BAUSCH & LOMB OPTICAL CO.

BALOPTICONS and Accessories

With a Foreword on Visual Education

ROCHESTER, N.Y., U.S.A.

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BAUSCH & LOMB BALOPTICONS

WITH *specific application of all types of still projection equipment to the needs of educational institutions, including a foreword on visual instruction*

BAUSCH & LOMB OPTICAL COMPANY
ROCHESTER, NEW YORK
NEW YORK CHICAGO SAN FRANCISCO BOSTON
FRANKFURT A/M LONDON

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Foreword

THE person interested in Visual Instruction methods and equipment will find in this catalog much information of interest and value regarding the various possibilities and applications of optical projection. It should be borne in mind that the trade name "Balopticon" stands for the highest type of "still" projection apparatus and that every part of the Balopticons (the trade name for Bausch & Lomb projectors) and accessories herein listed are manufactured and assembled in our own factory. For three-quarters of a century our scientists, technicians and artisans have co-operated in designing and building all types of optical instruments that are second to none in the world.

This Projection catalog has been prepared especially to bring before the attention of professors, instructors and purchasing agents of colleges, universities and technical schools; and before the supervisors, principals and teachers of elementary, high and preparatory schools, a simple explanation of the various modern processes attending Visual Instruction, together with a descriptive listing of the most complete and universally used line of "still" projection equipment in the world.

We do not wish to leave the impression with any one that we believe that classes cannot be successfully conducted without visual aids, but we do wish to impress upon the mind of every reader of this catalog the fact that teaching efficiency can be greatly increased by the judicious and common sense use of visual aids. Every prospective customer for visual instruction equipment should give serious consideration to the relative merits of the different types available. We are prepared to advise you and recommend without prejudice the equipment best suited for your particular needs. Such advice is free and will place you under no obligation to buy.

BAUSCH & LOMB OPTICAL CO.

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Our products are supplied also by dealers in the United States and Canada and by our agents in foreign countries.

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BAUSCH & LOMB OPTICAL CO.

Visual Instruction

THE general principles of what is today known as Visual Instruction were laid down by Comenius more than 300 years ago in his *Orbis Pictus*. A century later Pestalozzi advanced beyond the picture stage by insisting that teachers must either bring reality into school for study or take the children out to see reality.

In many Latin writings, between the years 1500 and 1700, we find the projection lantern described as "camera obscura" or a "lanterna magica." Who the inventor was seems to be unknown. Various forms of magic lanterns are shown in Zahn's Latin book, *Artificialis Teledioptricus*, published in the year 1685. These crude little devices are forerunners of the modern projection instruments. The principle difficulty in developing suitable projection apparatus at that time was the utter lack of efficient illuminants. Sunlight was about the only form that was sufficiently bright and that was impractical. Figures I and II, from Zahn's book, suggest that oil lamps were used, while Figure II shows how the "machines" were constructed to carry a series of slides.

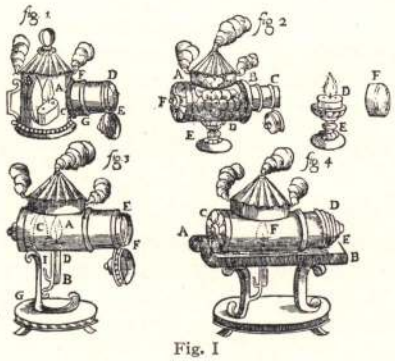


Fig. I

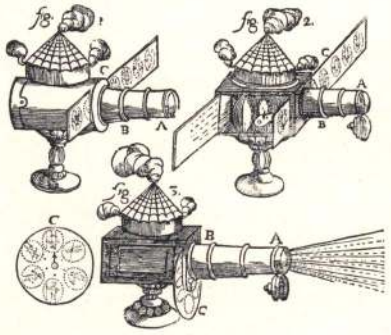


Fig. II

It was inevitable that when our modern scientific educators began the study of the most absorbing forms of the laws of the human mind their attention should be directed to the fact that the greater part of our information depends upon sight. Nor was it surprising that new departments of Visual Instruction should spring up in every state and large city in the country in order to develop and systematize this growing force in present-day education.

There is something strange and fantastic about the modern expression "*Visual Instruction.*" It seems to represent a weird searching for some Utopian device that will eliminate all text books, oral lectures and written examinations.

Visual Instruction is not a newfangled idea. It is as old as education itself. It is not the vague and disorganized system that it sometimes appears to be. It is, instead, a definite and orderly method of teaching that is *enriched* by the dominance of visual appeal of some form. It consists of more than merely showing pictures, passing specimens and reeling off films. It is a serious subject

that must be studied and thoroughly understood by the teacher and finally coordinated with the curriculum and the particular subject. Considerable time and effort must be expended by the teacher properly to organize and correlate the use of pictures so as to supplement and strengthen the lesson text.

Although the visual method has more chance to succeed than the language method in respect to a clear, interesting and precise presentation of the lesson because of its concreteness as compared with the abstract nature of language and words, it must be kept in mind that both methods should be interrelated and that failure to abide by this fundamental principle is almost certain to invite disaster.

"Still" Projection is, without a doubt, the form most suitable for class instruction by visual means. The attention of every member of the class or audience can be directed to the same thing at the same moment. Ample opportunity is provided for close observation and discussion. The subject matter on the screen can be made pertinent. The method is flexible—that is, any picture can be shown as long as desired, can be repeated whenever needed, or can be used in a greater variety of grades and classes than can other forms such as motion pictures.

The more one uses a Balopticon for projecting slides, opaque objects, "strip film" and microscope specimens, the more one discovers its potentialities as an aid to teaching. Although one may lay down definite rules for correlating visual methods with written and oral methods, and suggest hundreds of definite ways for using Balopticons in geography, science, history, English, psychology, musical appreciation, agriculture, domestic science, engineering and kindred subjects—they would be incomplete and unsatisfactory at the very best. Why? Because no two teachers have exactly similar problems, no two teachers work under conditions that are truly alike and no two pupils or groups of pupils can be handled in precisely the same manner. The problems that are encountered in a primary department are of no importance in a technical school nor can the difficulties met in an elementary class in geography be compared to those of a class in embryology in a medical school.

Every teacher must give careful consideration to the subject before him. He must decide how the introduction of visual aids will fit into his scheme of instruction. He must decide how much time can be allowed and what part of the period or periods will be best for using pictures. Will he use stereopticon or motion pictures once a week or will he use them with every lesson to strengthen and supplement the oral and printed work? Can the room be entirely or partially darkened? Is there a convenient electric socket? What is the voltage? What type and what make of projection lantern is most suitable and practical? Is there a convenient source of supply of slides, films or opaque objects?

Much valuable material, in the form of prepared lectures with accompanying films or slides, can be obtained from the State and Government Departments of Education, from large manufacturers such as the General Electric Company and the International Harvester Company and from other commercial, religious and educational institutions and organizations.

Libraries, museums, church boards, manufacturers and state universities are frequently in a position to furnish valuable visual material. Separate departments of Visual Instruction have been organized in many states and large cities and are co-operating splendidly with the schools under their jurisdiction.

The Bausch & Lomb Optical Company, because of its 75 years experience, its able corps of internationally known scientists and the fact that it manufactures and sells every known type of "still" projection apparatus that is practical for classroom use, is in the position of a consulting engineer and contractor of Projection Apparatus. It will be glad to advise you without obligation regarding the best type of equipment to use. It will be pleased to submit specifications and prices for your consideration.

A Recognized Necessity

A PROJECTION lantern is now a recognized necessity in every completely equipped school, college, church and lodge. Since there are models that project either lantern slides, strip film or opaque objects, or both, under "daylight" conditions as well as in darkened rooms, their range of usefulness is very wide.

Lantern Slide Projection

GLASS lantern slides, supplemented by a Bausch & Lomb BALOPTICON, doubtless approach nearest to the mark of perfection in artificial aids to education. Slides are easy to make, are inexpensive to rent, can be easily colored, give a clearer and larger image at a greater distance than any other medium and will not buckle or curl under extremes of heat. Slide projectors permit detailed study of an unlimited number of subjects—with the voice and personality of the teacher playing an important part. Bausch & Lomb Balopticons are durable, practical and have been tested by long and satisfactory use.

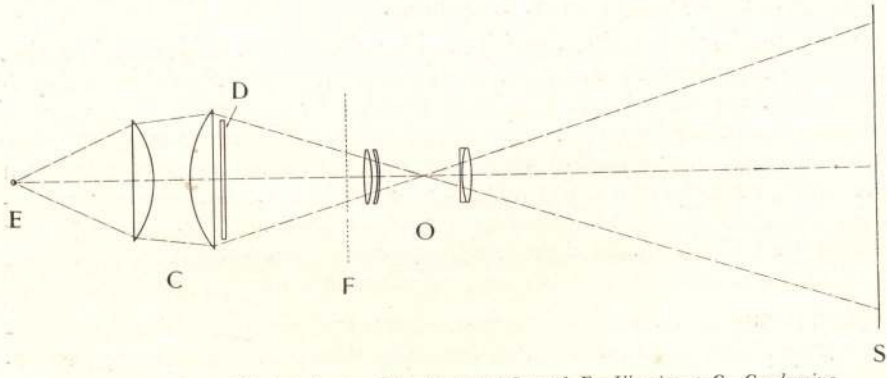


FIGURE III. *Path of Light in Lantern Slide Projection Legend: E—Illuminant; C—Condensing System; D—Slide; F—Diaphragm; O—Projection Lens (or objective); and S—Screen*

Opaque Object Projection

OPAQUE Projectors are excellent aids in presenting an extremely wide range of class work. The material that can be projected in this manner is almost unlimited and the cost is practically nothing. Almost any kind of opaque object —from book pages intact to geology fossils and from the mechanism of a watch to an outline map—can be shown by this method either in darkened rooms or under "daylight" conditions.

Inasmuch as a great deal of illumination is absorbed by the double reflection, a well darkened room is best suited for opaque projection. The pictures will not be as bright or sharp as with slide projection—other conditions being equal. Combined BALOPTICONS, for projecting slides as well as opaque objects—with instant interchange between the two methods of projection—are recommended for serious classroom work.

Film Projection

STEREOPTICON films are today supplementing—but are not supplanting—regular glass lantern slides. The printing of individual pictures on standard width motion picture film, offers an inexpensive and convenient method of using pictures for educational and entertainment purposes. Such film—known as "strip film," "film slides" and "still film"—can be purchased from a number of educational and commercial organizations at a price approximating the rental cost of glass slides. Either a special film projector or an attachment for use with standard BALOPTICONS is needed for this form of projection. Inasmuch as strip film has certain inherent disadvantages, we recommend the purchase of a combination instrument that will permit the projection of both glass and film slides.

It must further be remembered when purchasing a film projector that the same amount of detail and color that is possible with a 3¼ x 4-inch glass slide is not possible with the small ¾ x 1-inch area of the "strip film."

"Daylight" Projection

THERE is nothing magical about "daylight" projection. Any of our regular BALOPTICONS with short focus lenses located close enough to the screen to produce a small picture, with concentrated illumination, may be used with entire satisfaction in rooms that are moderately well lighted. A special translucent screen placed between the lantern and the class adds to the brilliancy of the picture and so aids in counteracting the effect of the light in the room. This form of projecting either slides, opaque objects or "strip film," eliminates the inconvenience of totally darkening the room and allows sufficient light for taking notes. On the other hand the size of the picture is greatly reduced and the value of the method is correspondingly decreased—its use of necessity being limited to comparatively small groups.

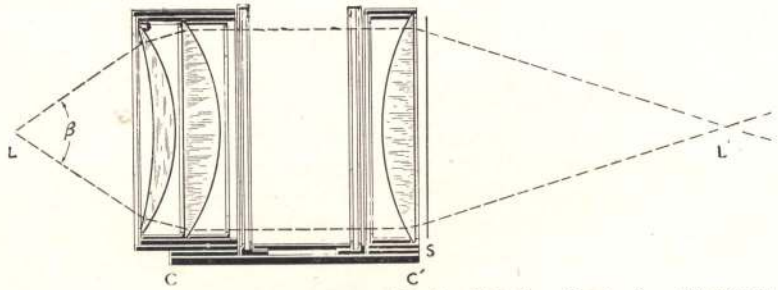
Specifications

CONSTRUCTION—The bodies of our Balopticons are of sheet metal, stamped out by special forming tools, making a light but durable instrument. They are finished with a dull, black lacquer thoroughly baked in a high temperature oven. This treatment produces a rich, black finish which is both serviceable and appropriate.

ILLUMINANTS—All of our Balopticons are regularly supplied with Mazda lamps—this type of illuminant being superior to other forms because of the following reasons: (1) entirely silent and automatic; (2) illumination is of excellent quality, ample and steady; (3) no rheostat required for 105 to 120-volt circuits, and (4) economical and simple to operate. The intensity of these lamps, as used on our instruments, ranges from 100 watts on the small film projector to 1,000 watts on the large CRM Balopticon—the most generally used lamp delivering 500 watts. All of the standard lamps (with the exception of the 1,000-watt bulb) are designed for use on any regular 110- 115-volt house lighting circuits. We can also supply bulbs of slightly higher or lower voltages to meet local requirements, also 6-volt, 24-watt bulbs for use with storage batteries, 30-volt, 14-ampere bulbs for use with Delco and other individual lighting systems, arc lamps that must be used with a rheostat, or acetylene burners when electricity is not available in any form.

PROJECTION LENS—Improvements of the optical parts of our Balopticons have been in keeping with the mechanical development, as evidenced by our series of Balo projection lenses. These superior objectives are of a type of construction, particularly well corrected for flatness of field and critical definition. They are fully described and listed on page 58.

THE CONDENSING LENSES play an important part in the optical system of any projection apparatus as they serve to collect the light rays from the light source. The amount of light transmitted is to a large extent dependent upon the purity of the glass used and the accuracy of the surfaces. The condensing systems supplied with the Balopticons are of a superior quality, and with one or two exceptions, consist of two plano convex lenses with the convex surfaces

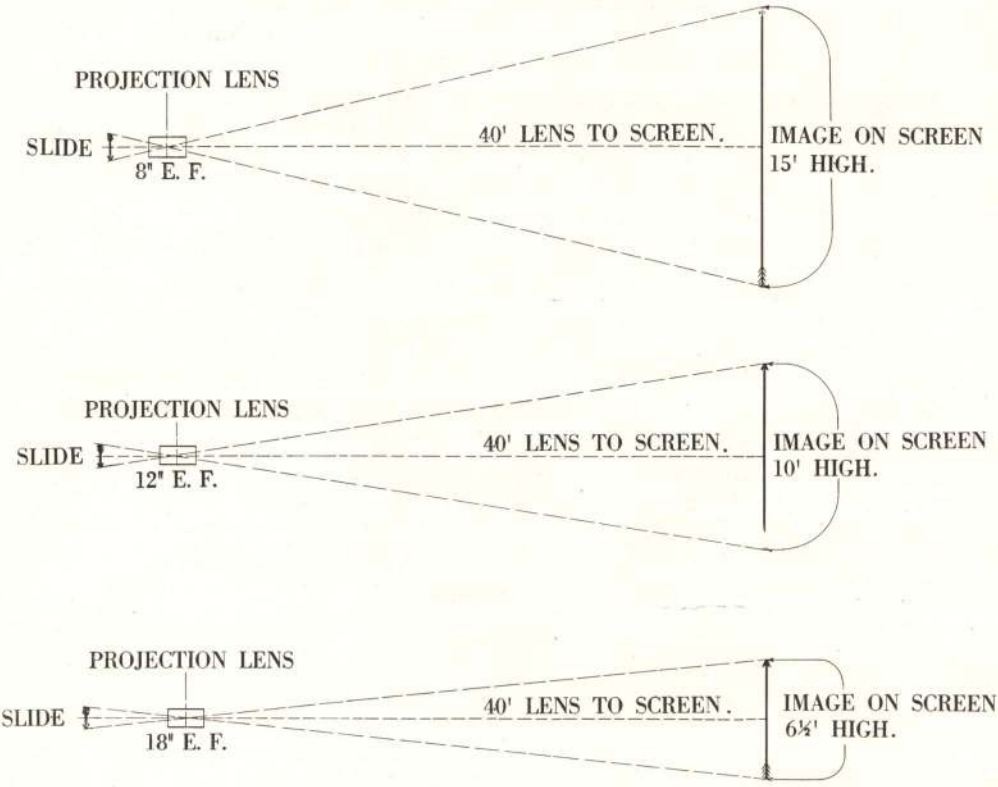


Sectional View of Triple Condensing System, Showing Light Rays Coming from Illuminant, L, Pendered Parallel by Rear Condensers, C, and Converged Again by Front Condenser, C", at L".

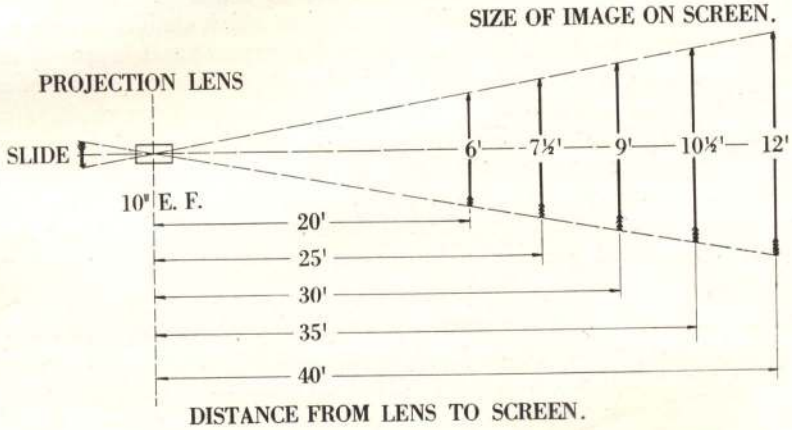
facing each other. If it should ever be necessary to order new condensers, be sure to specify whether the front or the rear unit is needed, giving the focus of the projection lens and the serial number of the lantern. (See page 59.)

Focal Lengths—In purchasing an apparatus for the projection of either lantern slides, strip film or opaque objects, a point which should receive careful attention, is the selection of an outfit with the correct focal length of lens to meet the specific requirements. The equivalent focal length (E. F.) of a lens or combination of lenses is the measure of the distance from the lens to the point at which all rays coming from a distant object would form a sharp image. The focal length is accordingly directly proportional to the distance from lens to screen—and inversely proportional to the size of the image on the screen—other factors being constant. This emphasizes the fact that the projection distance and the size of image on the screen must be determined definitely before ordering a Balopticon.

The three diagrams below illustrate how the size of the image on the screen is inversely proportional to the focal length of the projection lens—provided the distance between lens and screen remains constant.



The next diagram makes it clear how the size of the image on the screen varies directly with the distance from the lens—the greater the distance from lens to screen, the larger will be the image on the screen.



A point to bear in mind is that the intensity of illumination per unit of area, varies inversely as the square of the width of the picture; therefore, the smaller the picture the more brilliant it will be. On the other hand, the picture should be large enough, of course, to enable those seated at the farthest points from the screen to see all of its details without difficulty. A fairly safe rule to follow, according to Prof. S. H. Gage, of Cornell University, is to determine upon a picture equal in width to about 1/4 or 1/5 the distance from the screen to the farthest point at which it will be observed.

Projection Tables

PROJECTION TABLES—Having thus established the two determining factors mentioned, one has only to refer to that table on the following page, which covers the kind of projection and the size of projected area offered by his apparatus. The focal lengths here tabulated are those which are listed with any one of our different Balopticons for either lantern slides or opaque objects. The tables give in feet the length of one side (the longer in the case of lantern slides) of the screen image to be obtained at the different projection distances and with the different lens foci indicated.

Table 1: For Lantern Slides, 2¾ x 3-inch Mat Opening

Focus of Lens in Inches	Distance from Lantern to Screen											
	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.	45 ft.	50 ft.	60 ft.	70 ft.	80 ft.	90 ft.	100 ft.
6	7½	10	12½										
8	5½	7½	9½	11¼	13	15							
10	4½	6	7½	9	10½	12	13½						
12	.....	5	6¼	7½	8¾	10	11¼	12½	15				
15	.....	4	5	6	7	8	9	10	12	14	16½		
18	.....	.....	.....	5	5¾	6½	7½	8¼	10	11½	13	15	16½
20	.....	.....	.....	4¼	5	5¾	6½	7¼	8¾	10¼	11¾	13¼	14¾
22	.....	.....	.....	.....	.....	5¼	5¾	6½	8	9¼	10½	12	13¼
24	.....	.....	.....	.....	.....	4¾	5¼	6	7¼	8½	9¾	11	12¼

EXAMPLE—A 10-inch lens used at a distance of 40 feet from the screen will project an image measuring 12 feet on its longer side.

Table 2: For Opaque Objects, 6 x 6-inch Opening

Focus of Lens in Inches	Distance from Lantern to Screen						
	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.	45 ft.
15	5½	7½	9½	11½			
18	4½	6	8	9½	11		
25	.....	4½	5½	6½	8	9	10

Table 3: For Opaque Objects, 7 x 7-inch Opening

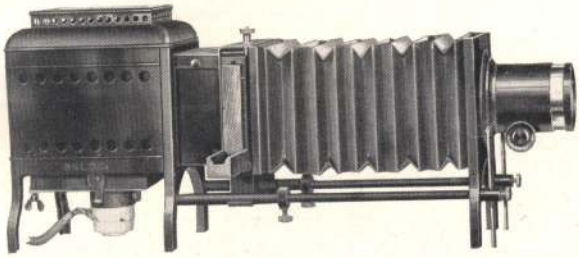
Focus of Lens in Inches	Distance from Lantern to Screen					
	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.
15	6¼	8¾	11¾			
18	5¼	7	9	11¾		
25	.....	5	6¼	7¾	9¼	10½

Table 4: For Strip Film, ¾ x 1-inch Opening

Focus of Lens in Inches	Distance from Lantern to Screen					
	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.
2½	5½	7¼	9	10¾	12½	
4	.....	4½	5½	6¾	7¾	9

Model B Balopticon

(With 500-watt Bulb)



THIS compact, efficient little instrument met with instant success when placed upon the market a few years ago and has increased in popularity constantly until it is now one of the most widely known for use with lantern slides only in schoolrooms, small auditoriums, Sunday school rooms, lodges and in the home. Because of its demonstrated merit it has been adopted as standard equipment by several large distributing organizations.

It is constructed throughout of a substantial weight of sheet metal, the various parts being made with special forming tools, thus providing lightness in weight, rigidity and durability. The finish is a smooth black.

The top of the lamp house is removable, permitting easy access to the illuminant, and the base is provided with an adjustable plate in which may be interchanged the 500-watt, 115-volt lamp, which is entirely silent and automatic, and can be attached to any ordinary lamp socket, the 6-volt lamp or the acetylene burner. The 30-volt, 14-ampere lamp, for use on Delco and other individual house lighting circuits, requires a special plate, as it must be provided with a mogul socket.

The condensing lenses, two plano-convex, fit in a square mounting connecting the lamp house and slide carrier support. Each condenser is held in place by a metal guide, while the hinged cover of the mounting has two clips, which hold the condenser in position and prevent their shaking about during shipment. The cover is fastened down by a small set screw.

Our well-known Balo projection lenses are supplied with this instrument. They are made in diameters of either 1⅝ or 2 $\frac{5}{16}$ inches. The former are made in 6, 8 and 10-inch focal lengths, mounted in either a spiral or rack and pinion focusing mount, and the latter in 10 to 24-inch focal lengths, in rack and pinion focusing mount. The larger diameter is particularly recommended, because of the fact that the illumination is increased approximately 40 per cent over that of the smaller diameter.

A very compact metal case, into which the lantern may be easily placed, is regularly supplied with each equipment, affording an easy means for carrying the instrument and a dust-proof cabinet in which to store it when not in use. This lantern may be equipped with a special short focus lens—thereby adapting it for use with a translucent screen. See page 20.

Specifications

BASE—Consists of front and rear metal standards, front standard fitted with elevating device, carried on sliding rods with extension for 15-inch lens.

LAMP HOUSE—Of sheet metal with special ventilation; measures 6½ x 7 x 5 inches with removable top; all illuminants interchangeable in one housing.

ILLUMINANT—Our 500-watt, 115-volt, gas-filled Mazda lamp, 30-volt, 14-ampere Mazda, 6-volt Mazda, or two-jet acetylene burner.

CONDENSING SYSTEM—Our regular double system, 4 5/16-inch diameter, in ventilated mount from which lenses can be easily removed for cleaning.

SLIDE CARRIER*—Our double carrier, No. 4430, with elevating device.

PROJECTION LENS—Balo lens of 1⅝- or 2 5/16-inch diameter.

DIMENSIONS—Length (ready for operation), 22 inches; height, 9¾ inches.

WEIGHT—Complete in case, 13-15 pounds, depending on equipment.

CASE—Sheet metal, 7¼ x 9½ x 15″, lacquered in black; with carrying strap.

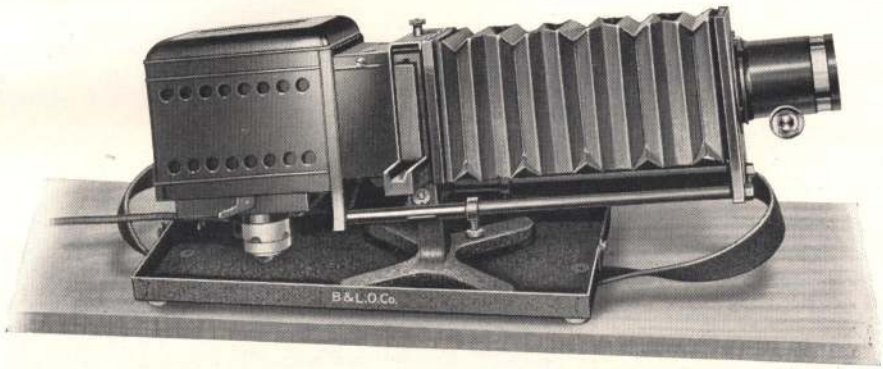
*The quick changing slide carrier, No. 4449, giving a dissolving effect, may be substituted for $3.00 extra.

Code Word	Cat. No.	Specifications	Price
Dhurj	**BM-6qs**	**Model B Balopticon** with 500-watt, 115-volt, Mazda lamp, with ground and polished glass reflector; 15 feet of extension cord with connecting plug and switch; double slide carrier; metal carrying case; and **1⅝″ diam., 6″ focus** projection lens in spiral focusing mount	**$54.00**
Dhusk	**BM- 8qs**	Same as BM-6qs, but with **8″ focus** lens	**54.00**
Dhutl	**BM-10qs**	Same as BM-6qs, but with **10″ focus** lens	**54.00**
Dhuvm	**BM- 6q**	Same as BM-6qs, but with **6″ focus** projection lens in rack and pinion focusing mount	**57.00**
Dhuxp	**BM- 8q**	Same as BM-6q, but with **8″ focus** lens	**57.00**
Daanf	**BM-10q**	Same as BM-6q, but with **10″ focus** lens	**57.00**
Daapg	**BM-10**	Same as BM-6q, but with **2 5/16″ diam., 10″ focus** projection lens in rack and pinion focusing mount	**65.00**
Daarh	**BM-12**	Same as BM-10, but with **12″ focus** lens	**65.00**
Daasj	**BM-15**	Same as BM-10, but with **15″ focus** lens	**65.00**
Diufz	**BM-18**	Same as BM-10, but with **18″ focus** lens, extra long bellow and extension rods	**65.00**
Diugb	**BM-20**	Same as BM-18, but with **20″ focus** lens	**65.00**
Diuhc	**BM-22**	Same as BM-18, but with **22″ focus** lens	**65.00**
Diujd	**BM-24**	Same as BM-18, but with **24″ focus** lens	**65.00**
Daavl	**BM-30V-12**	**Model B Balopticon** with 30-volt, 14-ampere (420-watt) Mazda lamp with ground and polished glass reflector; 4 feet of extension cord with switch and connector; double slide carrier; metal carrying case; **2 5/16″ diam., 12″ focus** projection lens	**70.00**
Daebt	**BM-6V-12**	**Model B Balopticon** with 6-volt Mazda lamp with silvered globe, supplementary condenser and six feet of extension cord fitted with switch and connecting lugs for attaching to storage battery; double slide carrier; metal carrying case; and **2 5/16″ diam., 12″ focus** projection lens	**63.00**
Daegy	**BG-12**	**Model B Balopticon** with two jet acetylene burner, fitted with ground and polished glass reflector and 6 feet of rubber hose; double slide carrier; metal carrying case; and **2 5/16″ diam., 12″ focus** lens	**62.00**
Dipot	**4486**	Extra 500-watt, 115-volt Mazda bulb ..... net	**3.30**

NOTE—The last three models—BM30V12, BM6V12 and BG12—can also be supplied with projection lenses of 10- and 15-inch focus, all of which are in rack and pinion focusing mount.

Model BT Balopticon

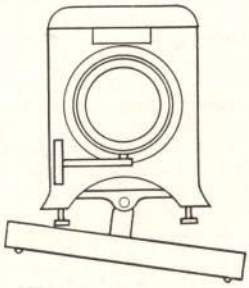
(*Portable*)



THIS Balopticon is unique among projection lanterns in that the general body construction, the optical system and the illuminating unit which are the same as those of Model B described on page 16, are supported by an inclination pedestal. The pedestal is secured to a broad base which forms the shallow or lower part of the carrying case. The cover proper is placed over the collapsed lantern and secured to the base forming a convenient carrying case and cover protection for the lantern.

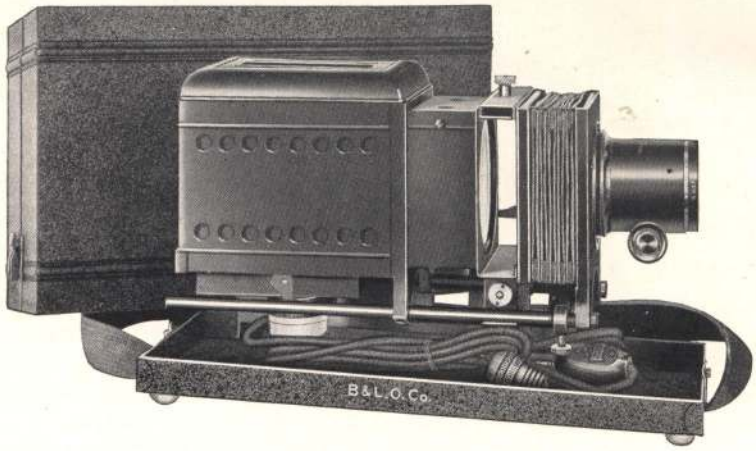
The light metal base, measuring 16½ x 7¼ inches, is fitted with rubber pads, which prevent scratching and slipping on polished and inclined surfaces. There are holes through these pads and the corners of the base through which screws may be put in case it is desired permanently to secure the Balopticon to a stand or table.

The pedestal type support is fitted with an inclination joint which makes it possible to tilt the lantern in two directions. The first joint allows the forward tilt of the lantern so as to govern the height of the picture on the screen. The second joint permits the lateral tilting so as to level the lantern when it is placed on an irregular surface. This makes it possible quickly to bring the



picture on the screen to the correct position, irrespective of the location of the lantern or the character of the surface on which it stands.

The specifications of the lantern proper are identical to those of Model B.



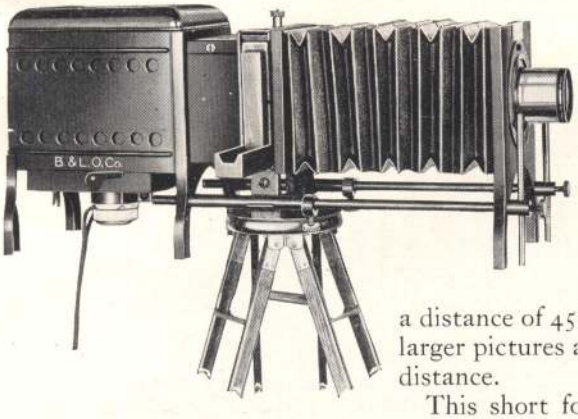
Prices

Code Word	Cat. No.	Specifications	Price
Difih	**BTM-10qs**	**Model BT Balopticon** with 500-watt, 115-volt, Mazda lamp, with ground and polished glass reflector; 15 feet of extension cord with connecting plug; double slide carrier; and $1\frac{5}{8}$" **diam., 10" focus** projection lens in spiral focusing mount...	**$57.00**
Digag	**BTM-10q**	**Model BT Balopticon** as described above but with projection lens in rack and pinion mount.....	**60.00**
Digeh	**BTM-10**	Same as above, but with $2\frac{5}{16}$" **diam., 10" focus** lens in rack and pinion mount.....	**68.00**
Digij	**BTM-12**	Same as above, but with **12" focus**.....	**68.00**
Digok	**BTM-15**	Same as above, but with **15" focus**.....	**68.00**
Dijun	**BTM-6V-10qs**	Same as BTM-10qs, but with 6-volt Mazda lamp with silvered bulb condenser instead of 500-watt Mazda lamp.....	**55.00**
Dikak	**BTM-6V-12**	Same as BTM-12, but with 6-volt Mazda lamp instead of 500-watt Mazda lamp.....	**66.00**
Dijek	**BTG-10**	**Model BT Balopticon** with two jet acetylene burner, fitted with ground and polished glass reflector and 6 feet of rubber hose; double slide carrier; and $2\frac{5}{16}$" **diam., 10" focus** projection lens in rack and pinion focusing mount.....	**65.00**
Dijil	**BTG-12**	Same as above, but with **12" focus** lens.....	**65.00**
Dijom	**BTG-15**	Same as above, but with **15" focus** lens.....	**65.00**
Dipot	**4486**	Extra 500-watt, 115-volt, Mazda bulb.....**net**	**3.30**

NOTE—The quick changing slide carrier, No. 4449, giving a dissolving effect, may be substituted for the regular carrier for $3.00 extra.

Model BM 4 qs Balopticon

(For "Daylight" Projection)



WHEN fitted with a tripod and a special short focus lens, Model B makes a particularly desirable equipment for use with a Trans-Lux screen for projection under "daylight" conditions. The lens is of 4-inch focus and produces pictures 30 inches wide at a distance of 45 inches from the screen, and larger pictures at a proportional increase of distance.

This short focus lens can be purchased separately and fitted to any of our Model B or Model C Balopticons already in use. The folding tripod with bracket for attaching to lantern may also be purchased separately and can be packed in the *regular carrying case.*

Code Word	Cat. No.	Specifications	Price
Dipis	**BM4qs**	**Model B Balopticon** with **4″ focus** lens for "daylight" projection; with case but without tripod	**$57.00**
Diomg	**4004-S**	Projection lens of **4″ focus** for attachment to any of our model B or model C Balopticons now in use.	**15.00**
Diper	**4447**	**Folding tripod** with bracket for attaching to model B	**15.00**

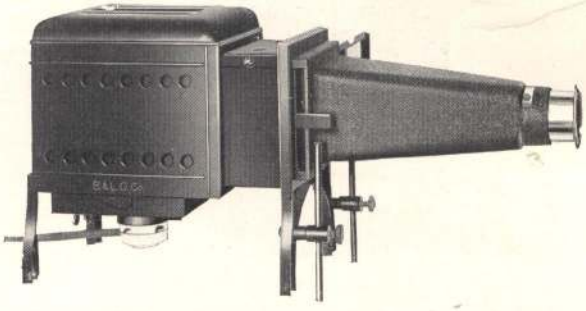
Trans-Lux Screens

THE Trans-Lux screen is very practical for "daylight" projection in comparatively small rooms. The material of which the screen is made is very tough and durable and will give excellent results for years. It can be removed from the frame, rolled up like a map, and be safely cleaned with alcohol. These screens are complete with frame and convenient tripod. They are made in four standard sizes.

Code Word	Cat. No.	Specifications	Price
Dikim	**No. 1**	24 x 30″ Screen with Frame and Tripod . . . . . net	**$25.00**
Dikon	**No. 2**	30 x 36″ Screen with Frame and Tripod . . . . . net	**35.00**
Dikup	**No. 3**	36 x 45″ Screen with Frame and Tripod . . . . . net	**52.50**
Dikel	**No. 4**	48 x 60″ Screen with Frame and Tripod . . . . . net	**80.00**

Model AB Balopticon

(Interchangeable with Film Attachment)



THE body of this Balopticon is the same as that supplied with the Unit Film Projector so that the Film attachment and the lantern slide attachment are easily interchangeable. This compact Balopticon is offered to those desiring an equipment for projecting lantern slides in conjunction with a translucent screen or for use in a classroom or other comparatively small room where the projecting distance would not exceed more than 20 or 25 feet.

It is offered with two different focal lengths of lenses, one of 4-inch focus particularly computed for use with a translucent screen and producing a 30-inch picture (based on a 3-inch mat opening on the lantern slide) at a distance of 45 inches from the lens. The other lens is 10-inch focus making a 6-foot picture at 20 feet and 7½-foot at 25 feet. This lens is of 1⅝-inch diameter.

To those requiring lenses of longer focus and larger diameter, we suggest the regular Model B Balopticon which has an adjustable front standard carrying the projection lens on which lenses of different focal lengths may be used.

Film attachments for use with the lamp house of Model AB, are described and listed on pages 46-48.

Code Word	Cat. No.	Specifications	Price
Diozt	**ABM-10**	**Balopticon** with elevating rods on front legs; 400 watt, 110-volt lamp with reflector; 10 feet of connecting cord with switch and plug; 2-110 mm diam. condensing lenses; **10″ focus, 1⅝″ diam.** projecting lens supported by cone adapter and double metal slide carrier. (No carrying Case) . . .	**$45.00**
Dipap	**ABM-4**	**Balopticon** same as above, but with **4″ focus, 1 5/16″ free diam.** lens for use with translucent screen . . .	**45.00**
Diper	**4447**	**Tripod** for use with above	**15.00**
Dikim	**No. 1**	**Trans-Lux Screen,** 2 x 2½ ft . . . . . **net**	**25.00**
Dikon	**No. 2**	**Trans-Lux Screen,** 2½ x 3 ft . . . . . **net**	**35.00**
Dikup	**No. 3**	**Trans-Lux Screen,** 3 x 3¾ ft . . . . . **net**	**52.50**
Depoh	**4479**	Extra 400-watt, 110-volt, Mazda bulb . . . . . **net**	**3.40**

Model BB Dissolving Balopticon

(With two 500-watt Lamps)

IT is an accepted fact that the most pleasing way of projecting lantern slides is with a dissolving view lantern, by means of which the "racing" of the slide across the screen or a short interval of darkness between slides is entirely eliminated. This not only relieves eyestrain, but the dissolving of one view into the succeeding one produces a very pleasing effect.

A number of devices have been produced for use on a single lantern for which claims of producing dissolving views have been made, but they either show movement of the slide upon the screen or produce momentary darkness. True dissolving effects can only be produced by the use of two lanterns fitted with a device by means of which the pictures are projected alternately by one lantern and then the other.

Believing that this feature in a projecting lantern makes a strong appeal, we have designed the *Model BB Balopticon*, which is very compact and extremely simple to operate. This is truly *two lanterns in one*, as there are two light sources and two complete optical systems side by side in the one lantern body. This construction makes possible the *maximum compactness* and eliminates the setting up and adjusting of the average double dissolving lantern. No more adjustments are required than in the ordinary lantern, except the adjustment of the lenses by means of sliding plates on the front standard, so that the pictures are superimposed on the screen. By means of the construction employed the complete equipment can be put in one carrying case—a decided advantage to traveling lecturers or to those who cannot leave their apparatus permanently installed.

Two 500-watt Mazda lamps are used, but due to the particular way in which they are connected up, there are never more than 500 watts drawn at one time, so that the apparatus requires only one lead of wire and can be connected to any regular lighting socket. In addition to this advantage the cutting off of the lamp when not required increases the length of service and materially reduces the heat.

Specifications

BASE—Consists of front standard supporting projecting lenses, and sliding rods connecting with lamp house.

LAMP HOUSE—Of sheet metal, specially ventilated, with removable top for access to lamps; measures 7 x 9⅝ x 10¼ inches.

ILLUMINANT—Two 500-watt gas-filled Mazda lamps with glass reflectors connected with dissolving rheostat.

CONDENSING SYSTEM—Two regular double systems, 4 $\frac{5}{16}$-inch diameter, in special ventilated mount from which lenses can be easily removed for cleaning.

SLIDE CARRIER—Permanently fastened in front of condensing system, with grooves for either American or English size of slide.

PROJECTION LENS—Two of our regular *Balo* lenses, either 1⅝-inch diameter or 2 $\frac{5}{16}$-inch diameter, as desired.

DIMENSIONS—Length (ready for projection with 15-inch focus lenses) over all, 26½ inches.

WEIGHT—Complete in case with 2 $\frac{5}{16}$-inch diameter lenses, 30 pounds.

CASE—Sheet metal, 15½ x 10½ x 10½ inches, lacquered in black; with hinged side door, two catches and carrying strap.

Code Word	Cat. No.	Specifications	Price
Daigz	**BBM-10q**	**Model BB Dissolving Balopticon** with two 500-watt, 115-volt Mazda lamps with ground and polished glass reflectors; two **1⅝" diam., 10" focus** projection lenses in rack and pinion mounts; dissolving rheostat with 15 feet of extension cord, switch and connecting plug; metal carrying case	**$134.00**
Daihb	**BBM-10**	Same as above, but with **2 $\frac{5}{16}$" diam., 10" focus** projection lenses	**150.00**
Daikd	**BBM-12**	Same as above, but with **12" focus** projection lenses	**150.00**
Dailf	**BBM-15**	Same as above, but with **15" focus** projection lenses	**150.00**
Daify	**BBM-18**	Same as above, but with **18" focus** projection lenses	**156.00**
Dipot	**4486**	Extra 500-watt, 115-volt, Mazda bulb	**net 3.30**

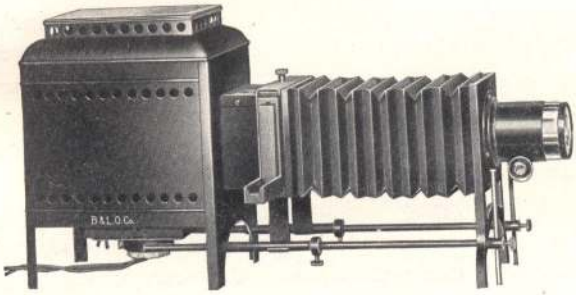
The *Model BB Balopticon* can be used for stereoscopic projection as well as regular projection purposes. Two slides, made from stereoscopic negatives, are used, the two pictures being superimposed on the screen. A blue-green glass filter is placed over one lens and a red glass filter, the complement of the blue-green, over the other lens, while the screen is viewed through spectacles having red and green lenses corresponding to the filters over the lenses.

True stereoscopic effect is produced in this manner, objects appearing in correct relation to each other. This apparatus will be found of particular value in the departments of Biology, Anatomy and the like, where the third dimension is of such vital importance. When using the instrument for this purpose, the dissolving resistance must be eliminated, as both lamps have to be operated at full brilliancy, which is accomplished by means of an extra extension cord and heavier wiring.

Code Word	Cat. No.	Specifications	Price
Daimg	**4262**	**Pair of Complementary Glass Filters,** one red and one green, in mountings to fit on front of projection lens	**$7.50**
Dainh	**4264**	**Pair of Spectacles** with red and green lenses	**2.25**
Daipj	**4266**	**Extension Cord**	**1.75**

Model BC Balopticon

(With 600-watt Mazda Lamp)



THIS Balopticon follows the general lines of Model B, but is enough larger to accommodate the 600-watt tubular-shaped Mazda lamp—the most powerful illuminant allowed on an ordinary lighting circuit by the Board of Underwriters. It is an ideal instrument for classrooms and moderate sized auditoriums where the regular 110-volt lighting system only is available.

With the 600-watt lamp, the only illuminant regularly supplied for this model, ample illumination is provided for screen images up to 12 feet in width. The highly corrected Balo projection lenses are furnished in either 10, 12, 15, 18, 20, 22 or 24-inch focal lengths, depending upon the projection distance and the size of the picture required.

A spherical glass reflector with a mounting by means of which it is attached directly to the lamp bulb is supplied, thereby assuring the user of the greatest efficiency from the Mazda lamp.

The specifications, except as stated above are similar to those of Model B. The extended length of the lantern is 26 inches; the height is 13 inches and the weight, without case, is 14½ pounds.

Code Word	Cat. No.	Specifications	Price
Daesk	**BCM-10**	**Model BC Balopticon** with 600-watt, 110-volt, tubular-shaped Mazda lamp, with ground and polished glass reflector; 15 feet of extension cord with connecting plug and switch; double slide carrier; metal carrying case; and $2\frac{5}{16}$" **diam., 10" focus** projection lens in rack and pinion focusing mount	**$75.00**
Daetl	**BCM-12**	Same as BCM-10, but with **12" focus** lens	**75.00**
Daevm	**BCM-15**	Same as BCM-10, but with **15" focus** lens	**75.00**
Daexp	**BCM-18**	Same as BCM-10, but with **18" focus** lens	**77.00**
Diset	**BCM-20**	Same as BCM-10, but with **20" focus** lens, extra long bellows and extension rods	**77.00**
Disiv	**BCM-22**	Same as BCM-20, but with **22" focus** lens	**77.00**
Disow	**BCM-24**	Same as BCM-20, but with **24" focus** lens	**77.00**
Deseh	**4536**	Extra 600-watt, 110-volt, Mazda bulb . . . . . **net**	**5.20**

NOTE—The quick changing slide carrier, No. 4449, giving a dissolving effect, may be substituted for the regular carrier for $3.00 extra.

Model A Balopticon

(Portable)

IN simplicity, compactness and portability, this little instrument is unexcelled for lantern slide projection in classrooms, small auditoriums and in the home. While it is a truly portable lantern, none of the optical and mechanical features so essential to best projection results have been sacrificed.

Essentially this instrument is constructed along the lines of our Model B Balopticon, which has long occupied a premier position among small lantern slide projectors. It has the same lamp housing, lamp, reflector and optical parts, but the carrying case is an integral part of the equipment, serving as a supporting base and bellows when the lantern is in operation.

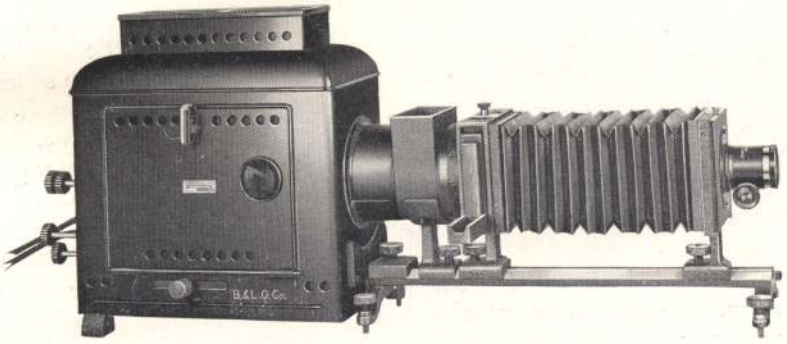
The Balo projection lens, of 12-inch focus and 1⅝ or 2 $\frac{5}{16}$-inch diameter, is fastened to a plate behind a spring door which opens in the front of the case. It is adjustable by means of a spiral focusing mount. On the rear of the case is a door which lets down to a horizontal position, allowing the lamp house easily to slide in and out of the case on metal tracks, a stop being provided to give it the correct location for use with the 12-inch focus lens.

The case, when closed, measures 13½ inches long, 11 inches high and 6½ inches wide. It is provided with a strong handle and because of the even balance of the outfit is extremely easy to carry.

Code Word	Cat. No.	Specifications	Price
Daabs	**AM-12q**	**Model A Portable Balopticon** with 115-volt, 500-watt Mazda lamp with ground and polished glass reflector; 15 feet of extension cord and connecting plug; **1⅝" diam., 12" focus** projection lens; 4 $\frac{5}{16}$" condensers; double slide carrier	**$70.00**
Daact	**AM-12**	Same, but with **2 $\frac{5}{16}$" diam., 12" focus** lens	**75.00**
Daadv	**AM-6V-12q**	Same as AM-12q, but with 6-volt, 24-watt Mazda lamp for use with storage battery	**67.00**
Daafw	**AM-6V-12**	Same, but with **2 $\frac{5}{16}$" diam., 12" focus** lens	**72.00**
Daahy	**AM-30V-12q**	**Model A Portable Balopticon,** as described, but with 30-volt, 14-ampere Mazda lamp for use on individual lighting circuits, **1⅝" diam., 12" focus** lens	**75.00**
Daajz	**AM-30V-12**	Same, but with **2 $\frac{5}{16}$" diam., 12" focus** lens	**80.00**
Daakb	**AG-12q**	**Model A Portable Balopticon** as described, but with acetylene burner, **1⅝" diam., 12" focus** lens	**67.00**
Daalc	**AG-12**	Same, but with **2 $\frac{5}{16}$" diam., 12" focus** lens	**72.00**
Dipot	**4486**	Extra 500-watt, 115-volt, Mazda bulb **net**	**3.30**
Dirov	**4310**	**Supplementary lens** in mounting to be attached to the back of the regular 12" lens to increase the focus to **15"** for longer projection distances **extra**	**7.50**

Model D Balopticon

(With Hand-Feed Arc Lamp)



THE *Model D Balopticon*, which is constructed on what is known as the optical bed type of construction, is an ideal instrument for use by science teachers or in any laboratory, as it is made to accommodate many accessories used in such work. An accurately milled bed of lathe type is supported by feet at either end, those at the front being provided with leveling screws. To this optical bed the lamp house containing the arc and the standards supporting the different accessories are attached by means of clamping blocks. These standards may be adjusted along the bed to any position, and the act of clamping fixes them rigidly in optical alignment.

The *triple condensing system* and *water cooling cell*, with which the Model D is equipped, make it a perfect outfit for lantern slide projection.

The large, light-tight, housing meets the most rigid requirements of the Boards of Underwriters, and is particularly recommended where a part of the audience is seated back of the lantern and for use with arcs of high amperage.

Specifications

BASE—Consists of cast iron supports of 6-inch spread, front and back, supporting optical bed 2¾ inches in height; front support provided with elevating screws.

OPTICAL BED—Of lathe type, carefully planed, accommodating supports for different parts which may be adjusted as desired and rigidly clamped; measures 19½ inches in length and accommodates projection lenses up to 15-inch focus; it is furnished with 25-inch optical bed accommodating projection lenses from 18 to 22-inch focus.

LAMP HOUSE—Sheet metal, fitted with our special, patent, light-tight ventilator and provided with two observation windows; measures 13½ inches long, 15 inches high and 7½ inches wide, light-tight, constructed of double walls with air space between and provided with large light-tight door on the side—*conforms to the most rigorous requirements of Boards of Underwriters.*

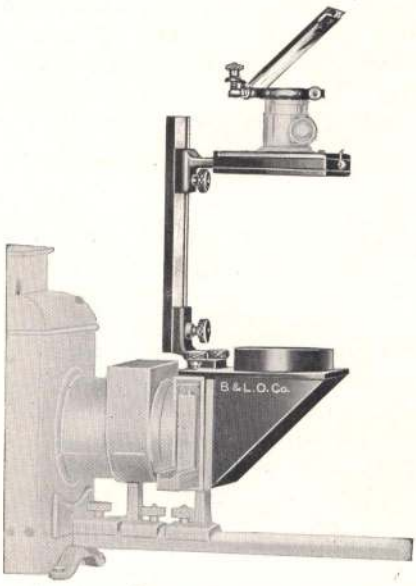
ILLUMINANT—Hand-feed arc lamp for direct or alternating current.
CONDENSING SYSTEM—Our triple system in patent, ventilated mount; provided with water cooling cell; diameter, 4½ inches.
*SLIDE CARRIER—Our double carrier, No. 4430, with elevating device.
PROJECTION LENS—Our *Balo* lens with rack and pinion adjustment.
DIMENSIONS—Length, extended, 32 inches without lens; height, 15 inches.

Code Word	Cat. No.	Specifications	Price
Daynb	**DAL-10q**	**Model D Balopticon** with optical bed 19½″ long; **1⅝″ diam., 10″ focus** projection lens in rack and pinion focusing mount; hand-feed arc lamp; without carrying case	**$137.00**
Daysp	**DAL-10**	Same as above, but with **2 5/16″ diam., 10″ focus** lens	**145.00**
Debap	**DAL-12**	Same as above, but with **12″ focus** lens	**145.00**
Deber	**DAL-15**	Same as above, but with **15″ focus** lens	**145.00**
Debis	**DAL-18**	Same as above, but with **18″ focus** lens and 25″ optical bed	**147.50**
		Extra carbons (specify AC or DC when ordering), each	**.04**

*The quick-changing slide carrier, *No. 4449*, giving a dissolving effect, may be substituted for *$3.00* extra.

If any of the above Balopticons is desired with a 1,000-watt Mazda lamp in place of the hand-feed arc lamp, deduct *$6.00* from the above prices.

Vertical Attachments



Attachment No. 4290 for Model D Balopticon

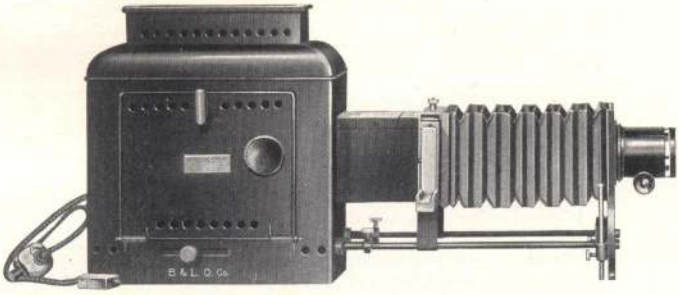
For the projection of *transparent objects* which must be maintained in the *horizontal position* two attachments are available. No. 4290 is attached to the slide carrier support by removing the bellows and substituting in the sliding ways the prism-shaped metal box which contains a reflecting mirror. No. 4136 is far more convenient and affords a much wider range of usefulness because one can change instantly from projection with this attachment to the use of lantern slides, and vice versa.

The instrument has a dark chamber supported by two standards which fit the optical bed and are provided with clamps. Within this dark chamber is the reflecting mirror, controlled by a conveniently placed exterior lever. When the mirror drops to the 45° angle, it reflects the light up through the vertical attachment.

Code Word	Cat. No.	Specifications	Price
Dhexl	**4290**	**Vertical Attachment,** as described and illustrated	**$30.00**
Dheym	**4136**	**Vertical Attachment,** including separate projection lens and condenser to permit instant interchange with lantern slide projection, as described	**75.00**

Model CL Balopticon

(With 1,000-watt Bulb)



THE Model CL Balopticon, which has been especially designed for lantern slide projection at relatively long distances where large size pictures are required, is an ideal instrument for use in auditoriums or other large rooms where the lantern must necessarily be so placed with reference to the screen. It is fitted with a light-tight lamp house with hinged side door, which complies in every way with the Underwriters' requirements for a housing for high power arc lamps. Either a 90° hand-feed arc lamp, with a maximum of 35 amperes of current, or a 1,000-watt, 110-volt Mazda lamp, can be used. Ample illumination for pictures up to 12 feet in width is given by the lamp, but for larger size pictures the arc lamp with rheostat is recommended.

Ample illumination for pictures up to 12 feet in width is given by the 1000-watt, 110-volt lamp, but for larger size pictures the arc lamp or the low volt Mazda with resistance is recommended.

This apparatus is very substantially constructed throughout; the condensers are mounted in a square frame, which connects the slide carrier support with the lamp house, thus making this part very rigid. Space is provided between the condensers for air cooling. A water cell can be inserted if desired, and is recommended if the slides are to remain in place for an unusually long period of time. Each condenser is held in place by a metal guide in the frame, while the hinged cover of the mounting has clips to hold the condensers in position and prevent their shaking about during shipment. The cover is fastened down by a small set screw.

A carrying case is not regularly supplied with this equipment, but one can be had as an extra.

Two of these units can be connected, one above the other, as shown on page 30, by means of special connecting parts, and the lenses fitted with an iris diaphragm dissolver or a dissolving switch, making an ideal dissolving view equipment. The two units can be disconnected easily and used alone.

Specifications

BASE—Consists of metal feet on bottom of lamp house and front metal standard of one piece with front board, the whole carried on sliding rods; front standard provided with elevating device for tilting instrument as desired.

LAMP HOUSE—Measures 13¼ inches long, 14 inches high and 7½ inches wide, light-tight, constructed of double walls with air space between and provided with light-tight door—*conforms to requirements of Boards of Underwriters.*

ILLUMINANT—Hand-feed arc lamp for direct or alternating current with adapters for small carbons, 1,000-watt, 110-volt, gas-filled Mazda lamp, 30-volt, 30-ampere (900-watt) Mazda.

CONDENSING SYSTEM—Our regular double system in ventilated mount; diameter, 4½ inches. Space for water cooling cell.

*SLIDE CARRIER—Our double carrier, No. 4430, with elevating device.

BELLOWS—Mounted on metal frames which slide in metal ways, with extension sufficient for 18-inch focus lens.

PROJECTION—Our *Balo* lens with rack and pinion adjustment.

DIMENSIONS—Length, extended, 33 inches without lens; height, 14 inches.

WEIGHT—Without case, 25 pounds.

With Arc Lamp

Code Word	Cat. No.	Specifications	Price
Daovp	**CLA-8q**	**Model CL Balopticon** with hand-feed arc lamp; double slide carrier; **1⅝″ diam., 8″ focus** projection lens in rack and pinion focusing mount	**$89.50**
Daoxs	**CLA-10q**	Same as above, but with **10″ focus** lens	**89.50**
Daozv	**CLA-10**	Same as above, but with **2 5/16″ diam., 10″ focus** lens	**97.50**
Daucy	**CLA-12**	Same as CLA-10, but with **12″ focus** lens	**97.50**
Daudz	**CLA-15**	Same as CLA-10, but with **15″ focus** lens	**97.50**
Daufb	**CLA-18**	Same as CLA-10, but with **18″ focus** lens	**99.50**
Diurl	**CLA-20**	Same as CLA-10, but with **20″ focus** lens	**99.50**
Diusm	**CLA-22**	Same as CLA-10, but with **22″ focus** lens	**99.50**
Diutn	**CLA-24**	Same as CLA-10, but with **24″ focus** lens	**99.50**
Daurm	**4376**	**Carrying Case** of lacquered metal	**9.00**
Dausn	**4374**	**Water Cell,** for cooling	**12.00**

NOTE—For transformers or rheostat for these lamps, see page 61.

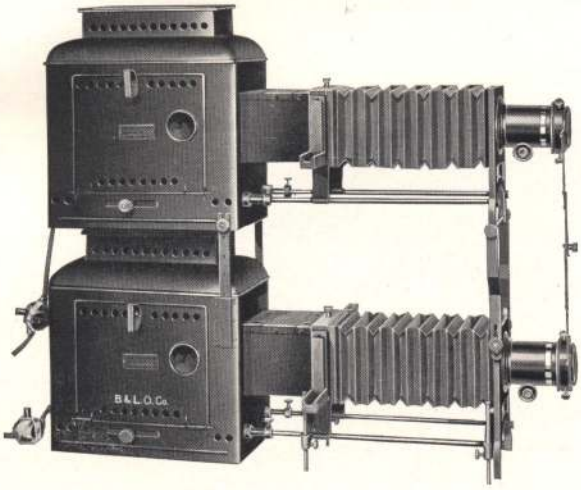
With Mazda Lamp

Code Word	Cat. No.	Specifications	Price
Daugc	**CLM-10**	**Model CL Balopticon** with 1,000-watt, 110-volt, Mazda lamp with ground and polished glass reflector and **2 5/16″ diam., 10″ focus** projection lens	**$95.00**
Dauhd	**CLM-12**	Same as CLM-10, but with **12″ focus** lens	**95.00**
Daujf	**CLM-15**	Same as CLM-10, but with **15″ focus** lens	**95.00**
Daukg	**CLM-18**	Same as CLM-10, but with **18″ focus** lens	**97.00**
Diuvp	**CLM-20**	Same as CLM-10, but with **20″ focus** lens	**97.00**
Diuxs	**CLM-22**	Same as CLM-10, but with **22″ focus** lens	**97.00**
Diuzv	**CLM-24**	Same as CLM-10, but with **24″ focus** lens	**97.00**
Deraf	**4478**	Extra 1,000-watt, 110-volt, Mazda bulb	**net 7.40**

NOTE—Lenses of longer focus than specified above can be supplied for projection at unusually long distances. Supplementary bellows and an extra standard are furnished with the long focus for $7.50 extra.

Double CL Balopticon

(Dissolving View Equipment)



TWO of the CL Balopticons can be connected, one above the other, as shown in the illustration, by means of special connecting parts. An iris diaphragm dissolver or dissolving switch is fitted to the projection lenses, making the double outfit an ideal dissolving view equipment. The two units can be easily and quickly disconnected and used separately.

When ordering a double dissolving outfit, prefix the catalog number with the word "Double." The price of the double outfit is twice that of the single instrument, plus *$5.00* for the necessary connecting parts and plus the cost of the dissolving apparatus desired. Unless otherwise specified, the iris dissolver will be supplied.

For example: the cost of *Double CLM-15* would be determined as follows:

2 Model CLM-15 Balopticons @ $95.00	$190.00
Special Connecting Parts	5.00
Iris Dissolver No. 4490	30.00
Total	225.00

Code Word	Cat. No.	Specifications	Price
Dautp	**4490**	**Iris Dissolver**	**$30.00**
Dauvr	**4487**	**Dissolving Switch** with connecting cord	**9.50**

Model AU Balopticon

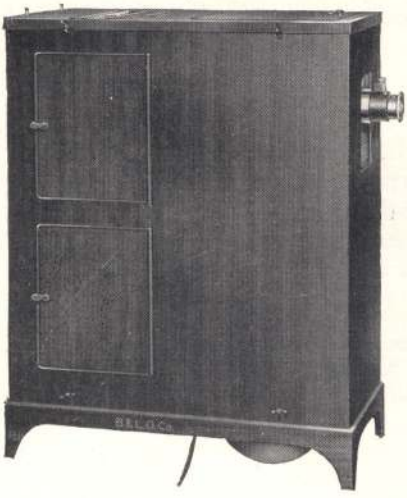
(*Automatic*)

THE Bausch & Lomb *Automatic Balopticon* is an instrument for continuously projecting pictures from standard size lantern slides upon a ground glass screen that is 16½ inches high by 18 inches wide. The slides are automatically changed every few seconds and the series repeated over and over again as long as the electric current is turned on.

Automatic Balopticons meet a need that is not filled by any other type of news, advertising or educational medium. They are widely used for the purpose of acquainting the public with the service of an organization, for interesting and holding the attention of individuals or groups and for furthering the sales of ideas, services and merchandise. With the display cabinets in place, they can be used in well lighted rooms.

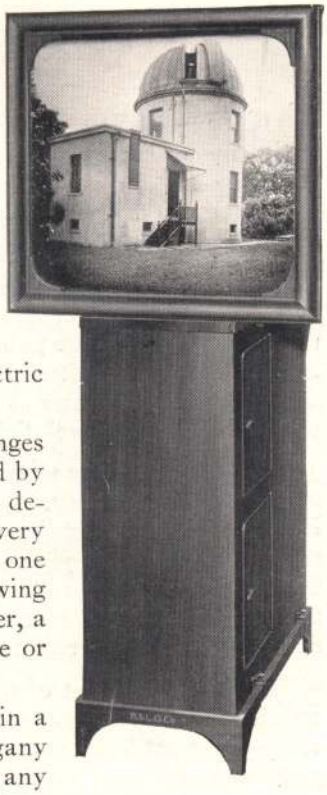
They can be used in school assemblies, reading rooms and corridors continuously to show series of slides on such subjects as "Better English," "National Parks," "Safety First," and "Better Health." Interesting lectures of this nature can be obtained from the Departments of Education of many states, from university extension bureaus, from manufacturers and from slide exchanges and manufacturers at very nominal rental rates. Slides can also be easily and inexpensively made to meet local conditions.

The display cabinet of the Automatic Balopticon can be easily removed, thus converting it into a machine for projecting on screens in classrooms, auditoriums, for outdoor advertising, etc. The regularly supplied 500-watt bulb is ample under ordinary circumstances, but when it is desired to project at unusually long distances or when the room and screen cannot be well darkened a powerful 1,000-watt Mazda lamp is recommended.



For projection distances greater than 40 feet a special long distance projection lens should be used. The size of the picture on the screen should not exceed fifteen feet, regardless of the projection distances. Smaller pictures are naturally more brilliant and can be shown in rooms that are not totally darkened.

From the mechanical viewpoint, Automatic Balopticons are simple, efficient and durable. They are made to tell a story hour after hour, day after day. They are practically trouble-proof, being constructed as simply and conveniently as possible. After being set at the desired speed and with an even number of slides, between 18 and 70 in place, no adjustments of any



kind are necessary. No mechanical or electrical knowledge is required to arrange the slides and start the machine, or to keep it in daily operation. After the slides have been placed in the desired sequence in the special holders and the cord plugged into any 110-115-volt light circuit—either direct or alternating current—everything is in readiness for operation. One turn of the three-way switch lights the bulb—a 500-watt Mazda lamp. A second turn starts the electric motor that governs the movement of the slides as they pass in succession into the optical axis of the Balopticon. A third turn cuts off the electric current from both the lamp and the motor.

The time interval between changes normally ranges from 9 to 11 seconds. The speed may be regulated by an adjustable rheostat and can be increased or decreased so as to change the slides as frequently as every 6 seconds or as slowly as every 12 seconds. As one slide moves out of the projection field the following one enters gradually, giving, by means of a shutter, a pleasing dissolving effect with no disturbing glare or dark lines.

The *Automatic Balopticon* is entirely enclosed in a sheet metal casing, finished in a rich mahogany lacquer, making it an attractive fixture to use in any display.

It may be desirable to remove the display cabinet and to project the pictures upon a screen in the front of a classroom or auditorium. The base equipment, when fitted with a projection lens of the proper focus, can then be used to project slides like a regular Balopticon.

It can be fitted with a distant control attachment which enables the lecturer or teacher to stand near the screen and change the pictures at whatever interval is desired. By pressing the switch, the motor is shut-off and the image allowed to remain on the screen for an indefinite length of time. A second press of the switch starts the motor again and the slides will continue to change automatically.

Suggested Uses

Automobile Showrooms	Political Meetings	Hotel Lobbies
Convention Booths	School Halls	Store Windows
Theater Foyers	Chambers of Commerce	Bank Lobbies
Restaurants	Waiting Rooms of R. R. Stations	

Specifications

SIZE OF BALOPTICON (with cabinet)—Greatest height, 49¾ inches; greatest width, 21 inches; greatest depth, 30¾ inches; base, 11½ x 23½ inches.

SIZE OF BALOPTICON (without cabinet)—Greatest height, 28½ inches; Greatest width, 11½ inches; greatest depth, 23½ inches.

SIZE OF PICTURE—With display cabinet—On ground glass screen, 16½ x 18 inches. Without display cabinet—Depends on distance of lantern from screen.

NUMBER OF SLIDES—Minimum, number 18; maximum, number 70. Use any even number between 18 and 70, as 24, 46, etc.

Handles either U. S. or British standard Lantern Slides.

RATE OF CHANGE OF SLIDES—Adjustable Rheostat permits any speed from 6 to 12 seconds between pictures. Recommended average speed—10 seconds.

MOTOR—Universal type for 110-volts, A. C. or D. C. Special resistance needed for 220-volts.

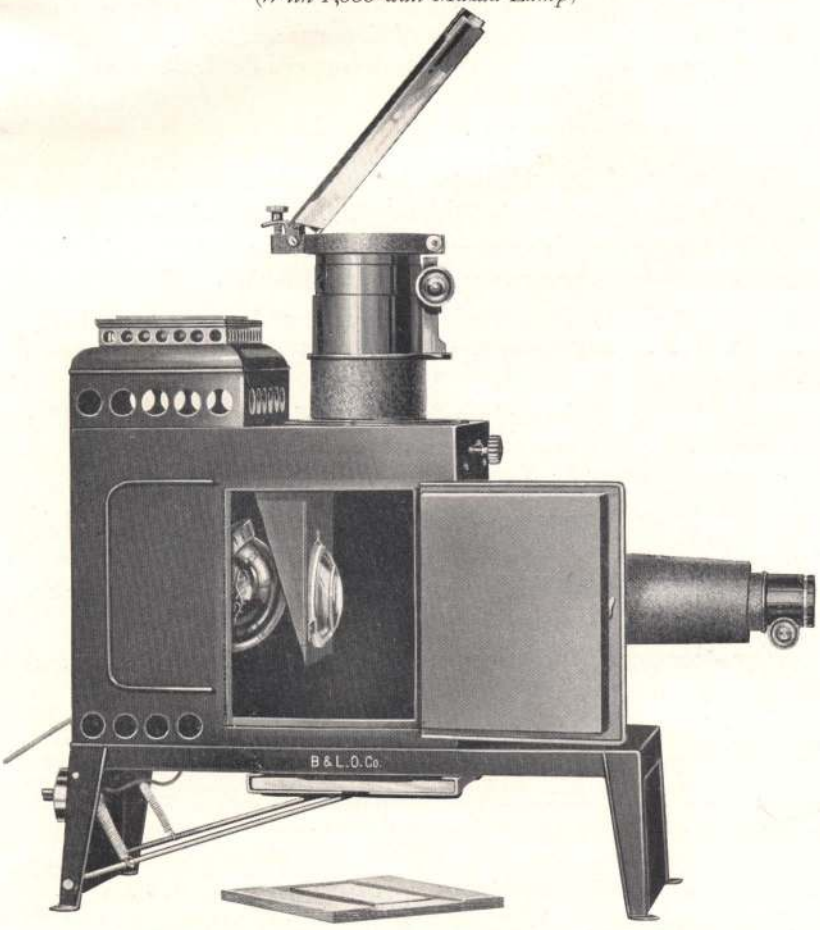
ILLUMINANT—500-watt Mazda lamp regularly supplied. 1,000-watt lamp interchangeable for distance projection.

LENSES—Special 6-inch focus projection lens. Triple condensing lenses.

Code Word	Cat. No.	Specifications	Price
Dinan	**AU-1**	**Automatic Balopticon,** complete with display cabinet, 500-watt Mazda lamp, and belt for 70 slides	**$260.00**
Dinep	**AU-3**	**Automatic Balopticon,** same as AU-1, but without display cabinet	**210.00**
Dimus	**AU-7**	**Automatic Balopticon,** without display cabinet; with belt for 70 slides, 1,000-watt Mazda lamp and **$1\frac{9}{16}$" diam., 6" focus** projection lens	**220.00**
Dimip	**AU-9**	**Automatic Balopticon,** same as AU-7, but with **$2\frac{5}{16}$" diam.** projection lens and adapter for longer focal length	**240.00**
Diobv	**4170**	**Special Shipping Cabinet**	**45.00**
Diocw	**(D)**	**Remote Control Attachment,** including 50 feet of cord with switch at end. (Add D to catalog number, as AUD-1)	**20.00**
Dipot	**4486**	Extra 500-watt, 115-volt, Mazda bulb	**net 3.30**
Deraf	**4478**	Extra 1,000-watt, 110-volt, Mazda bulb	**net 7.40**

Model CRM Balopticon

(With 1,000-watt Mazda Lamp)



CRM 18—Showing Condenser in position for Lantern Slide Projection

THE constantly increasing demand for the Combined Balopticon with 1,000-watt Mazda lamp has demonstrated that there is a positive need for a simple but high-grade and efficient apparatus with which it is possible to project post-cards, photographs, drawings, maps, solid objects and the like, as well as lantern slides. This instrument has proven itself to be the ideal equipment for the school and the church, both from an educational and entertainment standpoint. One of the reasons for its popularity is the fact that the 1,000-watt lamp, which was especially designed for this apparatus, makes it so *simple to operate* that even the most inexperienced in the use of projecting machines have no difficulty with this equipment.

This model, *CRM*, has been constructed especially for use with the Mazda lamp, and the design is calculated to give the greatest possible efficiency. The lamp housing and the dark chamber have been brought together to allow the lamp to be placed as close to the object as possible. No condensers are used in illuminating the opaque object, but the specially corrected glass reflector placed back of the lamp directs the light upon the object in parallel rays.

The advantages of the 1,000-watt Mazda lamp are obvious. It is entirely silent and automatic, requiring no attention whatever after it has been properly centered. No rheostat is required for circuits from 105 to 120 volts and the lamp works equally well on either A. C. or D.C. It operates on only 9 amperes of current and the quality and color of the light is such as to give a better interpretation of the subject than that obtained with the alternating current arc.

By means of special methods of *ventilation* the temperature of the outfit is kept sufficiently low, so that there is no danger of scorching the specimen; neither does the apparatus become uncomfortably hot for operating.

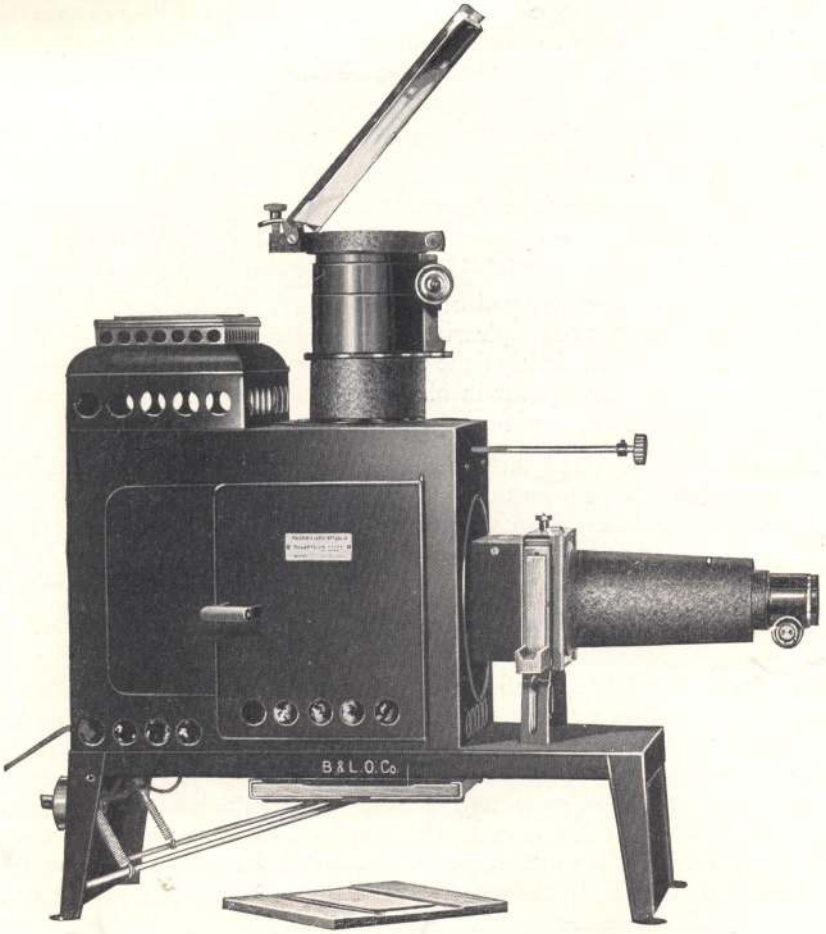
The instrument is constructed of heavy sheet metal by means of special forming tools, so that it has a pleasing appearance and the proper rigidity, at the same time being sufficiently light to make it readily portable from place to place. It is finished throughout in black enamel with a dull lustre, which is both serviceable and appropriate in such an apparatus.

The area of the opaque object that can be projected is ordinarily *6 x 6 inches*, but by removing a plate from the bottom of the dark chamber the size can be increased to *7 x 7 inches*. Much larger objects can be placed in position and shifted about so as to project any portion desired. The specimen is held in position against the bottom of the dark chamber by the object-holder, which is actuated by a spring-arm. To facilitate the rapid handling of small pictures, such as postcards, we supply two adjustable carriers.

The change from the projection of opaque objects to lantern slides, or vice versa, is *made instantly* by pushing in or pulling out a sliding rod located on the front of the dark chamber. This rod operated a shield in the dark chamber, which cuts off the light from the projection lens for opaque objects, or from the lens for lantern slide projection, and also brings the rear condenser, used for lantern slide projection, close to the lamp so that maximum efficiency of illumination for slides is secured. No movement of the lamp or lamp reflector is necessary in making the change, and there is consequently no jarring of the delicate lamp filaments during the operation.

The projecting lenses are the Balo series, especially corrected for flatness of field and critical definition. The one for projecting the image of the opaque object is mounted on top of the dark chamber, together with a first-surface mirror which directs the light toward the screen and causes the picture to appear in *correct position from left to right*. The lens is 4 inches in diameter, of 15 or 18 inches focus, the selection depending on the projection distance and the size of the picture desired. (See table, page 15.)

A lens is supplied for lantern slide projection, which is of the proper focal length to give approximately the same size picture as that obtained with the projection lens for opaque objects. In order that the apparatus can be used conveniently for lantern slide projection at long distances, such as 50 feet, we have arranged for a supplementary lens to be used in conjunction with the regular lens, thus giving the effect of a long focus lens, without the disadvantage of a long supporting extension. (See page 38.)



CRM—With Changing Device in position for Opaque Projection.

The mirror is fixed above the lens in an adjustable mount, which permits the images from both opaque object and lantern slide to be brought into coincidence on the screen.

On account of the unavoidable loss of light in any projection of opaque objects, it is not possible to secure the same brilliancy as when using slides. Con-

sequently, we would advise projecting a picture not larger than 10 feet square, if the distance will permit of such an arrangement.

Particular attention should be given to the selection of a screen. A good quality, white, opaque screen, at least, should be used, and an *aluminum-coated screen* is preferable. The latter, however, should not be used unless the audience can be placed within a total angle of about 60° from the center of the screen.

A small electric fan, which can be attached to the inside of the lamp house door, can be supplied extra. This will keep the air in the lamp house in constant circulation and thus render it next to impossible to scorch or burn the opaque objects no matter how long they are left in position.

Additional adapters can be furnished so as to extend the projection lens for opaque objects. This makes it possible for artists to project an image slightly enlarged, exact size or even reduced in size.

Specifications

BASE—Consists of heavy sheet metal supports, front and rear, 10½ inches wide, and carrying dark chamber at height of 5¼ inches; extreme length, 23 inches; each foot is provided with screw hole for fastening Balopticon to table, if desired.

LAMP HOUSE AND DARK CHAMBER—One continuous with the other; measure 9½ inches wide by 15 inches long; lamp house is 17 inches high; dark chamber 12⅞ inches; light-tight and freely ventilated, constructed of double sheet metal walls, with an air space one inch in thickness between the two walls; roof of lamp house is fitted with our special patented ventilator; dark chamber provided with large, light-tight door on side, convenient handle on outside of dark chamber at upper front controls shield by which light is cut off from opaque object lens or lantern slide lens, as desired.

ILLUMINANT—1,000-watt, concentrated filament, gas-filled, Mazda stereopticon, of special design; provided with ground and polished glass reflector, 8 inches in diameter, corrected to throw a parallel beam of light upon the specimen. Always specify exact voltage when ordering.

CONDENSING SYSTEM—Our regular double system, consisting of two plano-convex lenses, 4½ inches in diameter, one mounted at the front of the dark chamber, the other on a sliding frame in dark chamber, for lantern slide projection only.

OBJECT HOLDER—Square plate of sheet metal; held against opening in bottom of dark chamber by arm actuated by two strong springs; accommodate objects of varying thickness and automatically brings them into proper plane for projection; opening in bottom of dark chamber permits area, 6 inches square, to be projected. (7 inches square by removing plate on bottom of dark chamber.)

SLIDE CARRIER—One double carrier, No. 4430, with elevating device.

POST CARD CARRIER—Two adjustable carriers with wooden backs and frame, which fit object holder.

PROJECTION LENSES—Two of our new series of lenses, especially corrected to give a brilliant, flat field with the Mazda lamp; provided with rack and pinion adjustment; of such relative foci as to project images of approximately equal size from opaque objects and lantern slides; lens for opaque objects fitted with first-surface mirror to direct light to screen and cause picture to appear in proper position from left to right.

DIMENSIONS—Length, rear of lamp house to front of lens for lantern slide projection, 27 inches; height to top of mirror, 33 inches.

Code Word	Cat. No.	Specifications	Price
Decit	**CRM-15**	**Combined Balopticon** for projection of opaque objects and lantern slides, with **4″ diam., 15″ focus** lens for opaque objects and **1⅝″ diam., 8″ focus** lens for lantern slides; 1,000-watt Mazda stereopticon lamp	**$200.00**
Decov	**CRM-18**	Same as above, but with **18″ focus** lens for opaque objects and **1⅝″ diam., 10″ focus** lens for lantern slides	**200.00**
Dedas	**4379**	**Extra Post Card Holder**	**1.75**
Dipuv	**4372**	**Fan Cooling Attachment**	**extra 30.00**
Deraf	**4478**	1,000-watt, 110-volt Mazda bulb	**net 7.40**

NOTE—Model CRM-15 or 18 can be furnished for Opaque Projection only (without lantern slide attachment) for $175.00.

Long Distance Lantern Slide Projection

In order to make it possible to use this apparatus for long distance lantern slide projection, we have developed a supplementary lens to be used in conjunction with the regular 1⅝-inch diameter, 10-inch focus lens supplied on the CRM-18 outfit. This supplementary lens is furnished in a mounting, which fits between the extension adapter and the projection lens, giving the effect of a long focus lens without the long extension adapters which these would require. This combination of lenses makes it possible to use the apparatus up to a distance of 50 feet for lantern slide projection, producing a picture approximately 10 feet wide.

Code Word	Cat. No.	Specifications	Price
Dedet	**4404**	**Supplementary Lens** in mounting for use with **1⅝″ diam., 10″ focus** lens	**$11.50**

If the apparatus is to be used to a considerable extent, we suggest that a 2 5/16-inch diameter, 10-inch focus projection lens be substituted for the regular 1⅝-inch diameter lens, which would mean an appreciable increase in illumination. The extra charge for this lens would be *$7.50*, and a larger supplementary lens would be required.

Code Word	Cat. No.	Specifications	Price
Dediv	**4406**	**Supplementary Lens** in mounting for use with **2 5/16″ diam., 10″ focus** lens	**$14.50**

Model CRM-25 Balopticon

(For Long Distance Projection)

THIS Balopticon is offered in order to meet the demand of those who must, of necessity, use an instrument at a greater projection distance than is practical with the CRM-18, and to those who desire to project a somewhat larger object than is possible with any other model herein listed. Although the regular projection area is 7 x 7 inches, by removing a plate from the bottom of the dark chamber, it is possible to project areas up to 7 inches wide by 9 inches long. For those wishing to project only 6 x 6 inches areas, we can supply a special plate on order, to be attached to the bottom of the dark chamber.

For these large areas, it is quite essential to use specially corrected and long focus lenses—not only from the standpoint of image quality but because of the advantageous working distance from the screen. Consequently this equipment is offered only with the 25-inch focus, 4-inch diameter focus lens for opaque objects and a 12-inch focus, 2 $\frac{5}{16}$-inch diameter lens for lantern slides.

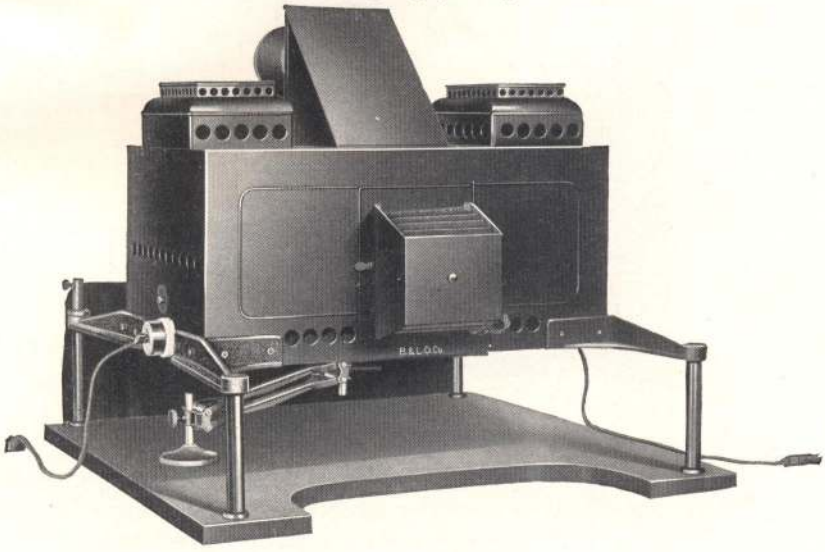
This equipment will particularly appeal to Architectural and Mechanical Engineering Departments, Schools of Journalism and Advertising, Sign Painters and Commercial Artists, and others where blueprints, layouts and large areas of varied description must be projected.

The general design and specifications of this model are the same as for the CRM models described on the preceding pages, except that the dark chamber is two inches longer and the reversing mirror is mounted in a prism-shaped box back of the projection lens.

Code Word	Cat. No.	Specifications	Price
Decuw	**CRM-25**	**Combined Balopticon**, with **5″ diam., 25″ focus** lens for opaque objects and **2 $\frac{5}{16}$″ diam., 12″ focus** lens for lantern slides	**$290.00**
Dedas	**4379**	**Extra Post Card Holder**	**1.75**
Dipuv	**4372**	**Fan Cooling Attachment** ..... **extra**	**30.00**
Deraf	**4478**	1,000-watt, 110-volt Mazda bulb ..... **net**	**7.40**

Model O Balopticon

(For Large Opaque Objects)



MODEL O Balopticon is especially designed for the projection of large opaque objects—the area of the opaque objects that can be projected being 12 inches square. It is highly recommended for use in Departments of Architecture and Mechanical Drawing, for use by sign painters and commercial artists, and wherever it may be necessary to show or draw an enlarged image on a screen, blackboard or sign board. As there is a considerable distance between the supporting columns of the base, large objects, part of which only are to be projected, can be put through without folding, making the outfit very valuable for use in the projection of blueprints, maps, large record sheets and the like. The specimen is held in position against the bottom of the dark chamber by the object holder, which is actuated by a spring-arm.

The illumination is furnished by two 1,000-watt, 110-volt Mazda lamps of special design, assuring an even, strong light over the entire projected area. A first-surface mirror, which directs the light toward the screen, causes the picture to appear in correct position from left to right.

The entire outfit is of unusually substantial construction. The base is of wood, neatly finished, while the supporting columns are of sufficient strength to make the outfit absolutely rigid. The rest of the equipment is of heavy sheet metal, finished throughout in black enamel with a dull lustre.

The projection lens, designed for use with this apparatus, is of 5-inch diameter, 25-inch focus and produces a 10-foot picture at a distance of 23 feet from the screen. A larger picture than this would not ordinarily be recommended.

Specifications

BASE—of heavy wood, 32 inches long, 34 inches wide, with supporting posts at each corner; their wide separation allowing blueprints, maps and large sheets to be placed in position without folding.

LAMP HOUSES AND DARK CHAMBERS—Two lamp houses and dark chambers continuous with each other; measure: 16 inches deep, 28 inches wide and 31 inches high; dark chamber is light-tight and freely ventilated; it is constructed of double sheet metal walls, with a 1-inch air space between walls; roof of lamp house is fitted with our special patented ventilator; dark chamber is provided with large light-tight door in back.

ILLUMINANT—Two 1,000-watt, 110-volt, gas-filled Mazda lamps of special design; provided with ground and polished glass reflector, 8 inches in diameter, corrected to throw a parallel beam of light upon the specimen.

OBJECT HOLDER—Plate of sheet metal, 13 inches square; held against opening in bottom of dark chamber by arm actuated by two strong springs; accommodates objects of varying thickness and automatically brings them into proper plane for projection; opening in plate at bottom of dark chamber permits area of 12 inches square to be projected.

PROJECTION LENSES—Special lens of 5-inch diameter, 25-inch focus, giving a flat, brilliant field with the two Mazda lamps; provided with rack and pinion adjustment; fitted with first-surface mirror which directs light to screen and causes pictures to appear in proper position from left to right.

FAN COOLING DEVICE—A small electric fan, which is fastened to the inside of the lamphouse door, keeps the air in the lamp-house in constant circulation. This renders it next to impossible for the heat from the powerful Mazda bulbs to scorch or burn the opaque objects no matter how long they are left in position.

Code Word	Cat. No.	Specifications	Price
Defox	**0–25**	**Large opaque Balopticon,** with two 1,000-watt, 110-volt, Mazda lamps with reflectors and **5″ diam., 25″ focus** projection lens, with fan.....	**$615.00**
Deraf	**4478**	1,000-watt, 110-volt, Mazda bulb.....**net**	**7.40**

Model KRMS Balopticon

(Combined Daylight)

THE KRMS Balopticon has been especially developed for use in conjunction with a translucent screen in which case the screen is between the lantern and the audience. It is designed to project both opaque objects and lantern slides with instant interchange between the two by shifting a light shield.

To secure the utmost illumination on the screen when projecting opaque objects, reflecting mirrors have been eliminated, which necessitates holding the object in a vertical position. The object holder is actuated by a spring tension which holds ordinary illustrations against the housing, and an adjustable ledge holds heavy books in position. Two card holders adjustable for width are supplied which slide through a groove in the object holder. The area projected is 6 inches square. The light source is a 500-watt, 115-volt Mazda lamp with a specially corrected glass reflector of large diameter collecting a large angle of light. The use of such a light source makes it possible to attach the equipment to any convenient lamp socket.

The lenses are of a special high grade construction designed especially for covering wide angles which is necessary when working at a very short distance from the screen. They produce remarkably sharp and evenly defined images. The one for opaque projection is of 8½-inch focus and the one for lantern slides of 4-inch focus. Both have spiral focusing mounts. As the opening for opaque objects is 6 inches and average lantern slides 3 inches, the two pictures are of the same size at any given distance.

The lens for lantern slide projection is mounted in a cone adapter which, together with the double metal slide carrier, is easily removed to permit the use of a Film Slide Attachment if desired.

Special attention has been given to the ventilation of this equipment so that there is no danger of damaging the pictures over such a period of time as would ordinarily be needed to project a picture. In designing this equipment particular attention was given to the question of portability. It can readily be moved, together with screen, from room to room, as it is only 15 inches long, 13½ inches wide, 18 inches long and weighs less than 21 pounds.

Specifications

LAMP HOUSE—Of sheet metal with special ventilating features; measures 15 x 13½ inches; illuminant reached through object holder door at rear.

ILLUMINANT—Tubular shaped, 500-watt, 115-volt Mazda lamp; with ground and polished glass reflector.

CONDENSING SYSTEM—Our regular double system, 4½-inch diameter, in special ventilated mount from which lenses may be easily removed for cleaning.

PROJECTION LENSES—Two high grade, short focus lenses; of 4-inch focus for lantern slides and 8½-inch focus for opaque objects.

OBJECT HOLDER—Actuated by spring tension holding it vertically against rear of lamp house; area projected is 6 inches square.

SLIDE CARRIER—Of metal construction, holding standard size slides.

Code Word	Cat. No.	Specifications	Price
Dirar	**KRMS**	**Balopticon** for projecting both opaque objects and lantern slides; with **4″ focus** lens for lantern slides and **8½″ focus** lens for opaque objects; 500-watt, 115-volt, Mazda lamp with 10 feet of cord with plug and switch	**$120.00**
Dipot	**4486**	500-watt, 115-volt, Mazda bulb.....**net**	**3.30**

NOTE—When desired, a special fan cooling device can be supplied for $17.50 extra.

Translucent Screen

Any translucent screen will have a reduced angle within which the maximum brilliancy of the picture will be observed as compared to that of the average type of reflecting screen, consequently an arrangement of the audience should be made so that all are within an included angle not to exceed 50° or 60°.

The screen should be so located that is is practically free from any direct light falling upon it either from the front or back. We consider that the No. 2 Translux screen is the most practical size for classroom use.

Code Word	Cat. No.	Specifications	Price
Dikim	**No. 1**	**Translux Screen,** 24 x 30″, on supporting frame and tripod.....**net**	**$25.00**
Dikon	**No. 2**	**Translux Screen,** 30 x 36″, on supporting frame and tripod.....**net**	**35.00**

Model HRM Balopticon

(For Opaque Objects Only)

THE HRM *Balopticon* has been designed primarily to meet the growing demand for a thoroughly efficient and high grade apparatus for projecting post cards, photographs, solid objects, etc., in the home. Its scope, however, is not limited to the home. It is valuable for the schoolroom where it can be used within 9 to 12 feet of the screen in a room that can be well darkened.

The outfit is made of sheet metal, finished in dull black, making it of light weight, but very durable. As the object holder occupies a horizontal position against the floor of the dark chamber, solid objects of many kinds can be projected on the screen. Pages from magazines and the like may be placed in position directly on top of the object holder and books or magazines which open flat may be readily placed in position. A single interior mirror brings the image always into correct position, from left to right, on the screen, so that reading matter appears unreversed. The exceptional strength of light makes this possible without detrimental loss of illumination.

The projection lens is of achromatic construction, designed to give maximum illumination and a flat field. It projects a picture that is clearly defined to the extreme margin. An aluminum screen, 3 feet square, is included with the outfit. While a 3-foot screen is regularly supplied, the illumination is sufficient for pictures up to 4 feet in width with the 500-watt lamp.

Code Word	Cat. No.	Specifications	Price
Debot	**HRM-13**	**Balopticon** for the projection of opaque objects only; with 500-watt, 115-volt, gas-filled Mazda lamp with specially corrected reflector, connecting cord and plug, and 3 ft. aluminum coated screen and two post card holders	**$55.00**
Diruw	**HRMD-13**	**Balopticon** same as above but with long focusing mount for low magnification; used by artists, chart makers, etc., for projecting small image	**62.50**
Dipot	**4486**	500-watt, 115-volt, Mazda bulb ..... net	**3.30**
Debuv	**5345**	**Metal Carrying Case**	**7.00**
Dhung	**4378**	**Extra Post Card Holder**	**1.50**

Aluminum coated screen 4½ x 4½ feet in place of 3-foot screen. $4.00 extra.

Model JCRM Balopticon

(Combined Junior)

THIS Balopticon has been designed to meet the popular demand for a really efficient but inexpensive instrument, for the projection of *opaque objects* as well as *lantern slides* for use before small groups in the classroom, Sunday School and home.

The interchange between the projection of opaque objects and of lantern slides is instantaneous, being effected by simply turning a convenient lever on the outside of the dark chamber. This lever operates an interior shield which cuts off the light from the lens for either form of projection not desired at the time.

The supporting base measures 3¼ inches from the table top to the bottom of the dark chamber and 13 inches between front and rear feet, so that ample space for the insertion of average size illustrations and objects is provided.

The horizontal object support is securely held in place against the floor of the dark chamber by strong springs, so that sheets of paper, books, irregularly shaped objects, etc., are readily placed and held in position. To facilitate the handling of post cards, small photographs and the like, two holders, which slide through the object support, are provided.

An aluminum coated screen, 54 inches square, is regularly supplied with this instrument. However, in a totally darkened room it is possible to very satisfactorily project pictures up to six feet in width at a distance not greater than 15 feet. This unusually good illumination is made possible by the use of an especially efficient 115-volt, 500-watt Mazda lamp and a corrected optical system. A 30-volt, 420-watt lamp may be used with Delco and other individual lighting circuits, or, when connected by a transformer, with a 115-volt circuit.

Code Word	Cat. No.	Specifications	Price
Decar	**JCRM-13**	**Combined Jr. Balopticon** for lantern slides, as well as for post cards, etc., complete with lantern slide accessories, 500-watt, 115-volt, gas-filled Mazda stereopticon lamp, connecting cord and plug and 4½-ft. square aluminum screen	**$90.00**
Deces	**JCRM-30V-13**	**Combined Jr. Balopticon,** same as above but with 30-volt, 14-ampere lamp in place of 500-watt, 115-volt	**95.00**
Dexop	**4499**	**Transformer** for use on 110-volt A. C.	**17.50**
Dhung	**4378**	**Extra Post Card Holder**	**1.50**
		6 ft. x 6 ft. Screen in place of 4½ ft.	**extra 6.50**
Dikel	**5346**	**Metal Carrying Case**	**8.50**
Dipot	**4486**	500-watt, 115-volt, Mazda bulb	**net 3.30**

Film Projectors

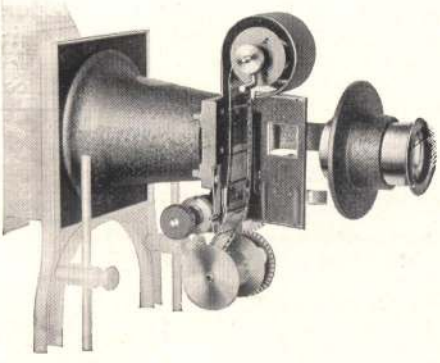
THE printing of individual pictures on standard motion picture film offers an inexpensive method of using pictures for educational and entertainment purposes, but their use makes necessary a specially designed projector or an attachment fitting on a standard lantern.

As we realized that possibly some of the thousands of users of our Balopticons would want to use this sort of illustrative material, we have designed an attachment for projecting still pictures on strips of film which can be used with any of our Balopticons with the exception of the Special Portable Model A. Therefore, it is not necessary for the user of one of our Balopticons to buy a complete new unit in order to project this sort of material, but to purchase one of the attachments and make the Balopticon serve an additional purpose.

It is likely that many churches, in particular, which do not possess any sort of projecting lantern at the present will be disposed to take up the use of film slides in their Church and Sunday School work, because of the low cost of such pictures and the ease of handling and transporting. To such purchasers we offer the complete Unit Film Slide Projector, which is so designed that by the purchase of additional parts it may also be used for projecting lantern slides. The logic of this arrangement will at once be recognized since there are enormous numbers of lantern slides already in use and in circulation, which might be made use of if a combination film slide and lantern slide projector were available.

We are not offering a collection of films for use with our attachment and Unit Projector, preferring to devote our efforts to the development of apparatus and to co-operate with those having material available from which still pictures on strips of film can be made, and to have the user of such equipment secure the particular picture series from whatever source it is available. Strips of film from any source can be used on our attachment and projector.

Such material is now being made up by a number of commercial, religious and educational organizations, a list of whom will be furnished on application.



No. 4114 4-Film Attachment showing film-gate thrown open.

While there is much to be said in favor of film slides particularly from the standpoint of economy and handling, it must be recognized that they have some limitations. It will not be possible to project as large size pictures as from standard lantern slides with the same brilliancy because of greater magnification required. We suggest an 8-foot picture as the maximum size that can be properly illuminated using a 400-watt lamp.

The film attachment, as illustrated at the left, attaches to the Balopticon by means of a cone shaped adapter

with square flanges that are secured to the guides supporting the bellows on the slide carrier support, on any of our regular slide projecting Balopticons—or in place of the cone adapter supporting the lantern slide lens in the case of the CRM, JCRM and KRMS Models. To the front of the supporting cone is attached the mechanism for holding and moving the film.

The roll of film is placed in the upper container and the lower end of the film inserted through a slot in the lower container and the gate then snapped into position. Care should be taken to see that the sprocket holes have engaged on the sprocket roller which feeds the film through. This sprocket is turned by a good sized knurled button, the shank of which has four notches with a spring stop engaging. The turn of this button, one quarter turn, moves the film one full width of picture and automatically brings the film to a stop at the correct point without the necessity of the operator watching the screen. One of the features is that the film may be run back if one desires to refer to a preceding picture. Means are provided for "framing" the picture when starting the roll.

The film passes between plates of highly polished hard glass, one of which is under spring pressure so as to eliminate buckling of the film when passing over the aperture plate. This pressure is necessary in order that portions of the picture on the screen may not appear to be out of focus.

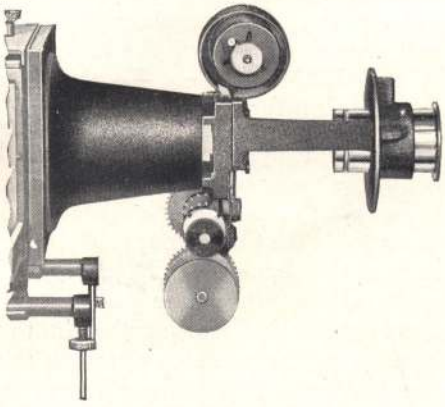
The supplementary condenser, mounted in the supporting cone, functions with the regular condensing system used for long focus lenses to concentrate the beam of light so that maximum illumination and minimum heat may be secured.

This supplementary condenser is omitted and a shorter length of cone adapter supplied when used on Models KRMS, JCRM and ABM-4, all of which are fitted with short focus condenser combinations that concentrate the beam at the proper point.

By fitting the film attachment to the front of the lantern slide support by means of a fixed length of cone adapter, the plane of the film is positively brought to the point where maximum illumination and safety to the film are assured. By means of a special adapter our film attachment can be fitted to the front standard of other makes of projecting lanterns in place of the projecting lens. In such cases care must be taken by the user to see that the position of the attachment is such that the film is not in the most concentrated part of the beam of light because of danger of scorching the film.

A lens of 4-inch focus is regularly supplied if the attachment is to be used with a reflecting screen, as this gives the same size picture as that projected from lantern slides using a lens of 12-inch focus. For use with translucent screen a lens of 2½-inch focus is regularly furnished. Other focal lengths can be supplied on special order.

A special feature of our attachment is the possibility of inserting a small slide carrier, in which individual film slides, mounted between pieces of card board, might be used to supplement those in the regular roll or in which microscopical slides might be placed. The carrier takes the regular 3 x 1-inch



4114B-4 Film Attachment—for use on Model B.

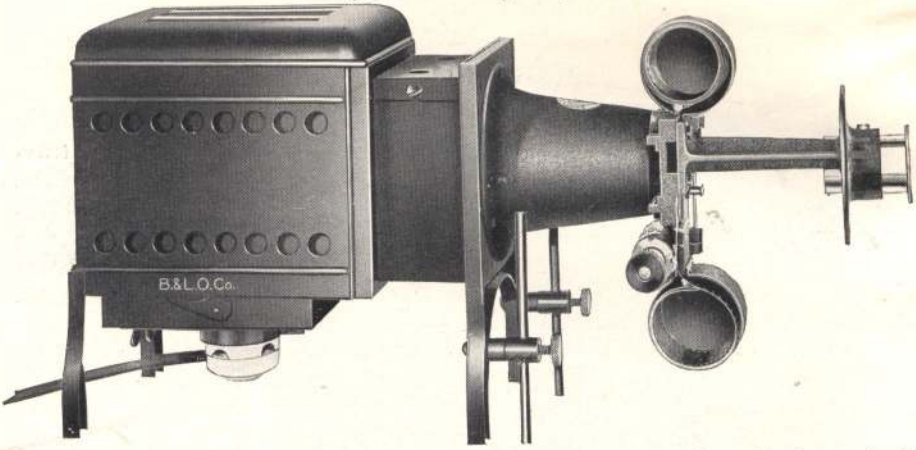
slide. This feature would appeal particularly to Biology Departments teaching elementary Biology, as the attachment would then serve both as a film slide or micro slide projector where relatively low magnification would suffice. When used for this purpose the 2½-inch focus lens should be purchased extra for the micro slides. This carrier is listed as an extra.

Note: When used on equipment fitted with lamps of higher wattage than 400, a heat absorbing glass should be used.

Code Word	Cat. No.	Specifications	Price
Diofc	**4114-4**	**Film Attachment,** with adapter having supplementary condenser for use on all Balopticons fitted with a projection lens for lantern slide projection of longer than **7″ focus,** with lens arm and **4″ focus** lens	**$38.50**
Daulh	**4114B-4**	Same as 4114-4, but with supplementary legs for use on Model B, making it possible to remove front standard and connecting rods	**38.50**
Diohb	**4114-2½**	**Film Attachment,** same as No. 4114-4, but with **2½″ focus** lens for "Daylight" projection	**38.50**
Daumj	**4114B-2½**	Same as 4114-2½, but with supplementary legs for use on Model B, making it possible to remove front standards and connecting rods	**38.50**
Dionh	**4113-4**	**Film Attachment,** with adapter for use on KRMS, JCRM and other Balopticons fitted with projection lenses of **7″ focus** and shorter, with lens arm and **4″ focus** projection lens	**38.50**
Diopj	**4113-2½**	**Film Attachment,** same as No. 4113-4 but with **2½″ focus** lens for "Daylight" projection	**38.50**
Diork	**4108**	**Double Slide Carrier** for holding either microscope slides or small individually mounted film sections	**1.75**
Daunk	**5350**	**Heat Absorbing Glass** 3¼ x 4 to be inserted in slide carrier of Balopticon	**5.00**

Model ABMF Balopticon

(Unit Film Projector)



THIS complete unit consists of the film attachment as described attached to one of our standard Model B lamp housings with special front supporting foot with elevating device. It will regularly be fitted with a 400-watt lamp, and the condenser lenses are the standard 4 $\frac{5}{16}$-inch diameter.

Within the cone adapter of this Film Balopticon is a supplementary condenser that serves to bring the light rays to a focus within the projection lens (the proper place for most efficient projection) instead of on the film or some other intermediate location. This keeps the temperature at the film down and eliminates the danger of scorching or burning the film. If the distances between illuminant, film and lens are variable, great care must be taken not to focus the light rays directly upon the film.

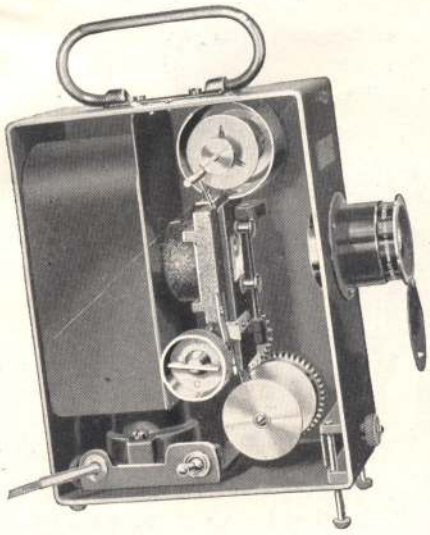
By having this projector one may also purchase an attachment consisting of a cone shaped adapter with projection lens and slide carrier which fits on the front of the lamp house in place of the film attachment.

While this film projector is slightly larger than one which might be designed for film only, its extra size is fully justified because of the dual use.

Code Word	Cat. No.	Specifications	Price
Diosl	**ABMF-4**	**Film Projector** complete as described with 400-watt, 110-volt, Mazda lamp, 10 feet of cord with switch and connecting cord and **4″ focus** lens . . .	**$65.00**
Diotm	**ABMF-2½**	Same as above, but with **2½″ focus** projecting lens (For use with translucent screen or other short distance projection)	**65.00**
Diovn	**4066**	**Lantern Slide Attachment** with cone adapter, slide carrier and **10″ focus** projecting lens	**18.50**
Dioxr	**4064**	**Lantern Slide Attachment** for use with above, but with **4″ focus** lens for use with translucent screen	**18.50**
Depoh	**4479**	Extra 400-watt, 110-volt, Mazda bulb . . . . . **net**	**3.40**
Daezs	**5352**	**Heat Absorbing Glass,** 4¼ x 4¼, to be inserted between condenser lenses	**5.00**

Model 4102-3 Balopticon

(A Portable Film Projector)



THE Bausch & Lomb Film Projector No. 4102-3 is an extremely simple, compact and portable instrument for projecting pictures from strip film in small classrooms, and for the use of traveling lecturers and extension workers. It is complete in itself and connects directly with any regular 110-volt lighting circuit. Its powerful little 100-watt Mazda bulb provides ample illumination for projecting pictures up to five by six feet in a darkened room, or, by reversing the film, the lantern may be used in conjunction with a translucent screen for "daylight" projection. The lens may also be focused upon a nearby white wall, curtain or piece of paper, giving an excellent though small, resulting image under daylight or subdued light conditions.

The film, which is of standard motion picture width, is non-inflammable and durable; it will carry as many as 200 separate pictures or captions in the correctly predetermined order. This tends toward a standardization of lecture work and makes it possible for any number of teachers, lecturers or demonstrators to give a tried and proven lecture with the minimum possibility of failure due to the variable human element. The pictures are always ready in the proper sequence and there is no danger of omitting or breaking an important slide. The film may be turned back to any previous picture if necessary, and the full rewinding operation can be easily and quickly done.

The carrying case, measuring 6½ x 8⅛ x 3⅝ inches, is an integral part of the lantern and weighs 6¼ pounds. There is nothing to get out of order and its very simplicity insures practicability under all conditions.

To operate from a storage battery when the standard voltage current is not available, we furnish a Headlight Lamp Adapter to fit the lamp socket in projector. This adapter will accommodate a 6-volt or 12-volt headlight lamp which is capable of projecting a 12- or 14-inch image in a semi-darkened room. To facilitate making connections to the battery we offer a weather-proof socket with short extension cord and lugs for connection to the battery.

Code Word	Cat. No.	Specifications	Price
Disux	**4102-3**	**Film Projector** as described with 100-watt, 110-volt, Mazda lamp on pre-focused base, cord, plug, switch and 3″ focus projecting lens	**$57.50**
Ditev	**4095**	**Headlight Lamp Adapter** for 6 or 12 volts.....	**3.00**
Ditox	**4501**	**Weather Socket** with cord and lugs.....	**1.50**
Dikel	**4488**	100-watt, 110-volt lamp on pre-focused base....net	**2.10**

Model 4090 Balopticon

(A Semi-portable Film Outfit)

THE Strip Film Projector No. 4090, represents a semi-portable type, which though slightly larger than the preceding model, is fitted with a 200-watt, 110-volt bulb on pre-focused base. Hence, there results more illumination, but with no danger of damaging the non-inflammable film.

The projection lens of 4-inch focus and designed to produce an image of high quality, is adjustable for focusing at the end of a rigidly clamped lens arm, which when not in use, is released and dropped to the vertical position to permit fitting in the compact carrying case.

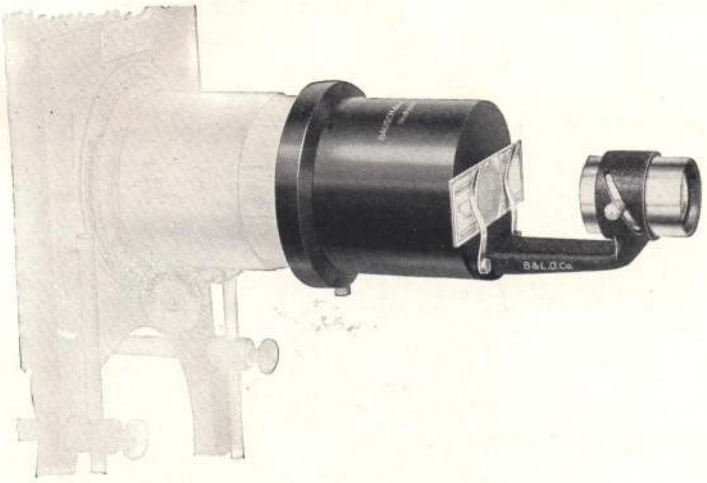
The lamp house is hinged to a pedestal base thus permitting tilting at any angle. The projector alone weighs 7 pounds.

The projector is sold separately although we recommend the purchase of the carrying case which includes a film tray to accommodate 12 spools of film, and an extra bulb. This case measures 11⅜ x 10⅝ x 6¾ inches and weighs 3 pounds. The film tray measures 9¾ x 6$\frac{1}{16}$ x 2 inches and weighs 1 pound. The No. 4095 Headlight lamp adapter listed and described on page 50 may be used in this projector when only current from a storage battery is available. With this will be required the No. 4501 weather socket with cord and lugs.

Code Word	Cat. No.	Specifications	Price
Ditat	**4090**	**Film Projector** as described with 200-watt, 110-volt, Mazda lamp on pre-focused base, with cord, plug and switch, and 4″ focus projecting lens . . .	**$57.50**
Divew	**4090-G**	**Film Projector** No. 4090, as above, but with the Gear Take-up and spool	**61.00**
Divix	**4091**	200-watt, 110-volt, lamp on pre-focused base . . . net	**2.35**
Divav	**4093**	**Carrying Case**, with film tray . . . . . extra	**7.50**

No. 4115 Micro Projector

(Low Power Projection Microscope)



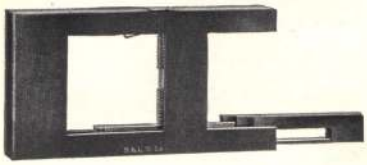
REALIZING that many schools offering elementary courses in Biology have a real need for equipment with which to project microscopical slides of plant stems, flowers, insects, etc., we have developed a very simple and inexpensive projection microscope of high quality. Apparatus of this type is ordinarily too elaborate and expensive for high school use, and young students in Biology are therefore deprived of the use of this valuable and interesting method of study. Our newly designed simple projection microscope will very adequately fill this long felt need. While it has been especially constructed for use with our Balopticons—Models B, C and BC, it can be used regularly with any projection lantern having a projection lens with an outside barrel diameter of 2¾ inches, or by means of a special adapter supplied extra at a nominal cost, it can be attached to lenses of smaller sizes.

This attachment is fastened to the front of the projection lens by means of a single clamp screw in such a way that one can quickly change from the projection of lantern slides to microscopical slides, no shifting of the projection lens being necessary. Slides are held in position on the stage by spring clips.

The lens on this new instrument is of 2-inch focus, giving a magnification of 60 diameters at 10 feet, 120 at 20 feet and 180 at 30 feet, and is provided with a spiral focusing mount. A substage condenser of focus suitable for use with this lens, is permanently mounted with its upper surface flush with the stage.

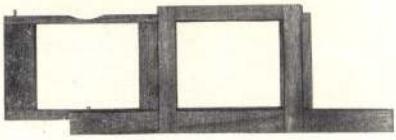
Code Word	Cat. No.	Specifications	Price
Dhuph	**4115**	**Low Power Projection Microscope** as described above for lanterns having projection lens of 2¾″ diameter	**$20.00**
Daupl	**4115A**	Adapter for B. & L. 1⅝″ diameter lens	**2.50**

Slide Carriers



Rapid-Changing Slide Carrier, No. 4449

A SATISFACTORY slide carrier, both convenient and durable, is essential to a high grade projection apparatus. We supply several which have given such satisfaction. Particular attention is called to *No. 4449*, our new *rapid-changing slide carrier*, which is a double carrier operated entirely from one side. As a new slide is fed forward, the preceding slide is automatically returned, and a metal shield, which travels with the slide, obliterates all movement of the slide on the screen, so noticeable in ordinary double carriers and other types of slide changers. This approximates a dissolving effect, thereby relieving all eyestrain.



Slide Carrier, No. 4430

Two carriers, *Nos. 4430* and *4432*, are neatly finished wooden frames, provided with an automatic elevating device. This consists of loosely fitted metal pins beneath the center of the slides, which engage with an inclined plane at the end of the sliding movement, raising the slide so that it may be easily lifted out by its margin. No. 4430 is regularly supplied with our lantern slide equipments.

We also make a convenient *post card carrier* for our apparatus projecting opaque objects.

Code Word	Cat. No.	Specifications	Price
Dhish	**4430**	**Slide Carrier,** for two 3¼ x 4″ slides with auto-automatic elevating device	**$2.00**
Dhitj	**4432**	**Double Slide Carrier,** for either 3¼ x 3¼ or 3¼ x 4″ slides with automatic elevating device	**2.75**
Dhivk	**4449**	**Rapid-Changing Slide Carrier**	**5.00**

NOTE—The semi-dissolving slide carrier, No. 4449, may be substituted on any equipment regularly supplied with No. 4430 for *$3.00* additional.

Screens

ORDINARY sheeting, or common cloth, is too translucent to furnish a satisfactory screen for projection work. Our screens are all made of heavy cloth, specially prepared, nearly opaque and mounted on spring rollers.

Code Word	Cat. No.	Specifications	Price
Dhoct	**4420**	**Screen,** 6 feet x 6 feet, each.....**net**	**$ 8.75**
Dhodv	**4421**	**Screen,** 7 feet x 7 feet, each.....**net**	**12.00**
Dhofw	**4422**	**Screen,** 8½ feet x 8½ feet, each.....**net**	**18.00**
Dhojz	**4425**	**Screen,** 10 feet x 10 feet, each.....**net**	**35.00**
Dhokb	**4426**	**Screen,** 12 feet x 12 feet, each.....**net**	**55.00**

Larger sizes will be quoted upon request.

Aluminum Screens

THESE screens are made of heavy material with a metallic surface. They give a much more brilliant image than the ordinary screen and are recommended in all cases, but especially will their superiority be noted in projecting opaque objects, microscopic specimens and in all work requiring brilliant illumination. Owing to their narrower field, however, due to the high reflecting surface, they should be used only when the audience can be seated within an included angle of 60 degrees from the center of the screen.

Code Word	Cat. No.	Size	Price	Code Word	Cat. No.	Size	Price
Dhold	**4420A**	6 x 6 ft.	**$11.50**	*Dhorh*	**4425A**	10 x 10 ft.	**$42.50**
Dhomd	**4421A**	7 x 7 ft.	**15.50**	*Dhosj*	**4426A**	12 x 12 ft.	**65.00**
Dhonf	**4422A**	8½ x 8½ ft.	**23.00**				

All prices on screens are **Net.**

Sateen Screens

THESE screens are supplied for *portable* outfits. Sateen is as nearly opaque and highly reflecting a material as can be obtained, which at the same time is suitable for packing in a case. These screens are provided with eyelets for stretching and have reinforced borders.

Code Word	Cat. No.	Specifications	Price
Dhotk	**4420S**	**Screen,** 6 x 6 feet.....**net**	**$ 7.00**
Dhovl	**4421S**	**Screen,** 7½ x 7½ feet.....**net**	**10.00**
Dhowm	**4423S**	**Screen,** 9 x 9 feet.....**net**	**18.00**
Dhoxn	**4426S**	**Screen,** 12 x 12 feet.....**net**	**24.00**

Trans-Lux Screens

THE Trans-Lux screens are very practical for use under "daylight" conditions in comparatively small rooms. The translucent material of which the screens are made is tough and durable. It can be easily removed from the frame, rolled up like a map and safely cleaned with alcohol. The prices include frames and tripods.

Trans-Lux Screens

(Continued from page 54)

Code Word	Cat. No.	Specifications	Price
Dikim	**No. 1**	**Trans-Lux Screen,** 2 x 2½ feet ..... net	**$25.00**
Dikon	**No. 2**	**Trans-Lux Screen,** 2½ x 3 feet ..... net	**35.00**
Dikup	**No. 3**	**Trans-Lux Screen,** 3 x 3¾ feet ..... net	**52.50**
Dikel	**No. 4**	**Trans-Lux Screen,** 4 x 5 feet ..... net	**80.00**

Cable

Code Word	Cat. No.	Specifications	Price
Deyam	**5179**	**Rubber Covered Twin Cable,** No. 12 copper wire, for 15 amperes, per foot	**$ .20**
Deyen	**5180**	**Rubber Covered Twin Cable,** No. 10 copper wire, for 25 amperes, per foot	**.25**
Deyip	**5184**	**No. 14 Rubber Covered Portable Lamp Cord,** per foot	**.12**
Deyor	**5185**	**No. 16 Rubber Covered Portable Lamp Cord,** per foot	**.08**

Carbons

Code Word	Cat. No.	Specifications	Price
	4474	**Cored Carbons,** ¾″ diameter, 6″ long, per ten...	**$ .60**
Deyus	**4470**	**Cored Carbons,** $\frac{9}{16}$″ diameter, 6″ long, per ten...	**.40**
Dezan	**4471**	**Cored Carbons,** $\frac{7}{16}$″ diameter, 6″ long, per ten...	**.40**
Dezep	**4472**	**Cored Carbons,** $\frac{5}{16}$″ diameter, 6″ long, per ten...	**.40**
Diabv	**4481**	**Cored Carbons,** $\frac{9}{32}$″ diameter, 6″ long, per ten...	**.40**
Dezir	**4473**	**Cored Carbons,** ¼″ diameter, 6″ long, per ten...	**.40**

Acetylene Tank

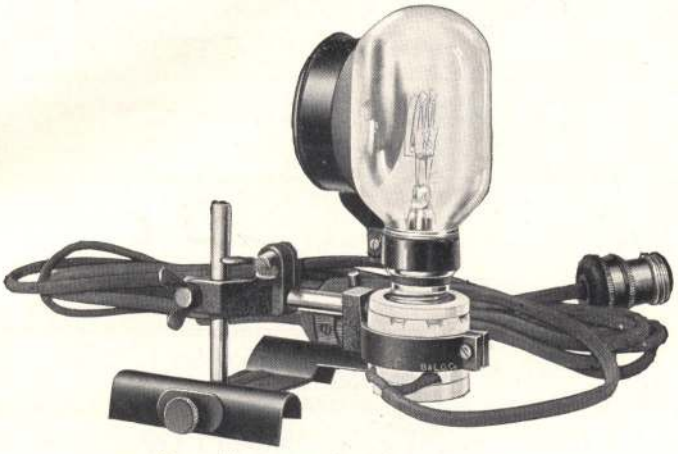
Code Word	Cat. No.	Specifications	Price
Dhabn	**4483**	**Acetylene Tank,** 10 cubic feet capacity	**$13.00**

Acetylene Generator

THIS is a very compact generator, with a capacity of one pound of carbide. It is fitted with a needle valve, etc., for control of the gas flow.

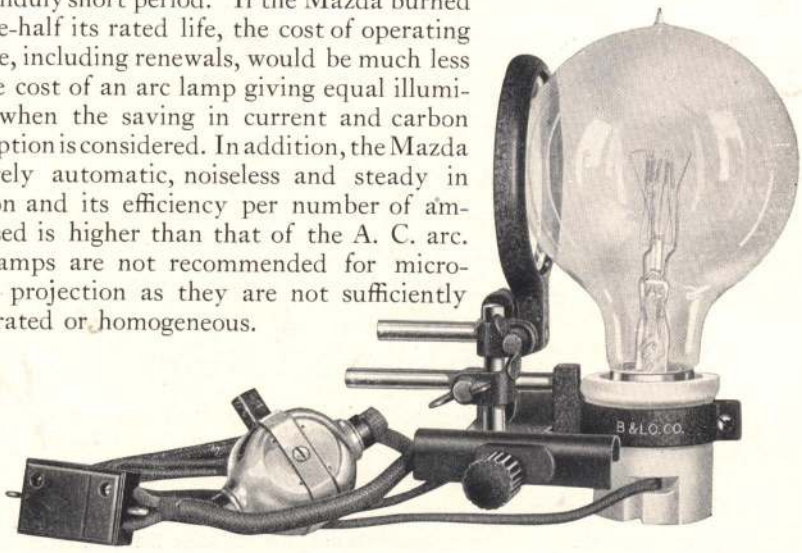
Code Word	Cat. No.	Specifications	Price
Dhacp	**4587**	**Acetylene Generator** as described; dimensions, approximately 7 x 11″	**$14.00**

Gas-filled Mazda Lamps



No. 4466—500-watt Gas-Filled Mazda Lamp

THE new gas-filled tubular-shaped Mazda lamps with concentrated filament, which have been especially developed for projection purposes, furnish an automatic, steady-burning and very efficient and economical light source for the simpler types of Balopticons. The efficiency varies from 0.8 watt per candle power in the lower wattages to 0.55 watt per candle power in the higher wattages. They are rated by the manufacturer to have a life of approximately 50 hours and we stand ready to replace any that may prove defective or burn for an unduly short period. If the Mazda burned only one-half its rated life, the cost of operating this type, including renewals, would be much less than the cost of an arc lamp giving equal illumination, when the saving in current and carbon consumption is considered. In addition, the Mazda is entirely automatic, noiseless and steady in operation and its efficiency per number of amperes used is higher than that of the A. C. arc. These lamps are not recommended for microscopical projection as they are not sufficiently concentrated or homogeneous.



No. 4476 -1,000 watt Gas-Filled Mazda Lamp

The 400-, 500 and 600-watt lamps are intended for use on 110-115 volt circuits (or with 220-volts when use with a resistance); the 1,000-watt gas-filled Mazda lamp operates on a regular 110-volt circuit but needs special wiring because of the heavy current carried; the 30-volt, 14-ampere lamp should be used on individual lighting plants or on the regular circuit when used in series with a transformer or rheostat; while the 6-volt, 24-watt lamp is intended for use with a storage battery.

Code Word	Cat. No.	Specifications	Price
Depig	**4466**	**500-watt Mazda Lamp** with gas-filled globe, reflector on support, 15 feet of extension cable, connecting plug and switch	**$16.00**
Dipot	**4486**	500-watt, 115-volt Mazda lamp, **bulb only**	**net 3.30**
Depoh	**4479**	400-watt, 110-volt Mazda lamp, **bulb only**	**net 3.40**
Depuj	**4476**	**1,000-watt Mazda Lamp,** with gas-filled globe on support with glass reflector, 4 feet of extension cord and pass-through switch	**24.00**
Deraf	**4478**	1,000-watt, 110-volt Mazda lamp with gas-filled globe, clear; **bulb only**	**net 7.40**
Dereg	**4500**	**6-volt Mazda Lamp** for use with storage battery, with silvered globe, supplementary condenser in mounting, 6 feet of connecting cord with switch and lugs for connecting storage battery	**13.50**
Derih	**4504**	6-volt, 24-watt Mazda lamp, silvered; **bulb only**	**net 1.25**
Deroj	**4477**	**30-volt, 14-ampere Mazda Lamp,** with gas-filled globe on support with glass reflector, 4 feet of extension cord and pass-through switch	**22.50**
Deruk	**4492**	30-volt, 14-ampere lamp; **bulb only**	**net 5.50**
Deseh	**4536**	600-watt, 110-volt, tubular-shaped Mazda lamp; **bulb only**	**net 5.20**
Desij	**4467**	**Acetylene Lamp** with reflector and 6 feet of rubber tubing (designed particularly for use on Model C)	**13.00**

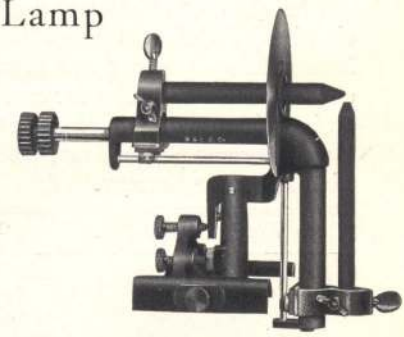
Mazda bulbs of voltages varying from 105 to 120 can also be furnished.

Special Lamps for Models B and BT

Code Word	Cat. No.	Specifications	Price
Daemf	**4461**	**500-watt Mazda Lamp** with reflector, socket, 15 feet of extension cord, connecting plug and switch, for use on Model B	**$11.25**
Daeng	**4462**	**2-jet Acetylene Burner** with ground and polished glass reflector, mounted on a base to interchange with socket for 500-watt lamp on Model B; with 6 feet of rubber hose	**10.50**
Daeph	**4515**	**30-volt, 14-ampere (420-watt) Lamp** with reflector, mogul socket and clamp for attaching to sliding plate on bottom of lamp house, 4 feet of extension cord and connector, for use on Model B	**18.50**
Daerj	**4502**	**6-volt Mazda Lamp** with silvered bulb supplementary condenser on support to interchange with 500-watt lamp, and weather socket for battery connection	**7.00**

Note—To those who desire a 30-volt lamp to interchange with the regular 115-volt, 500-watt lamp, we can supply a 30-volt, 250-watt lamp with medium screw base at the same price as the regular 400-watt lamp.

Hand-feed Arc Lamp



THIS lamp is carefully constructed, with screws and gears cut so as to prevent binding even after being thoroughly heated. The carbons can be fed independently or simultaneously. A wide range of adjustment is provided for by accurate centering screws, and all adjusting and feeding screws are carefully insulated. Either direct or alternating current can be used, although the former is desirable.

A rheostat must always be used with this lamp.

Code Word	Cat. No.	Specifications	Price
Denuh	**4464**	**Hand-feed Arc Lamp,** with centering support; for use in small lamp houses, Model C type.....	**$21.50**
Depad	**4464L**	Same as above, but with long feeding and adjusting rods for use in large size lamp house.....	**30.00**

Balo Projection Lenses

THIS series of projection lenses has been designed to meet the requirements for lenses to project opaque objects as well as lantern slides. They are corrected for chromatic and spherical aberration and give critical definition to the extreme edges of the field.

The lenses of 1⅝ and 2 $\frac{5}{16}$ inches diameter are intended particularly for lantern slide projection. The former, made in focal lengths up to 10 inches, should be used only on outfits equipped with the arc lamp, while the latter should be used with the Mazda lamp and acetylene burner. The larger diameter lenses are especially constructed for the projection of opaque objects.

These lenses, very accurately mounted in heavy brass tubes with rack and pinion focusing adjustment, are finished in black and white engraving.

Code Word	Cat. No.	Diameter in Inches	Focus in Inches	Price
Dejey	**4006**	1⅝	6	**$15.00**
Dejiz	**4008**	1⅝	8	**15.00**
Dejob	**4010**	1⅝	10	**15.00**
Dejuc	**4020**	2 $\frac{5}{16}$	10	**23.00**
Dekay	**4022**	2 $\frac{5}{16}$	12	**23.00**
Dekez	**4025**	2 $\frac{5}{16}$	15	**23.00**
Dekib	**4028**	2 $\frac{5}{16}$	18	**23.00**
Dekoc	**4045**	4	15	**82.50**
Dekud	**4048**	4	18	**82.50**
Delaz	**4055**	5	25	**140.00**

Condensing Lenses

WHEN ordering extra condensers, the table given below will enable you to determine the catalog number of required lens. The Rear Condenser is nearest the light source and the Front Condenser is nearest the projection lens.

Condenser Table of Catalog Numbers

Balopticon	Rear Condenser	Front Condenser	Balopticon	Rear Condenser	Front Condenser
ABM-4	5093	5106	**BM-18**	5106	5102
ABM-10	5106	5107	**BM-20**	5106	5102
AM-12	5106	5107	**BM-22**	5106	5104
BBM-10	5106	5107	**BM-24**	5106	5104
BBM-12	5106	5107	**BTM**	Same as BM models	
BBM-15	5106	5108	**CLM-10**	5095	5110
BBM-18	5106	5102	**CLM-12**	5095	5110
BCM-10	5106	5107	**CLM-15**	5095	5111
BCM-12	5106	5107	**CLM-18**	5095	5112
BCM-15	5106	5108	**CLM-20**	5106	5102
BCM-18	5106	5102	**CLM-22**	5106	5104
BG-10	5093	5106	**CLM-24**	5106	5104
BG-12	5106	5107	**CLA**	Same as CLM models	
BG-15	5106	5108	**CRM-15**	5093	5107
BM-4	5093	5106	**CRM-18**	5093	5108
BM-6	5093	5106	**CRM-25**	5093	5104
BM-8	5093	5106	**D***	4413	*
BM-10	5106	5107	**JCRM**	5102	5104
BM-12	5106	5107	**KRMS**	5106	5106
BM-15	5106	5107			

*Model D has three condensing lenses, the rear lens being listed above. The catalog number of the middle lens is 4411. The focus of the front unit is the same as that of the projection lens with which it is used.

Code Word	Cat. No.	Style	Diameter	Focus	Price
Divoy	**5094**	Plano-Convex	4″	5.5″	**$ 1.40**
Deleb	**5095**	Plano-Convex	4″	6.5″	**1.40**
Delic	**5093**	Plano-Convex	$4\frac{5}{16}$″	5.5	**1.50**
Demec	**5106**	Plano-Convex	$4\frac{5}{16}$″	6.5″	**1.50**
Divuz	**5107**	Plano-Convex	$4\frac{5}{16}$″	7.5″	**1.50**
Diwaw	**5108**	Plano-Convex	$4\frac{5}{16}$″	8.5″	**1.50**
Deluf	**5102**	Plano-Convex	$4\frac{5}{16}$″	9.0″	**1.50**
Demab	**5104**	Plano-Convex	$4\frac{5}{16}$″	10.0″	**1.50**
Diwex	**5105**	Plano-Convex	$4\frac{5}{16}$″	12.0″	**1.50**
Diwoz	**5103**	Plano-Convex	$4\frac{5}{16}$″	15.0″	**1.50**
Diwub	**5101**	Plano-Convex	$4\frac{15}{32}$″	5.5″	**1.50**
Dixax	**5109**	Plano-Convex	$4\frac{15}{32}$″	6.5″	**1.50**
Dixey	**5110**	Plano-Convex	$4\frac{15}{32}$″	7.5″	**1.50**
Dixiz	**5111**	Plano-Convex	$4\frac{15}{32}$″	8.5″	**1.50**
Dixob	**5112**	Plano-Convex	$4\frac{15}{32}$″	9.0″	**1.50**
Demid	**4411**	Plano-Convex	$4\frac{15}{32}$″	10.0″	**1.50**
Dixuc	**5113**	Plano-Convex	$4\frac{15}{32}$″	12.0″	**1.50**
Dizaz	**5114**	Plano-Convex	$4\frac{15}{32}$″	15.0″	**1.50**
Dizeb	**5115**	Plano-Convex	$4\frac{15}{32}$″	18.0″	**1.50**
Dizic	**4427**	Plano-Convex	6″	10.0″	**6.00**
Dizod	**4435**	Plano-Convex	6″	12.0	**6.00**
Demug	**4413**	Concave-Convex	4″	11.5″	**3.75**
Dizux	**4419**	Concave-Convex	$5\frac{1}{2}$″	11.5″	**9.00**
Denac	**4428**	Concave-Convex	6″	11.5″	**10.50**
Dened	**4429**	Double-Convex	$7\frac{7}{8}$″	10.75″	**15.00**

Rheostat for Arc Lamps

No. 4452—4½-Ampere Rheostat

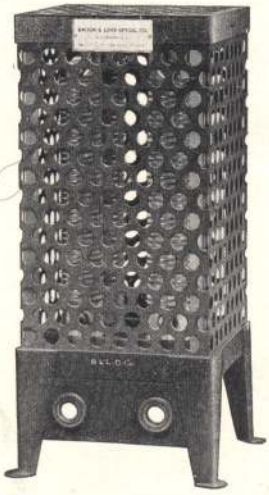
WITH every arc lamp there must be used a rheostat, selected according to the voltage available and the number of amperes required.

We construct our rheostats to meet the strictest requirements of fire boards and underwriters and they have been approved by the National Board of Fire Underwriters' Laboratory of Chicago. The wire in the resistance coils has practically no temperature coefficient and will not deteriorate with frequent heating and cooling. The cases are of perforated metal thus providing for the freest possible air circulation among the coils. There are no exposed contact points, and every means of insuring safety has been taken advantage of.

The coils in rheostats of 15 amperes capacity and over are wound on asbestos board strips to prevent sagging or possible contact between coils. The coils in the 4½-ampere rheostats are carried on porcelain spools.

The 4½-ampere rheostats can be used satisfactorily with the electric wiring usually found in private houses, connecting with the ordinary lamp socket. Those of higher capacity generally require special wiring.

When ordering be sure to specify voltage



No. 4450—15-Ampere Rheostat

No. 4456—15 to 35-Ampere Rheostat

Code Word	Cat. No.	Specifications	Price
Desok	**4450**	**Fixed Form,** 15 amperes, 110 volts	**$15.00**
Desul	**4451**	**Fixed Form,** 15 amperes, 220 volts	**27.00**
Detol	**4452**	**Fixed Form,** 4½ amperes, 110 volts, with cord, plug and pass through switch	**8.50**
Detum	**4453**	**Fixed Form,** 4½ amperes, 220 volts with cord, plug and pass through switch	**13.75**
Devek	**4454**	**Adjustable Form,** 15 to 25 amperes, 110 volts	**27.00**
Devil	**4455**	**Adjustable Form,** 15 to 25 amperes, 220 volts	**37.50**
Devom	**4456**	**Adjustable Form,** 15 to 35 amperes, 110 volts	**50.00**
Devun	**4460**	**Adjustable Form,** 15 to 35 amperes, 220 volts	**62.50**

Transformers and Resistances for Mazda Lamps

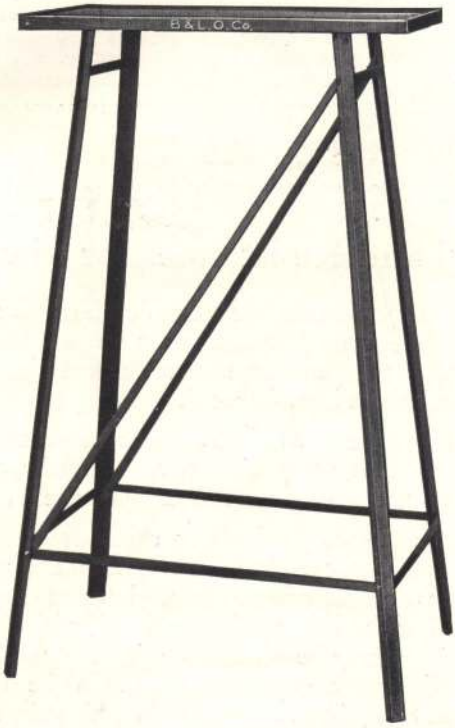
ANY Mazda lamp, used on an electrical circuit whose voltage materially exceeds that for which the lamp is rated, must be provided with a suitable transformer or resistance to be connected with the lamp in order to reduce the voltage to that for which the lamp is rated.

It has not been found practical to make these concentrated high power lamps for 220 volts or higher; hence, where high voltage prevails, the 110-volt lamps, as well as the 6-and 30-volt ones, must be used with a resistance.

For the low voltage lamps, particularly those drawing rather high amperage, a transformer should be used wherever alternating current is available, as with this device the rate of current consumption on the main line is reduced to the point where all of the low volt lamps listed, with the exception of the 30-volt, 30-ampere lamp, may be connected with the regular lighting socket. When operating on direct current a resistance must be used and an outlet, with an ampere capacity equivalent to that for which the lamp is rated, provided.

Code Word	Cat. No.	Specifications	Price
Dexem	**4496**	**220-volt Resistance** for 400-watt lamp	**$ 9.50**
Daicw	**4475**	**220-volt Resistance** for 500-watt lamp	**11.00**
Daamd	**4465**	**220-volt Resistance** for 600-watt lamp	**13.00**
Dexin	**4498**	**220-volt Resistance** for 1,000-watt lamp	**14.00**
Dexop	**4499**	**30-volt, 14-ampere Transformer,** for use on 110-volt, alternating current, with 15 feet of extension cord, switch and plug on primary cord from lamp on secondary side	**17.50**
Dexur	**4469**	**Rheostat** for use on 110-volt, direct current with 30-volt, 14-ampere lamp with 2 feet of connecting cord attached to terminals	**22.00**

Balopticon Tables



No. 4259

TO provide a suitable means of supporting the Balopticon we have developed a line of supporting tables, all of which are of a convenient height for operating the Balopticon and of a proper height for clearing the heads of the audience.

No. 4259 stand, made of angle iron, is very rigid, 48 inches high. Wooden top 30 x 12 inches. Very desirable for the smaller types of Balopticons.

Stand No. 4257 is made of angle iron, strongly braced, and has a wooden top, the front of which may be raised or lowered. One of the unique features of this stand is that it may be folded up when not in use and stored in any small closet. It is of course folded when shipped. The front legs are fitted with casters, so that by lifting rear legs free of the floor it may be easily moved from place to place. Because of the method of bracing it is extremely rigid, and is recommended for such outfits as the CL and CRM.

Folding Balopticon Tables

No. 4257 in Two Positions

NO. 4253 stand is made with a heavy cast iron base with supporting columns, and a cast-iron frame-work upholding the wooden top, which is provided with elevating screws at the front. This table is particularly recommended for such apparatus as the Convertible.

Code Word	Cat. No.	Specifications	Price
Dhixm	**4259**	**Balopticon Table** of metal, 48″ high; top of wood, 30 x 12″	**$15.00**
Dhizp	**4257**	**Folding Balopticon Table,** 47″ high, with wooden top 32 x 19″	**27.50**

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