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CONSTRUMENTS
“200” OUTFIT

INSTRUCTIONS
REGARDING THE
BUILDING OF
CINEMATOGRAPH
PROJECTORS

WITH NOTES ON BUILDING
THE IMPROVED 9.5 m/m CINE
PROJECTOR

CONSTRUMENTS LTD.,
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CINEMATOGRAPHS.

GENERAL NOTES.

Each model consists of three units, viz., 1, PROJECTION UNIT, 2, MECHANICAL UNIT, and 3, ILLUMINATION UNIT.

If these units are assembled separately as described, and the three units fitted together, no difficulty should be encountered.

The Mechanical Unit is common to all three models, and it should be noted that great care is necessary in the adjustment of the Claw, as successful results cannot be obtained if this is incorrect. This adjustment is fully explained later.

It will be seen that 16 m/m or 9.5 m/m film may be used. It is for this reason that the Mechanical Stand (57) is provided with three parallel slots 1/8 in. wide. The central slot is used with the 9.5 m/m Gate Pad (58) and either of the outer slots with the 16 m/m Gate Pad (59). The method of assembling the Claw is described in the next section, but it must be remembered that the Claw must be arranged so as to pass through the centre slot for 9.5 m/m film or through either of the outer slots for 16 m/m film. This is easily done by fixing Collar (74) and Gear Wheel (66) in suitable positions on the Claw Axle.

After any model has been assembled great care should be taken to focus the light on the picture of the film. The lamp should be exactly central to the lens and it should be fixed in such a position that the circle of light falling on the picture just covers the gate opening.

THE MECHANICAL UNIT. (See Figs. 1, 2, 3.)

1. This is required for Models 109, 110, 111.

Assemble two Film Carrier Arms (60) and 1 Gate Pad (58) or (59) on Mechanical Stand (57) as indicated in Fig. 1. Half-inch Bolts and Nuts should be used, care being taken that threaded portions are as shown, viz., outside on top, and inside on the two sides. Now thread a film, with its pictures upside down, between the Gate Pad and Mechanical Stand where marked "X" on drawing. The film should pull through easily, but not

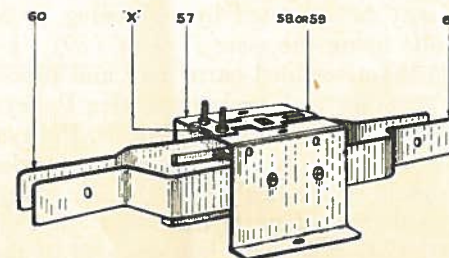


Fig. 1.

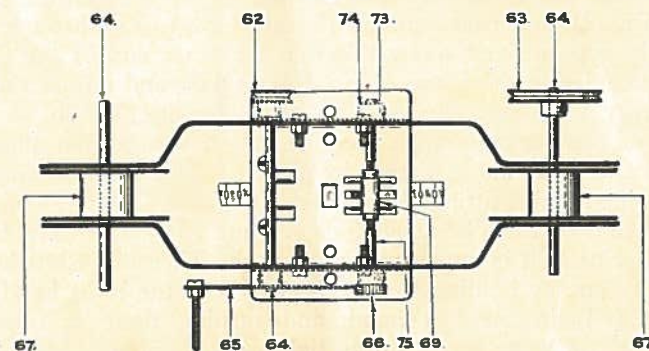


Fig. 2.

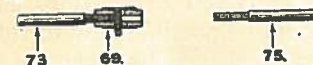


Fig. 2A.

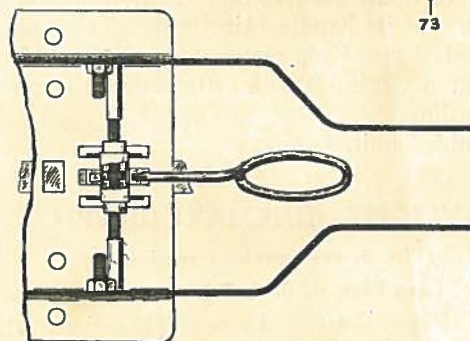


Fig. 2B.



Fig. 4.



Fig. 5.

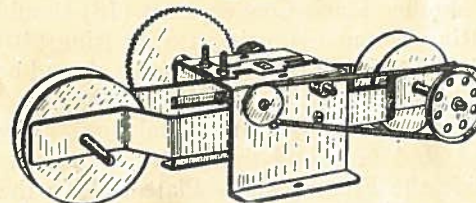


Fig. 3.



Fig. 6.

loosely, which may be adjusted by tightening or loosening the Nuts on the Bolts fixing the Gate (58) or (59).

2. Now turn the assembled parts over and proceed to mount the Axle Rods, together with their respective Pulleys, etc., in the positions shown in Fig. 2. All Gear Wheels, Pulleys and Collars are provided with Set Screws for securing to axles, and when secured, axles should rotate easily with the minimum of end play.

Fig. 2a shows details of parts necessary for the Claw Axle. A Threaded Rod (73) is screwed into one end of the Claw (69). Insert this combined part into its hole in the Mechanical Stand (see Fig. 2), and pass another Threaded Rod (75) through hole directly opposite and screw this into the other end of the Claw, thus completing the Claw Axle. Rotate axle and adjust claw if necessary with Screwdriver (70) as shown in Fig. 2b, so that point of claw engages with the perforations in the film allowing the film to move along picture by picture. This position must be maintained whilst fitting Gear Wheel (66) and Collar (74) firmly to the ends of the Threaded Rods (73 and 75). The Claw being in adjustment, it is important to screw the Threaded Rods home. This is done by holding Gear Wheel (66) in the right hand and Collar (74) in the left hand, and turning these in opposite directions so as to screw up as tightly as possible.

Fig. 2 is self explanatory as regards assembly of spools, etc. It should be possible now to rotate claw spindle easily by turning Gear Wheel (65) by means of its handle (1in. Bolt) so that film passes downwards through Gate Pad, picture by picture. To complete the assembly, fit a Spring Band (70) round the two Pulleys, which must be in line.

Fig. 3 shows the assembled unit.

MODEL 109.—DAYLIGHT CINEMATOGRAPH.

THE MECHANICAL UNIT. (Fig. 3, see previous section.)

THE PROJECTION UNIT. (See Figs. 4, 5, 6, 7.)

After assembling two Plano-Convex Lenses (18), between which a Distance Ring (8) has been placed, in a Tubular Mount (39) as shown in Fig. 4, another Plano-Convex Lens (18) should be placed in a Screwed Ring Mount (3), using a Split Ring (10) to hold lens in place. (See Fig. 5.) These two mounts should be screwed together as indicated in Fig. 6.

To complete the assembly secure this to an Optical Box (1) by means of a 5in. Screwed Rod (72) and the necessary nuts as illustrated in Fig. 7. Slide the Frosted Glass Plate (22) in the top of the Optical Box to complete the unit.

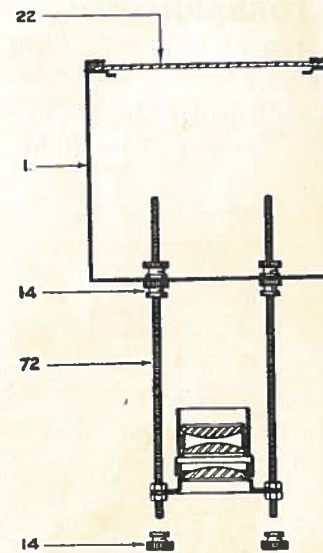


Fig. 7.

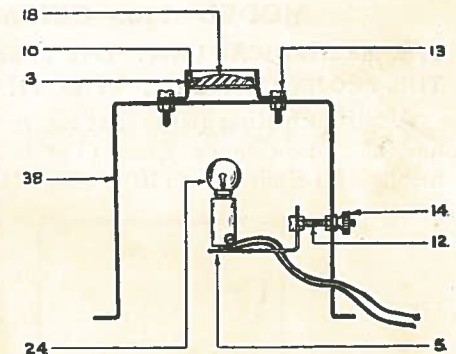


Fig. 8.

THE ILLUMINATION UNIT (Fig. 8.)

This consists of a Screwed Ring Mount (3) fitted with a Plano-Convex Lens (18) held in position with Split Ring (10) secured to an Instrument Stand (38) by $\frac{1}{4}$ in. Screws (13). By means of 1in. Bolt (12) with the necessary Nuts, a Lamp-holder (5), complete with Focus Electric Bulb (24) is fitted in position. Fig. 8 shows the assembled unit.

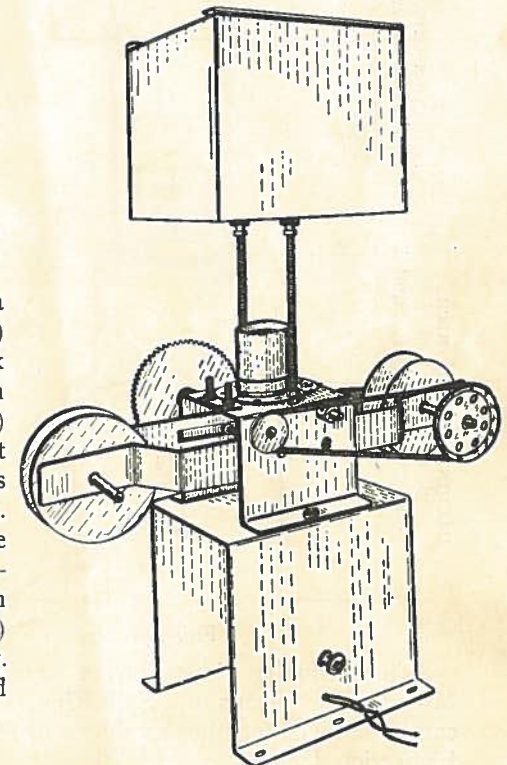


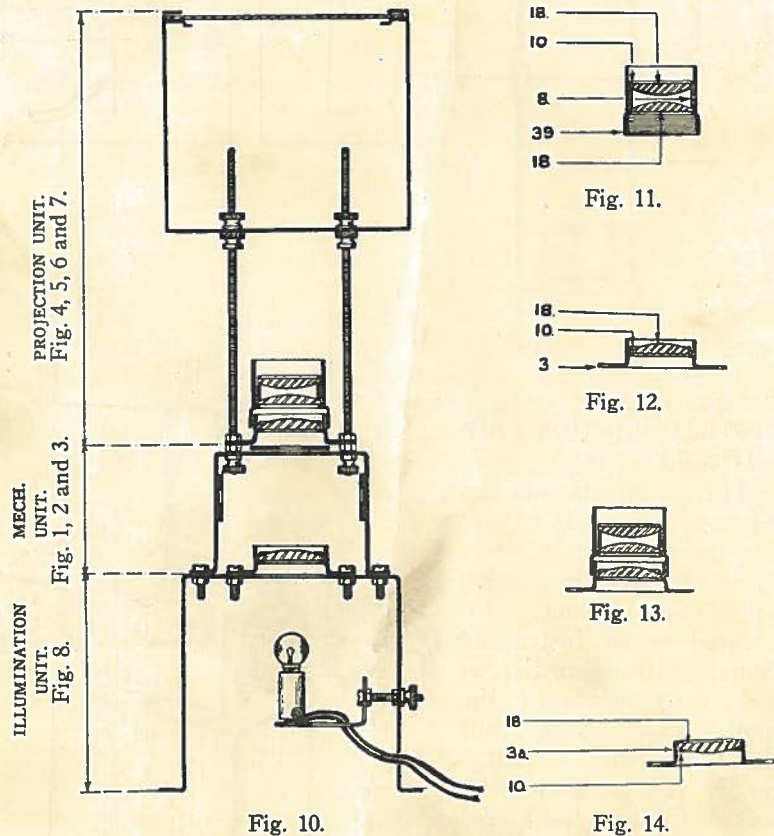
Fig. 9.

COMPLETE MODEL. (Figs. 9 and 10.)

The model can now be completed by first securing Projection Unit to the Mechanical Unit, the Illumination Unit being fixed afterwards to the other units. Figs. 9 and 10 illustrate the complete assembly.

MODEL 110.—CINEMATOGRAPH.**THE MECHANICAL UNIT.** (Fig. 3, as before.)**THE PROJECTION UNIT.** (Figs. 11, 12, 13.)

A Distance Ring (8) is first inserted in a Tubular Mount (39) and a Plano-Convex Lens (18) held in position above it by means of a Split Ring (10). (Fig. 11.)



ILLUMINATION UNIT.
Fig. 8.

MECH. UNIT.
Fig. 1, 2 and 3.

PROJECTION UNIT.
Fig. 4, 5, 6 and 7.

Fig. 10.

Fig. 14.

Fig. 11.

Fig. 12.

Fig. 13.

2. Insert two $\frac{1}{2}$ in. Screwed Bolts (13) in an Assembly Plate (61). Study Fig. 15, making sure of using the holes indicated.

3. From the inside of the Optical Box (1) insert two 1in. Screwed Bolts (12) in the two small holes in the top (see Fig. 16) and from the outside secure to the box by means of Hexagonal Nuts (15).

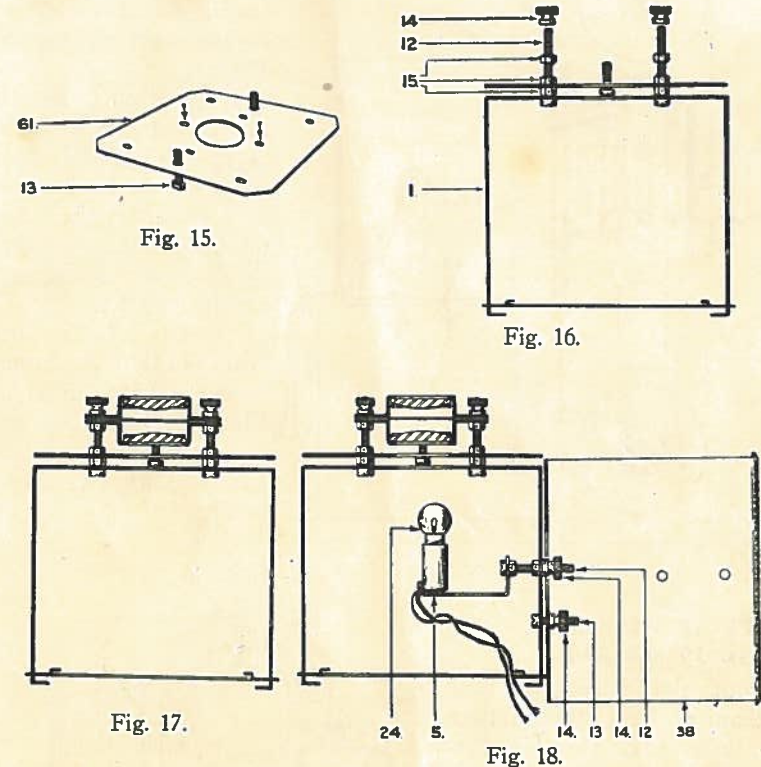


Fig. 15.

Fig. 16.

Fig. 17.

Fig. 18.

After fitting a Plano-Convex Lens (18) in a Screwed Ring Mount (3) by means of a Split Ring (10) (Fig. 12), the two parts can be screwed together as shown in Fig. 13, thus completing the Projection Unit.

THE ILLUMINATION UNIT. (Figs. 14, 15, 16, 17, 18.)

1. Assemble two mounts as shown in Fig. 14, viz., a Plano-Convex Lens (18) in a Plain Ring Mount (3a) held by Split Ring (10).

4. Now lift the Assembly Plate (61) by means of the screwed ends of the Bolts (13), and place it over the projecting bolts which are fitted to the Optical Box.

The $\frac{1}{2}$ in. Bolts by which the Assembly Plate has been lifted should now be between the projecting bolts. Fig. 16 should make this clear, and arrows shown on Fig. 15 indicate the holes which thread on the projecting bolts.

The $\frac{1}{2}$ in. Bolts which now have their heads between the Assembly Plate and the Optical Box, will be used later for securing the mechanical unit.

PROJECTION UNIT. Figs. 11, 12 and 13.	MECH. UNIT. Figs. 1, 2 and 3.	ILLUMINATION UNIT. Figs. 14, 15, 16, 17 and 18.
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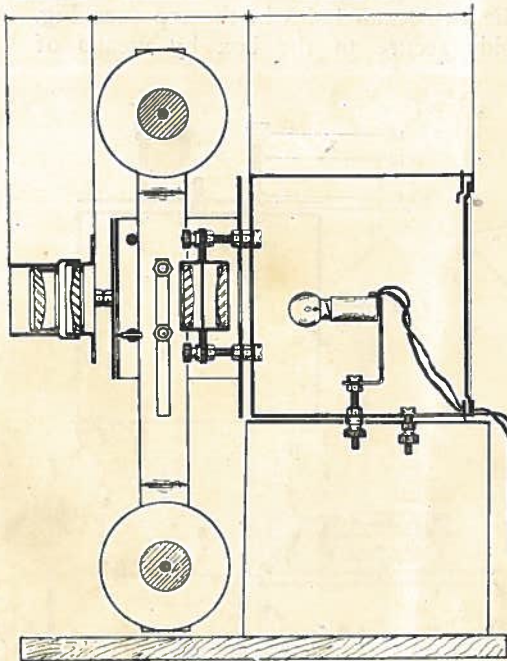


Fig. 19.

COMPLETE ASSEMBLY. (Figs. 19 and 20.)

From the inside of the Mechanical Unit, thread two 1in. Bolts (12) through the holes provided and from the outside screw two Hexagonal Nuts (15) on to each. Secure the Projection Unit by means of these bolts and Terminal Nuts (14).

Fit a wooden base to the Instrument Stand (38). (This is not supplied with the set but a piece of wood 7in. x 5in. x 3/8 in. approximately, will serve the purpose, and let this

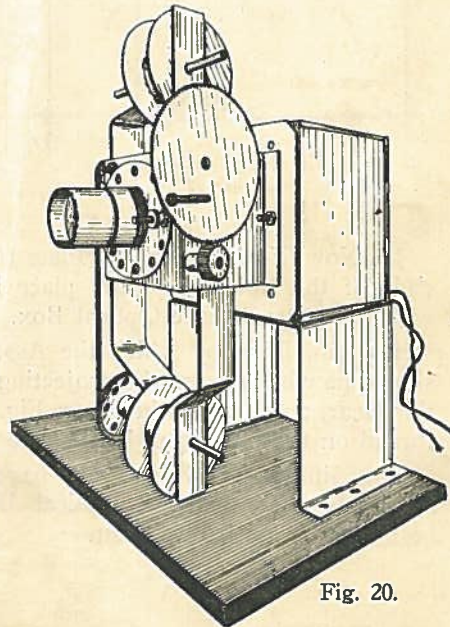


Fig. 20.

Two more Hexagonal Nuts (15) are now screwed on the projecting bolts for securing the Assembly Plate.

Half way down the projecting bolt, two more Hexagonal Nuts (15) should be screwed to support the lens mounts which are threaded on and secured as illustrated by Fig. 17, by means of Terminal Nuts (14). A Lamp-holder (5), Focus Electric Bulb (24) and an Instrument Stand (38) are fitted as shown in Fig. 18.

support the Illumination Unit.) Complete the assembly by securing the mechanical and projection units, to the illumination unit by means of the 1/2in. Bolts referred to in section 4 above, and Hexagonal Nuts (15).

MODEL 111.—MIRROR CINEMATOGRAPH.

THE MECHANICAL UNIT. (Fig. 3, as before.)

THE PROJECTION UNIT. (Figs. 11, 12, 13, 21.)

The Projection Unit is similar to that described for the "Projection Model," and is illustrated in Figs. 11, 12 and 13. When assembled, fit two 1in. Screwed Bolts (12) with Nuts (14)

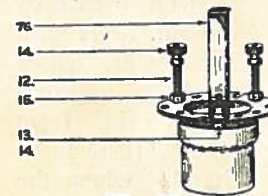


Fig. 21.

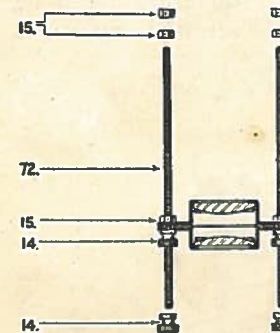


Fig. 22.

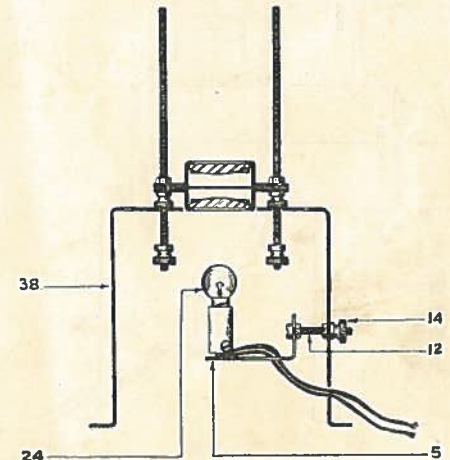


Fig. 23.

and (15) as shown, and secure a Mirror Clip (76) to the Mount by means of a 1/2in. Screwed Bolt (13) and a Terminal Nut (14). This is illustrated in Fig. 21, by studying which, the correct holes for the bolts can be easily selected.

THE ILLUMINATION UNIT. (Figs. 22, 23.)

1. Assemble two Plano-Convex Lenses (18) in two Plain Ring Mounts (3a) as illustrated by Fig. 14.

2. Thread Mounts on to two 5in. Screwed Rods (72), see Fig. 22. Securing same by means of a Hexagonal Nut (15) at the top and a Terminal Nut (14) at the bottom, the Ring Mounts

should be about a quarter of the length of the Rod from the bottom.

3. Now thread the short ends of the length of the Rods in an Instrument Stand (38) and to the ends inside the Stand screw two Terminal Nuts (14) for the distance of a few threads.

4. Complete the Unit by fixing Lampholder (5), Focus Electric Bulb (24) by means of 1in. Screwed Bolt (12). See Fig. 23.

COMPLETE ASSEMBLY. (Figs. 24 and 25.)

Thread the Mechanical Unit over the 5in. Screwed Rods and secure to Instrument Stand with $\frac{1}{2}$ in. Bolts (13). Screw a Hexagonal Nut (15) on to each of the 5in. Rods until the lower lenses are lifted approximately $\frac{1}{4}$ in. from the Instrument Stand; when the Terminal Nuts underneath can be screwed up tight

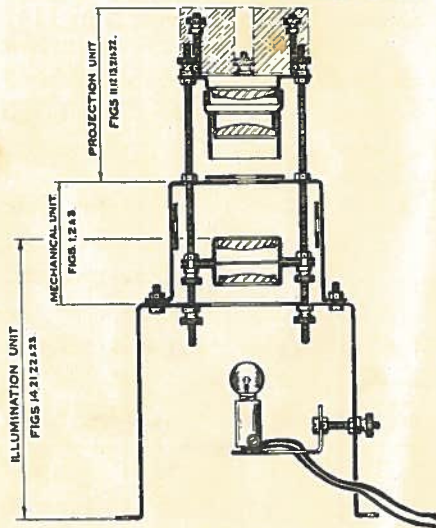


Fig. 24.

screw two more Hexagonal Nuts on the top of the Screwed Rods to support the Projection Lens Unit, the bottom of which should be approximately $\frac{1}{4}$ in. from the Mechanical Stand. Terminal Nuts can now secure Projection Lens Unit in position.

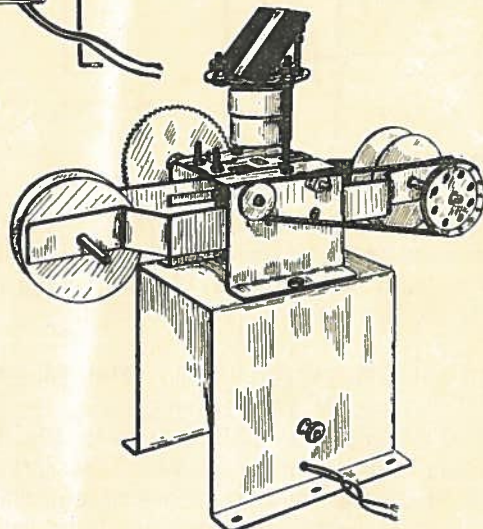


Fig. 25.

**INSTRUCTIONS FOR BUILDING
THE INSTRUMENTS 9.5 m/m. CINE PROJECTOR
—IMPROVED MODEL.**

The instructions contained in the Construments Instruction Book under the heading "Cinematographs" should be followed in regard to the main assembly, but the following additional points should be noted:—

- (a) The gate spring now provided is fitted on top of the Gate Pad (Part No. 58, Fig. 1) by placing the coiled parts over the two screwed studs on the pad and the nuts provided screwed down about two or three turns so that when the film is pulled through by hand it is subject to a slight friction grip. These nuts provide an adjustment of this tension, but too much tension must not be applied to the film.
- (b) The Claw Parts (No. 69, 73 and 75, Fig. 2A) have now been superseded by a complete claw. This is held in place on the shaft by means of a set screw and should be so adjusted on the shaft that the tooth of the claw is in the exact centre of the middle slot on the bridge and engages with the film perforation.
- (c) The 16 m/m gate mentioned in the original instructions has now been discontinued, and this cine-projector is now only for use with standard 9.5 m/m.

The rest of the instructions and illustrations should be carefully followed as regards general assembly and lens system.

LIST OF INSTRUMENTS IN "200" OUTFIT.

Name	No.
1 Optical Box	(1) ✓
1 Lid for Optical Box	(2) ✓
2 Screwed Ring Mounts	(3) ✓
2 Plain Ring Mounts	(3a) ✓
1 Optical Tube (3in.)	(4) ✓
1 Optical Tube (1½in.)	(4a) ✓
1 Lampholder	(5) ✓
1 Camera Cap (Plush)	(6) ✓
1 Camera Cap (Plain)	(6a) ✓
2 Battery Clips	(7) ✓
1 Distance Ring	(8) ✓
1 Small Pinhole Disc	(9) ✓
4 Split Rings	(10) 3
2 3in. Rods	(11) ✓
7 1in. Bolts	(12) 4
11 ½in. Bolts	(13) 10
7 Terminal Nuts	(14) 5
25 Hexagonal Nuts	(15) 15
1 Spanner	(16) ✓
1 Bi-Convex Lens	(17) ✓
4 Plano Lenses	(18) 3
3 Strip Mirrors	(19) ✓
2 Square Mirrors	(20) ✓
1 Clear Glass Plate	(21) ✓
1 Frosted Glass Plate	(22) ✓
6 Glass Slides	(23) ✓
1 Special Bulb (3.5 volt)	(85) ✓
1 Frosted Disc	(26) 0
1 Red Transparent Disc (1in. diam.)	(27) ✓
1 Yellow Transparent Disc (1in. diam.)	(28) ✓
1 Green Transparent Disc (1in. diam.)	(29) ✓
1 Blue Transparent Disc (1in. diam.)	(30) ✓
1 Red Opaque Disc (⅝in. diam.)	(31) ✓
1 Yellow Opaque Disc (⅝in. diam.)	(32) ✓
1 Green Opaque Disc (⅝in. diam.)	(33) ✓
1 Blue Opaque Disc (⅝in. diam.)	(34) ✓
1 White Opaque Disc (⅝in. diam.)	(35) ✓
1 Black Opaque Disc (⅝in. diam.)	(36) ✓
6 Rubber Bands	(37) ✓
1 Lens Stop (⅜in.)	(37a) ✓
2 Tubular Mounts	(39) ✓
2 Caps for Tubular Mounts	(40) ✓

LIST OF INSTRUMENTS IN "200" OUTFIT.—Continued.

Name	No.
1 High Power Objective	(41) ✓
1 Mount for High Power Objective	(41a) ✓
1 Stand	(38) ✓
1 Reflector	(42) ✓
2 Spring Clips	(43) ✓
1 Lens Stop (½in.)	(44) ✓
1 Large Pinhole Disc	(45) ✓
2 2in. Bolts	(46) ✓
1 Glass Collecting Tube	(47) ✓
1 Carrier Bridge	(57) ✓
1 9.5m/m. Gate Pad	(58) ✓
2 Film Carrier Arms	(60) ✓
1 Assembly Plate	(138) ✓
1 1½in. Pulley with Boss	(62) 0
1 2½in. Gear Wheel with Boss and Set Screw	(65) 0
1 Pinion	(66) 0
1 Spring Band	(86)
1 Mirror Clip	(71) ✓
1 ½in. Pulley with Boss and Set Screw	(63) 0
3 Axle Rods	(64) 1
2 Film Spools Complete	(67) 1
2 5in. Rods	(72) ✓
1 Screw Driver	(70) 0
2 Brass Collars with Set Screw	(83) 1
1 Gate Spring	
1 Axle Rod	
2 ½in. Bolts	

LIST OF INSTRUMENTS IN "100 PLUS" OUTFIT.

Name	No.
1 Carrier Bridge	(57)
1 9.5m/m. Gate Pad	(58)
2 Film Carrier Arms	(60)
1 Assembly Plate	(138)
1 1½in. Pulley with Boss and Set Screw	(62)
1 2½in. Gear Wheel with Boss and Set Screw	(65)
1 Pinion	(66)
1 Spring Band	(86)
1 Mirror Clip	(71)
1 ½in. Pulley with Boss and Set Screw	(63)
3 Axle Rods	(64)
2 Film Spools complete	(67)
1 Plano-Convex Lens	(18)
1 Terminal Nut	(14)
7 ½in. Bolts	(13)
4 Hexagonal Nuts	(15)
2 5in. Rods	(72)
1 Split Ring	(10)
2 Brass Collars with Set Screw	(83)
1 Claw Socket	(69)
1 Screw Driver	(70)
1 Special Bulb (3.5 volt)	(85)
1 Gate Spring	
1 Axle Rod	
2 ½in. Bolts	

N.B.—(In building Cinematograph models where reference is made to Bulb No. 24, this should read No. 85).

**INSTRUMENTS THAT CAN BE CONSTRUCTED
WITH THE INSTRUMENTS "200" OUTFIT.**

Models 1 to 108 (excluding 27 and 28) can be constructed from the "200" outfit, with the addition of three cinematograph projectors as under:—

DAYLIGHT PROJECTOR.

DIRECT PROJECTOR.

MIRROR PROJECTOR.

