

PHILIPS

Cinema





INSTRUCTIONS FOR USE AND MAINTENANCE
OF PHILIPS TYPE EL 4000 PROJECTOR
(35 mm and 70 mm)

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GENERAL DESCRIPTION

The PHILIPS type EL 4000 Projector can rightly be called "fully universal", it being suitable for:

- 70 mm film with six magnetic sound tracks and
- 35 mm normal, wide-screen or CinemaScope films with either optical sound track or with one to four magnetic tracks.

A. Projector mechanism and soundheads

The complete projector mechanism as well as the optical and the magnetic soundhead are housed in one casing (fig. 1). The rear cover of the casing (fig. 2) is oil-tight without any packing material being required, so that it can easily be removed and fitted again for inspection of the interior.

The entire film path is closed by a door with large glass window. An illumination lamp fitted at the inside of the door is so circuited that it illuminates the whole film path when the door is opened, thus facilitating threading of the film.

The projector is equipped with water cooling for the film gate and with a film-rupture protector. The latter is operated as soon as for any reason the film should stop in the projector, thereby closing a dowser (and thus intercepting the light beam) and switching off the motor.

As the projection lens (Cine-Apergon) used for 70 mm film is large, the lens holder must satisfy high demands. The lens is focused without any backlash by means of a sturdy knob ("4" in fig. 1); during focusing the whole lens holder moves over a long slide.

The two soundheads are built as separate, easily removable units.

B. Base (fig. 1)

The base consists of an upper part "8" which can pivot in the lower part "10", thus allowing the adjustment of the projection angle between 28° downward and 15° upward.

1. Lower base

The sturdy lower base gives the projector the necessary foundation. In each of the four corners there are a hole for the fixing bolt and a tapped hole for a bolt to correct unevenness of the floor; these levelling bolts allow also a small height adjustment.

At the bottom the lower base is open, so that the connecting cables and the water conduits can be led to the projector through the floor. They can also be passed through a notch at the front of the bottom.



2. Upper base

The upper base, with screwed on lower spool box, carries the projector casing. In this part of the base are housed the driving mechanism for the lower spool, the terminal blocks and the connecting cocks for the water-cooling conduits of projector and lamphouse. The interior is easily accessible, the cover at the rear being fixed with only two screws (fig. 3).

At the operating side there are two push-buttons "11" (fig. 1) for switching on and off the motor; button "7" at the front serves for change-over from one projector to the other.

In the upper part of the base there is, furthermore, a micro-switch ("2" in fig. 3) operated by centrifugal force which does the light-dowser open when a definite speed of the projector has been attained and does it close again as soon as the speed drops below this value.

C. Mounting table for the lamphouse

This mounting table is fixed to the upper base with four bolts. It has six slotted holes for fixing the lamphouse. The three push-buttons "13" (fig. 1) at the operating side serve for switching on (first half, then full voltage) and for switching off the arc-lamp rectifier.

D. Upper spool box

The upper spool box is provided with a sturdy cast-iron arm which is screwed on top of the projector casing. It is equipped with a time scale and an inspection lamp.

E. Driving mechanism

The motor is coupled with the driving shaft of the projector by means of a V-belt. To make the projector run at either 24 frames/sec (35 mm film) or 30 frames/sec (70 mm film), the motor shaft is provided with a double pulley and the driving shaft with two single pulleys which at choice are coupled to this shaft by means of a friction clutch. The belt and the pulleys are housed in belt guard "5" (fig. 1).



DESCRIPTION OF THE PRINCIPAL PROJECTOR PARTS

A. Cooling plate "17" (fig. 4)

The cooling plate is provided with an interchangeable aperture plate and with two holders for the pressure bands. It can easily be slid out of the projector casing for rapid and easy interchange of aperture plate and bands.

B. Runner plate "18" (fig. 4)

With each projector are supplied one runner plate for 35 mm film and one for 70 mm film. To each of these plates are fixed two pad rollers, that at the top for the lower feed sprocket ("19") and that at the bottom for the intermittent sprocket. Furthermore, each runner plate is provided with two lateral guide rollers which keep the film well aligned with respect to the gate aperture.

C. Main shaft "4" (fig. 5)

This large, very sturdy shaft runs in three bearings; it is driven by the horizontal shaft "16".

Direct driven by the main shaft are:

- the upper feed sprocket (gear wheel "3");
- the lower feed sprocket (gear wheel "4");
- the shutter shaft ("6");
- the hold-back sprocket (gear wheel "11").

Furthermore, the main shaft drives:

- the intermittent mechanism ("7") via an intermediate gear wheel and
- the shaft of the lower film spool via coupling shaft "1" (fig. 3).

D. Intermittent mechanism (fig. 5)

The intermittent mechanism, manufactured of the most appropriate materials and machined with great precision, satisfies the highest demands. It is built as a separate, easily removable unit.

E. Shutter and shutter shaft

The projector is equipped with a single-blade, conical shutter of large diameter. It is located close to the gate aperture and thus intercepts the light beam (twice per frame) where it is narrowest. The large diameter of the shutter and its favourable place in the projector explain its very high light efficiency.

The shutter shaft with its support can as one unit be taken out of the projector.

F. Oil pump and lubricating system (fig. 5)

The powerful spur-gear oil pump "13" is mounted at such a place that, even when the projector is tilted at a large angle, the suction opening is always below the oil level.



The pump is provided with an easily removable gauze filter, combined with a magnetic filter.

The central oil pipe "12" has branches to the various gear-wheel transmissions. The oil level can be checked with the aid of gauge "8" (fig. 4).

OPTICAL SOUNDHEAD

The optical soundhead "13" (fig. 4) is built as a separate unit which is screwed in the projector casing by means of four screws.

The sound drum is driven by the film. Several guide rollers keep the film in close contact with the drum over a large proportion of its circumference.

With the aid of a condenser system and a glass rod a very uniform and bright light spot is projected on to the sound track of the film. A macro-lens projects the strongly illuminated sound track on to a screen with slit via a mirror. Finally, a condenser lens, placed direct behind the slit, concentrates the light on a highly sensitive photocell.

MAGNETIC SOUNDHEAD

Like the optical soundhead, the magnetic soundhead "4" (fig. 4) is built as a separate unit which is screwed in the projector casing.

The two sound shafts are driven by the film. The magnetic head is placed between these shafts; it can explore in total ten tracks, viz. six tracks of 70 mm film and up to four tracks of 35 mm film. The head is protected by cap "3" which is fixed with only one screw, and provided with a plug, so that it can easily be replaced if necessary.



HINTS ON INSTALLATION

The unpacking, setting up and testing of the equipment is usually done by an expert. A few important points should be noted.

1. Projection room

It is advisable not to install the equipment before the projection room has been completely fitted out, i.e. has been provided with windows with shutters, the complete electrical wiring and the water pipes.

2. Unpacking

Care should be taken when opening the cases: use a nail extractor, not a hammer. Do not try to take the apparatus from the cases before all the fixing material has been removed. Do not remove the oil-paper before all the wood-wool has been taken out. See that no parts are left in the packing.

In the factory all bright parts are coated with anti-rust oil; this should not be removed before the equipment is ready for initial testing.

The cases in which the various parts of one projector are packed are all marked with the same series number (viz. the series number of the projector casing) and with Roman numerals which refer to the part(s) packed in the case, viz.

Case No.	Contents	See	
		Fig.	No.
I	Lower base	1	10
II	Upper base	1	8
III	Mounting table for lamphouse	1	14
	Lens holder + adapters	4	6
IV	Projector casing with projector mechanism ⁺)	1	3
V	Upper and lower spool boxes	1	1,9
VI	Belt guard	1	5
	Motor	1	6
	Belt-transmission mechanism	-	-
VII	Optical soundhead	4	13
	Slide for lens holder	4	7
	Parts (in box) for projection of 35 mm film	-	-
	Hinges for front door	-	-
	Flywheels, magnetic head and junction box for magnetic soundhead	-	-
	Door for projector casing	-	-
VIII	Door for projector casing	-	-

⁺) Unpacking has to take place in a special way; see page 6, IV.



ASSEMBLING THE EQUIPMENT

I Lower base

- Put four steel plates of about 2" x 2" (50 x 50 mm) and with a thickness of min. 3/16" (4 mm) on the floor of the projection room at the place where the projector will be mounted; the distance between the plates should match the distance between the levelling bolts in the lower base.
- Place the lower base on these plates, the side profiled for the lower spool box facing the operating side.
- Put a layer of the felt used for the packing on the curved top surface of the lower base (when later on the tilting angle is adjusted, the bottom of the upper base pivots over this surface).

II Upper base

- Place the upper base on the lower base, the side profiled for the lower spool box facing the operating side.
- Fix the upper base on the lower base with the aid of the two bolts supplied with the base (a washer comes between the heads of the bolts and the casting!); tighten the two bolts with the key supplied for this purpose.

III Mounting table for the lamphouse

- Hold the mounting table against the rear of the upper base and fix it with the four bolts approximately concentrically in the bolt holes (a washer comes between the heads of the bolts and the casting!).

Lens holder + adapters

- Take these parts out of the packing case and put them aside.

IV Projector casing with mechanism

- Remove the lid of case IV and tip the case carefully until it stands with its open side on the floor; then lift the case carefully from the projector casing.
- Remove the upper board (three bolts) and the lower board (two bolts) from the projector casing.
- Put the casing on the upper base.
- Loosen the two screws "9" (fig. 5) two turns; turn the washers under these screws 180° and tighten the screws again.
- Shift the casing on the upper base so that the two washers lie flat against surfaces "17" (fig. 3) on the upper base and the two tapped holes at the bottom of the casing are approximately concentric with respect to the two holes in the top surface of the upper base.



- Fix the projector casing on the upper base with two bolts (a washer comes between the heads of the bolts and the casting of the upper base!).
- Loosen the screw which fixes coupling sleeve "15" (fig. 3) to the shaft and slide the sleeve downwards.
- Grease both ends of shaft "1" well with vaseline or with consistent **grease**.
- Slide shaft "1" through the hole in the upper base, hold the shaft vertically downwards and push coupling "15" back to its original position; then fix it again with the screw.
- Check whether shaft "1" is mounted correctly; for this purpose push it upwards and let it go; it should then fall freely downwards and the driving pin should snap again into the slit of coupling sleeve "15". Repeat this some times, each time after having turned the main shaft part of **one** revolution. If shaft "1" fails to move freely, screw up the projector casing half-tight and shift it slightly to or from the front wall of the projection room.

V Upper spool box

- Place the upper spool box on the machined surface of the projector casing, push it against the stop cam and fix it provisionally with the three screws.
- Align the spool box with the aid of a film: after having passed the rollers of the fire trap, the film should reach the upper feed sprocket without torsion; then tighten the three fixing screws.

Lower spool box

- Fix the lower spool box with four screws against the upper base.

VI Belt-transmission mechanism

- Open the lid of the belt guard and fix the guard against the front of the projector casing with the aid of the six screws fixed in the projector casing.
- Remove the protecting plate at the front of the pulley coupling (three small screws), push this coupling against the coupling sleeve of the driving shaft and fix it with the three long screws; then mount the protecting plate again.
- Clean the motor shaft and the boring in the pulley. Slide the pulley on the motor shaft until it strikes against the stop and fix it; the fixing screw of the pulley should face the motor.
- Put the two belts in the belt guard.
- Push the motor over the projecting stud bolts of the belt guard.



- Put the belts on the pulleys and fix the motor half-tight (4 nuts).
- Adjust the belt tension; the tension should be as small as possible, however large enough to prevent the belt from slipping.

VII Optical soundhead

- Take the four fixing screws out of the projector casing.
- Push the soundhead carefully into the opening in the projector casing provided for this purpose; seen from the operating side, this opening is to the left in the lower part of the casing.
- Fix the soundhead with the four screws.

Hinges for front door

- Fix the hinge without bracket against the front of the projector casing beside the belt guard (three screws).
- Fix the hinge with bracket also against the front of the projector casing but more to the top.

Slide for lens holder

- Take the four fixing screws out of the projector casing.
- Hold the slide in the correct position (see "7", fig. 4) and push it against the machined surface of the projector casing (see that the centring pins come into the holes in the casing).
- Fix the slide with the four screws.
- Remove the grease from the upper surface of the slide and lubricate it abundantly with fresh Cardan oil (type 8657).
- Push the resilient shaft of the slide towards the projector and turn this shaft 90° with the aid of projecting transversal pin "16" (fig. 4).
- Let the shaft slowly come back and see that pin "16" comes into the shallow groove at the projector side of the slide.
- Clean the bottom of lens holder "6" and lubricate it with fresh Cardan oil (type 8657).
- Put the lens holder on the slide, insert bolt "15" in the slotted hole of the slide and screw it into the lens holder.
- Push the lens holder towards the projector, turn the resilient shaft of the slide 90° and let the lens holder carefully come forwards until pin "16" lies in the long groove of the slide.



Flywheels for the magnetic soundhead

- Remove the rear cover of the projector casing.
- Remove the locking bush on sound shaft "18"; the screw is used again for fixing the flywheel; the bush (only fitted for transportation) can be thrown away.
- Hold sound shaft "18" at the operating side of the projector and put on the flywheel at the non-operating side.
- Fix the flywheel on the shaft with one screw ; see that it has minimum, but still perceptible play in axial direction.
- Mount the flywheel of shaft "17" in the same way.

Junction box (fig. 7)

- Remove the four screws at the top of plate "3" and loosen the lower screws a few turns.
- Fix bracket "1" half-tight with the four removed screws; push plate "3" upwards until the top is level with the top of the casting, then tighten the screws.
- Fix ornamental tube "12" with the aid of a bracket to the upper hinge of the door.
- Mount the junction box against the front wall of the projection room; take care that the tube cannot obstruct the light beam of the projector.

Magnetic head "12" (fig. 7)

- Remove the four lower screws of plate "3".
- Push the soundhead over plate "3" upwards until its plug is well inserted in the socket mounted on bracket "1".
- Fix the magnetic head with the four screws.
- Slide the protecting cap over the head and the bracket; it should slide easily over plate "3"; if not, shift the plate slightly; fix the cap with the milled nut.

VIII Door for projector casing

- Grease the two hinge pins with consistent grease.
- Mount the door by letting the pins sink into the holes of the hinges.
- Connect the socket of the ornamental tube coming out of the upper base to the plug in the door.



MOUNTING OF THE LAMPHOUSE

The parts and instructions for mounting are supplied with each Philips lamphouse. For the height of the optical axis above the mounting table see fig. 6.

CONNECTION OF THE WATER COOLING

- Loosen the milled nut in the cap of the shutter housing, push the cap upwards and remove it.
- Make a loop in the feed and in the return tube; do not make the loops too large for they might come into the light beam of the lamphouse and then certainly be burned. See that the tubes pass under the strip of the cover plate with light cone and that the loop running upwards passes over this strip.
- Fix the tubes to the pipes of the cooling plate (fig. 16); the water can flow in either direction through this plate, i.e. feed and return side can be chosen at will.
- Lead the tubes through the opening in the projector casing towards the upper base and fix them there with the connectors (see fig. 3; "11" = feed tube; "4" = return tube).
- Fix the tubes for cooling the arc lamp under the mounting table of the lamphouse and connect them in the upper base as indicated in fig. 3 ("3" = feed tube; "5" = return tube).
- Lead the general feed and return tubes through the notch at the bottom of the lower base to the upper base; fix the feed tube to connector "9" and the return tube to connector "6" (fig. 3).



ELECTRICAL CONNECTIONS

The projectors are normally supplied for connection to 220 V, 50 c/s A.C. mains. For operation from 110 V, 50 c/s mains, a 1.5 kVA transformer (type 3852) has to be used with a view to switch SK1. On order the projector can also be supplied for 60 c/s mains.

Fig. 8 is the wiring diagram and fig. 9 the principle diagram based on the connection of the terminals marked with an arrow in fig. 8. In these diagrams are:

- 20-60 = mains connection
- 40 = connection of the earth lead
- 80-81 = exciter-lamp supply
- 105-106 = connection of the change-over switch
- 50-52 = supply of picture relay
- 64-65-66-67 = safety connection when switching on rectifier and arc lamp.

Explanation of the Roman numerals in figs 8 and 9

- I = Lamp in projector door.
- II = Motor connection for 220 V.
- III = Motor windings (H = main winding; N = auxiliary winding).
 - Connect cable 20A, coming from switch SK1, to the main winding and connect cable 20B, coming from the capacitors C2, C3, C4, to the auxiliary winding.
- IV = Female plug for connection of the lamp in the projector door.
- V = Transformer for 6 V supply of the inspection lamps.
- VI = Inspection lamp (type 8008N) in the upper spool box.
 - Lead the connecting wires of this lamp through block "9" (fig. 2) and the pipe in the shutter housing to the upper base and connect them to terminals 34 and 35.
- VII = Framing lamp (type 8008N).
 - Connect the wires of this lamp also to terminals 34 and 35 in the upper base.
- VIII = Exciter lamp (type 7251 C).
 - Connect the wires of this lamp to terminals 80 and 81.
- IX = Picture relay; operates at a D.C. voltage of 90 V.
 - Connect the relay to terminals 50 and 52B.
 - Note:** When replacing capacitor C5, observe its polarity.
- X = Fuse (500 mA, 250 V) with holder for lamp in projector door.

Specification of the switches

- SK 1 = Electromagnetic switch for motor and picture relay.
 - The two main contacts serve for switching on motor and relay, the third contact is the hold contact.
 - The current through the coil of the switch can be switched on by means of a push-button (SK 3) at the operating side of the projector and be switched off both at



the operating and at the non-operating side (SK 4 and SK 5).

Microswitch SK 6 interrupts the current through the switch coil automatically when the cooling plate is turned aside or when the upper film loop ("22" in figs 19 and 20) becomes too large (.e.g. in the event of film rupture).

SK 2 = Switch for change-over of picture and sound.
This switch operates a relay in the amplifier.

SK 7 = Centrifugal microswitch for the motor.
For its working, see page 2, "Upper base".

SK 10 = Safety microswitch for the water cooling of the lamphouse.
This switch is operated by the water pressure.
An alarm bell can be connected to the free contact.

SK 12 = For switching off	} control voltage of the electro-	
SK 13 = For switching on half		magnetic switch in the rectifier.
SK 14 = For switching on full		

Note: The rectifier cannot be switched on when SK 10 has not been switched on by the water pressure.

Specification of the capacitors

C1-C2-C3-C4 = Capacitors for controlling the starting speed of the projector motor.

C5 = Electrolytic capacitor to prevent remanent mechanism of the armature of the picture relay.

Note: All the connecting cables coming from the projector are marked and have to be connected at the terminals with the same number on the terminal blocks in the upper base.

Connection of the photocell cable

- Remove cap "8" (fig. 5).
- Solder the photocell cable (use acid-free resin!) to the photocell holder as indicated in fig. 10 (seen at the side of the holder where the wires have to be soldered).

The photocell cable can in two manners be led from the projector to the amplifier, viz.:

1. via the opening in the projector casing to the upper and the lower base and from the latter to the amplifier;
2. via the pipe in the shutter housing to the top of the projector and from there to the front wall of the projection room and then to the amplifier.



Water-pressure switch ("2" in fig. 3)

This switch is located in the upper base and inserted in the feed circuit of the water cooling for the lamphouse. It can be used only when the rectifier is equipped with an electromagnetic switch for remote control.

Operation (fig. 11):

The contacts "10" and "11" have to be inserted in the current circuit for starting the rectifier; to contacts "9" and "10" an alarm bell can be connected.

The cooling water flows via connector "15", pressure box "14" and connector "13" to the lamphouse. It causes in box "14" a pressure which makes diaphragm "1" bulge, thereby depressing the pin of microswitch "3" via strip "2", and thus establishing contact between strips "10" and "11".

If the water cooling fails or the pressure becomes too low, diaphragm "1" does not bulge, there is no contact between strips "10" and "11", the former being then in contact with strip "9". When an alarm bell is connected between strips "9" and "10", it will warn the projectionist immediately there is something wrong with the water supply.

Adjustment (fig. 11):

- Loosen the nuts of the two screws "6" and "7" one turn (the nuts are at the rear of bracket "12").
- Tighten screw "8" half-tight so that microswitch "3" can be pivoted round it.
- Open the water-supply cock and check whether the water flow is sufficient for cooling the lamphouse (see Instructions for Use of the lamphouse).
- Adjust microswitch "3" with the aid of screws "4" and "5" so that contact between strips "10" and "11" is just established, then tighten screws "6", "7" and "8".
- Check the adjustment of the switch by opening and closing alternately the water-supply cock; when necessary, correct the adjustment.



PREPARING THE PROJECTOR FOR OPERATION

CHECKING

- Open lid "12" (fig. 4) and insert the exciter lamp (type 7251 C) so that the pin in the holder snaps into the notch in the centring disc of the lamp; the lamp is then automatically aligned.
- Remove cap "8" (fig. 5), insert the photocell (type 3554) and fit the cap again.
- Fill the projector with oil (see page 26).
- Upon delivery the projector is equipped with parts for the projection of 70 mm film. For the projection of 35 mm film definite parts have to be replaced (see page 21).
- Check the adjustment of the pad rollers (see page 17, B.1).
- Check the adjustment of the pressure roller and of the tension roller of the magnetic soundhead (see page 18, .2).
- Check the adjustment of the pressure roller of the optical soundhead (see page 18, 3).
- Check the running projector without film:
 - Open the water-supply cock and wait some minutes; in the meantime, check whether there is any leakage.
 - Check whether the belt transmission is set for a speed of 30 frames/sec (see page 23, g).
 - Start the projector by depressing the left-hand push-button "11" (fig. 1).
 - Check the lubrication through the window in the rear cover, then stop the projector with right-hand push-button "11".
 - Start the projector, let it run a short moment, then stop it with the right-hand push-button "11" (fig. 1); start it again and stop it now with push-button "6" (fig. 2); start it for the third time and stop it by pulling the resilient lever "18" (fig. 4) a moment forward.
 - Repeat the three stopping tests a few times.
 - Set the belt transmission for a film speed of 24 frames/sec (see page 23) and repeat the three stopping tests.

INSERTION OF THE PROJECTION LENS

With each projector are supplied:

- two eccentric sleeves (outside dia. 5"; inside dia. 4");
- two centric sleeves with adjustable stop ring (outside dia. 4"; inside dia. 2.78" = 70.6 mm); +)
- one adapter for a lens with a diameter of 62.5 mm.

Preparing the various lenses

1. Lens for projection of 70 mm film (Cine-Apergon):
 - Push an eccentric sleeve over the lens up to the stop and tighten the fixing screw.

+) When more of these sleeves are required for various projection systems they can be ordered under No. C1 705 75.



2. Lens for projection of normal and of wide-screen 35 mm films:

- For lenses with a diameter of 2.78" (70.6 mm) push a centric sleeve over the lens and for lenses with a diameter of 62.5 mm first push the adapter and then a centric sleeve over the lens.
- Tighten the two fixing screws; they push the lens slightly to one side of the sleeve.

3. Anamorphic lens + backing lens for 35 mm CinemaScope projection:

- For the backing lens see under 2.
- Slide the anamorphic lens also in the centric sleeve, approximately so that when later on it is inserted in the lens holder, the two fixing screws will be at the top; tighten the two fixing screws.

Insertion of the lens for projection of 70 mm film (fig. 17, I)

- Loosen knob "A" a few turns, place the lens holder in the middle of the slide by means of the focusing knob and push the unit Cine Apergon lens + eccentric sleeve in the lens holder so that pin "3" snaps into the groove shown in fig. 17, I of the sleeve; then tighten knob A.

Insertion of the lens for normal and wide-screen 35 mm films (fig. 17, II)

- Slide an eccentric sleeve in the lens holder so that pin "3" snaps into the groove of the sleeve shown in fig. 17, II, then tighten knob "A".
- Thread a film in the projector (see page 24).
- Place the lens holder with the aid of the focusing knob in the middle of the slide.
- Fix stop ring "4" half-tight on sleeve "5" and push the unit sleeve + lens or sleeve + adapter + lens in the eccentric sleeve mounted in the lens holder so that the two fixing screws of sleeve "5" lie at the top.
- Focus the picture on the screen by shifting the lens + sleeve (+ adapter) in the eccentric sleeve of the lens holder and tighten the screw accessible through the slit in the lens holder.
- Stop the projector.
- Push stop ring "4" against the eccentric sleeve so that pin "6" falls in the groove indicated in fig. 17, II.

Insertion of the anamorphic lens + backing lens for CinemaScope

- Proceed exactly as indicated for normal and wide-screen films but:
for CinemaScope with an aspect ratio of 1:2.34:
see for grooves fig. 17, II (same as normal and wide-screen)
for CinemaScope with an aspect ratio of 1:2.55:
see for grooves fig. 17, III.



ALIGNMENT OF THE PROJECTOR

- Let the projector run without film and focus the mask image projected on the screen.
- Check whether the light beam falls through the centre of the projection-room window and whether the mask image is symmetrical with respect to the centre of the screen. Small adjustments in vertical direction are possible with the aid of the four levelling screws in the base.
- Fix the projector to the floor of the projection room.

FILING THE MASK APERTURE FOR PROJECTION OF 70 mm FILM

As for the projection of 70 mm films a deeply curved screen is used, the picture projected on this screen would be barrel-shaped if the mask aperture were exactly rectangular; when the projector is tilted, the lateral sides of the picture would, moreover, be oblique.

To obtain a perfectly rectangular picture it is necessary to adapt the mask aperture to the screen. Therefore, the supplied masks have an angular aperture of only 48 x 20 mm, whereas the aperture can be max. 48.6 x 22.0 mm.

- Always file the aperture to shape so that the distance between the corners has its maximum value (48.6 x 22.0 mm); the projected picture will then be as large as possible.

Note: When projection takes place under an angle of 10° or more, the supplied mask with aperture cannot be used; in that case the blind mask has to be filed out.

Filing:

- Check (or mount) all the parts necessary for the projection of 70 mm film.
- Thread a 70 mm film (see page 24).
- Ignite the arc lamp, start the projector and focus the picture; then do not touch the focusing knob again!
- Adjust the frictions of top and bottom spool shaft (see page 17, A, 1 and 2).
- Switch off the arc lamp, stop the projector and take out the film.
- Let the projector run without film and switch on the arc lamp. Do not focus the mask image on the screen!
- File the mask until the image on the screen is rectangular; this has to be done gradually and the projector has to be stopped between the successive stages of the filing.

Attention!

When the mask is hold in the hand so that the engraved word "FILM" is readable at the front above the aperture, then:

left-hand top corner {of mask} = left-hand bottom } of image
 left-hand bottom corner {aperture} = left-hand top } onscreen



ADJUSTMENTS

A. Adjustments which can be effected by the projectionist

1. Friction coupling of upper spool shaft

- Remove cap "2" (fig. 2) and adjust the friction by turning the milled nut more or less far on the shaft.
Note: The friction coupling should be on the loose side yet tight enough to avoid looping, also when the projector is switched off.

2. Friction coupling of lower spool shaft

- Remove cap "5" (fig. 2) and adjust the friction by turning the milled nut at the end of the spool shaft more or less far on this shaft.
Note: The friction coupling should be on the loose side yet tight enough to avoid looping; from the beginning to the end of the reel, the film piece between hold-back sprocket and lower spool box should neither be too slack nor too taut.

B. Adjustments which should be effected by a Philips technician

1. Pad rollers (fig. 12)

a. Clearance between rollers and sprockets (applies to all the sprockets)

Fig. 12 shows a pad-roller unit in open position (free from the sprocket). The unit is closed by pushing in holder "2". There has to be a definite clearance between the running faces of the rollers "6" and those of the sprocket.

Checking of the clearance:

- Open the pad-roller unit.
- Place two film pieces over each other on the sprocket.
- Close the pad-roller unit.
- Turn rollers "6" by hand; they must run free from the two layers of film.
- Put a third piece of film over the sprocket; keep the three pieces of film taut, close the pad-roller unit and turn rollers "6"; a slight friction should now be perceptible between pad rollers and film pieces.

Adjustment of the clearance:

- Loosen locking screw "1" a few turns.
- Turn adjusting screw "4" until the clearance between rollers "6" and sprocket is correct.
- Tighten screw "1" firmly.

b. Pressure of the pad-roller unit

Checking:

- Close the pad-roller unit.
- Remove screw "5" and replace it by a screw which projects about 1" (25 mm).
- Hook a spring balance to this screw and pull in the direction perpendicular to the pad-roller unit.



- Note the force necessary at the moment the unit starts to move (starts to be pulled away from the sprocket); then let it veer (release the pulling force on the spring balance) slowly and carefully and note the force exercised at the moment the pad-roller unit just starts to move back to its closed position.

The average of the two noted forces should be 21 ozs (600 g).

Adjustment of the pressure (fig. 15)

- Loosen nut "3" one turn.
- Turn spring holder "2" until the average pulling force is 21 ozs (600 g).
Note: The pressure of pad-roller unit "24" (figs 19 and 20) increases by turning holder "2" clockwise; with all the other pad-roller units it increases by turning holder "2" anti-clockwise.
- Tighten nut "3" again.
- Check with the aid of the spring balance whether the average pressure is correct.

2. Pressure roller and tension roller of magnetic soundhead

a. Pressure roller (fig. 7)

The pressure of nylon roller "5" on sound shaft "4" should be 21 ozs (600 g).

Checking and adjustment:

- As indicated for the pad-roller unit (see above).
Note: To turn holder "9", loosen screw "10".
The pressure increases by turning the holder clockwise.

b. Tension roller (fig. 7)

The pressure of this roller should be 14 ozs (400 g).

Checking and adjustment:

- As indicated for the pad-roller unit (see above).
Note: To turn holder "7", loosen screw "8".
The pressure increases by turning the holder anti-clockwise.

3. Pressure roller of optical soundhead (figs 19 and 20)

The pressure of roller "16" on sound shaft "15" should be 2 lbs 10 ozs (1200 g).

Checking and adjustment:

- As indicated for the pad-roller unit (see above).
Note: The pressure increases by turning the holder anti-clockwise.

4. Shutter

The projector is equipped with a single-blade conical shutter. To open the cooling plate (e.g. for threading the film) it is necessary that the shutter blade is not in the room behind the cooling plate, otherwise it would be irreparably damaged. To avoid accidents of this kind, there is a safety device between shutter shaft and cooling plate (fig. 14).



The safety device is formed by strip "2" (fig. 14) of the cooling plate and centrifugal disc "6" mounted on the shutter shaft. Disc "6" is so constructed that:

when the projector is running, the cooling plate cannot be opened because the projecting end of strip "2" is blocked by disc "6";

when the projector is not running, the cooling plate can only be opened in one definite position of disc "6"; the shutter has, therefore, to be mounted on its shaft so that in this position of disc "6" the shutter blade is not in the room behind the cooling plate (this position is obtained whenever indicator "1" stands on a line at the front of lower feed sprocket "2"; see fig. 13).

The shutter has been adjusted in the factory with the aid of a special test film. It should be re-adjusted only after replacement or in the event of travel ghost.

Adjustment (fig. 14):

- Remove the rear cover of the shutter housing.
- Mark the position of shutter blade "3" with respect to ring "4".
- Loosen the six screws "5" one turn (they are accessible with a long screwdriver through the light-cone of the lamphouse).
- Turn shutter blade "3" until the travel ghost disappears:
 - with travel ghost at the bottom of the picture:
 - shift the shutter blade in the normal direction of rotation;
 - with travel ghost at the top of the picture:
 - shift shutter blade opposite to the normal direction of rotation.
- Tighten the six screws "5" again.
- Project a film and check whether the adjustment of the shutter is correct; stop the projector.
- Inch the projector until indicator "1" (fig. 13) stands on a line of feed sprocket "2".
- Check carefully whether the cooling plate can be opened without touching the shutter blade; if not:
 - loosen screw "7" one turn;
 - turn slightly the centrifugal disc on the shutter shaft;
 - tighten screw "7" again.

Emergency adjustment during the performance:

While the film is running on the correct projector:

Inch the projector which causes travel ghost until the intermittent sprocket begins to move.



- Check whether the top of the shutter blade is slightly above the top of the mask aperture.
- Inch the projector further until the intermittent sprocket stands still.
- Check whether the bottom of the shutter blade is slightly below the bottom of the mask aperture.
- When the position of the shutter blade is not correct, loosen the six fixing screws "5" (fig. 14) and turn the shutter blade as indicated under adjustment; then tighten screws "5" again.
- Do not perform any further adjustments but check as soon as possible - preferably immediately after the performance - with the aid of a film whether the adjustment has been correct (see adjustment).



INTERCHANGE OF PARTS
WHEN CHANGING OVER FROM 70 mm FILMS TO 35 mm FILMS
(or vice versa)

Upon delivery the projector is equipped with parts for 70 mm films. The parts which have to be used for the projection of 35 mm films are in the separate case provided with the serial number of the projector they are intended for; they should never be used on another projector.

- Put each part taken out of the projector (i.e. either that for 70 mm films or that for 35 mm films) always directly in the box at the place of the part which is replacing it. Errors are then precluded!

Specification of the parts supplied for interchange (fig. 15):

- 1 = complete runner plate for 35 mm films
- 2-8 = aperture plates for:
 - normal 35 mm films ("NORM 35")
 - 35 mm CinemaScope, aspect ratio 1:2.55 ("CM")
 - 35 mm CinemaScope, aspect ratio 1:2.34 ("CO")
 - 35 mm wide-screen, aspect ratio 1;1.75
 - 35 mm wide-screen, aspect ratio 1:1.85
 - 35 mm wide-screen, aspect ratio 1:2.00
 - blind plate
- 9 = pad-roller unit for 35 mm films (2 pcs are supplied)
- 10 = pressure bands for 35 mm films:
 - 1 set of steel bands and
 - 1 set of bands covered with velvet
- 11 = pressure roller of magnetic soundhead for 35 mm films.

Furthermore, the case contains:

- 12 = hook for removing the pressure bands
- 13 = set of velvet-covered pressure bands for 70 mm films (the plain steel bands are in the projector).
- 14 = loose bottom plate of the case for easy storage of the various parts.

For change-over from projection of 70 mm films to projection of 35 mm films, or vice versa, the following parts have to be replaced (figs 19 and 20):

- a. Pad-roller units "3" and "10".
- b. Pressure roller "5" of the magnetic soundhead.
- c. Runner plate "25".
- d. Aperture plate "20".
- e. Pressure bands "21".
- f. The lens.

Moreover, it may be necessary to change the belt transmission between motor and driving shaft of the projector.

The 70 mm films "The Miracle of Todd-AO" and "Oklahoma" have to be run at a speed of 30 frames/sec.

The 70 mm film "South Pacific" and probably all the future 70 mm films have - like all 35 mm films - to be projected at a speed of 24 frames/sec.



Instructions for interchange of the various parts
(figs 19 and 20)

a. Pad-roller units "3" and "10"

These two units are identical and can, therefore, mutually be interchanged.

Removal:

- . Open the pad-roller unit by pushing it up.
- . Loosen the two fixing screws.
- . Take the unit from its centring pins.

Mounting:

- . Slide the pad-roller unit so on its centring pins that it is open.
- . Tighten the two fixing screws.

b. Pressure roller "5" of the magnetic soundhead

Removal:

- . Push the lever downwards.
- . Remove the ornamental screw and take the roller from its spindle (it forms one unit with its two ball-bearings which are fixed in the boring).

Mounting:

- . Push the roller on its spindle and tighten the ornamental screw.

Note: The rollers are symmetrical; therefore, no risk of erroneous mounting.

c. Runner plate (see fig. 13)

Removal:

- . Open the cooling plate; for this purpose:
 - . turn inching knob "11" (fig. 4) until a line on feed sprocket "2" is just under indicator "1";
 - . pull knob "13" forward until the spindle on which it is fixed is out of its locking groove; then move the knob to the left until the spindle snaps into the left-hand locking groove.
- . Open the pad-roller units "18" and "24" (figs 19 and 20).
- . Loosen winged nut "3".
- . Hold the runner plate with both hands (left hand at the top, right hand at the bottom) and lift film stripper "4" with the little finger of the right hand; then pull the runner plate carefully forward therewith taking care not to damage the teeth of the intermittent sprocket.

Mounting:

- . In reverse order; see that the pad-roller units are in opened position and that film stripper "4" is well lifted.
- . Push the runner plate firmly against the machined surface of the projector before fixing winged nut "3".



d. Aperture plate (see fig. 13)

Removal:

- Open the cooling plate as described under c.
- Loosen screw "5", lift slightly shutter cap "6" and remove this cap.
- Pull out knob "8".
- Pull cooling plate "7" so far out that it is still about $\frac{3}{4}$ " (2 cm) in the grooves of its holder.
- Turn lock "9" one quarter turn (90°) anti-clockwise and remove the aperture plate.

Mounting: In the reverse order.

e. Pressure bands (see fig. 16)

Removal:

- Open the cooling plate and pull it partly out as described under c and d.
- Lift the pressure bands "4" from the fixing pins with the aid of hook "12" (fig. 15).

Mounting:

- Hook the coloured curl of each pressure band over the pin of the same colour on the upper band holder ("12" in fig. 13); then hook the other ends of the bands over the pins on the lower band holder.
- Check whether the pressure bands are correctly fitted on the pins.
- Close the cooling plate.

f. Lens (see fig. 17)

a. Change-over from 70 mm projection to 35 mm projection:

- Loosen knob "9" (figs 19 and 20) a few turns and take the unit Cine Apergon lens + eccentric sleeve out of the lens holder.
- Insert an eccentric sleeve in the lens holder and insert in this sleeve either the unit projection lens + centric sleeve or the unit anamorphic lens + backing lens + centric sleeve, depending on the 35 mm film that will be projected (see page 15); tighten knob "9".

b. Change-over from 35 mm projection to 70 mm projection:

- Loosen knob "9" (figs 19 and 20) a few turns and take the unit projection lens (or anamorphic lens + backing lens) + centric sleeve + eccentric sleeve out of the lens holder.
- Insert the unit Cine Apergon lens + eccentric sleeve (see page 15); tighten knob "9".

g. Modification of the belt transmission (fig. 18)

Note: This should be done without film in the projector as the film might easily be damaged.

- Open the cover of belt guard "5" (fig. 1); it is easiest to do this from the non-operating side of the projector.
- Hold with the left hand disc "1" and with the right hand disc "2" (fig. 18) and turn the discs in mutually opposite directions as indicated by the arrows and the numbers "24" for 24 frames/sec and "30" for 30 frames/sec.



OPERATION

Introduction

70 mm film, because of its double width, tends sooner to buckle in the gate than 35 mm film with the result that the picture projected on the screen would become out of focus. This has been avoided by using a curved runner plate, the curvature counteracting the tendency to buckling.

Furthermore, the force necessary for the intermittent movement of the film is much larger than for 35 mm films, whilst, after each movement, the film has to stand still immediately in the gate for projection of the next frame. Each film has the tendency to slide further after its intermittent movement and that is why it is braked by the skate pressure. Because of its greater mass, a 70 mm film requires a higher skate pressure than a 35 mm film, with the result that there is more film deposit on runner plate and pressure bands.

For 70 mm films it is essential that the upper film loop ("22" in fig. 19) be not too large; the film would then begin to undulate and consequently rattle and this undulating movement would be propagated to the film gate. In that case, a sufficiently steady picture can only be obtained by making the skate pressure extra high, which would cause still more film deposit on runner plate and pressure bands. Therefore the rule: for 70 mm films, keep the upper film loop as small as possible.

Threading the film (fig. 19 = 70 mm film and 35 mm films with magnetic sound tracks;
fig. 20 = 35 mm films with optical sound track)

- Open the upper spool box, the door of the projector and the lower spool box.
- Check whether all the parts required for the projection of either 70 mm film or 35 mm film are mounted.
- Put the framing device in its middle position, so that later on it can be turned in both directions (in the middle position of the framing device the white indicating strip stands in the middle of the hole beside the intermittent sprocket).
- Place a spool with film in the upper spool-box and an empty spool in the lower spool-box.
- Open all the pad-roller units and the cooling plate (see page 22, c.).
- Pull about 6 ft (2 m) of film from the upper spool.
- Thread the film as follows:

70 mm films and 35 mm films with magn. sound	35 mm films with optical sound
in projector and magnetic soundhead as shown in fig. 19	in projector and optical soundhead as shown in fig. 20



- See that a whole frame is in front of the mask aperture and close pad-roller unit "18".
- Form the upper film loop ("22") and keep it, especially for 70 mm film, as small as possible; then close pad-roller unit "24" and the cooling plate.
- Adjust the film in the magnetic soundhead (only for 70 mm film and for 35 mm films with magnetic sound track) in the following way:
place the film so on the teeth of sprocket "4" that the red dots of film-tension indicator "6" face each other; then close pad-roller unit "3"; the tension of the film in the magnetic soundhead is then correct.
- Form the lower film loop ("26") in the following way:

70 mm films and
35 mm films with magn. sound

Push the film between guide roller "17" and hold-back sprocket "13" with a finger to the left so that it forms an angle of 90° to the left of the sprocket (see dotted line in fig. 19), then release the film.

35 mm films with optical sound

Hold a finger on the film on pad rollers "18" and lead the film from there via the optical soundhead to hold-back sprocket "13".

By proceeding in the above indicated ways, the lower film loop will disappear; it will be formed again automatically at the correct size by inching the projector or when the motor is started.

- Close the lower spool-box.
- Inch the projector and check whether the film is correctly framed. When the film is threaded in the magnetic soundhead, check also whether the red dots of indicator "6" face each other.
- Inch further until frame "START" appears in the gate aperture and indicator "1" stands on a line on lower feed sprocket "2" (fig. 13).

The projector is now ready for operation.

Projection

- Ignite the arc lamp.
- Start the projector by depressing the left-hand push-button "11" (fig. 1).
- Open the dower of the arc lamp.
- If necessary, correct the framing with knob "27" (figs 19 and 20).
- Adjust the tension of the pressure bands with the milled nut on the lower pressure-band holder; for this purpose, first reduce the pressure until the projected picture becomes unsteady, then increase it until the picture is just steady.
Keep the pressure as low as possible!



- Close the door of the projector.
- Focus the picture by means of focusing knob "4" (fig. 1).

MAINTENANCE

CLEANING

a. After each film reel:

- Take the runner plate out of the projector and clean the running surfaces carefully with a soft cloth. Remove agglomerated film deposit by rubbing with a wet finger and then removing it with a piece of wood; never remove it with a hard object!

- Take the steel pressure bands out of the holder on the cooling plate and clean them in the same way as the runner plate; avoid sharp bends!

Note: Velvet-covered pressure bands need not be taken out of the projector; they can be cleaned with a tooth brush; finish with brushing in the direction of film travel, i.e. from top to bottom.

b. Once a day: (projector not running!);

- Clean all the sprockets with a tooth brush; take care not to damage the teeth.
- Clean the magnetic head with a soft cloth.
- Take the pad-roller units out of the projector and clean them with a cloth moistened with paraffin.
- Clean the guide rollers of the projector as well as the sound drum and the pressure roller of the magnetic and of the optical soundhead.

c. Once a week:

- Clean from the operating side of the projector the interior of the projector and of the upper and lower spool boxes with the aid of a soft cloth.
- Clean the rollers and the interior of the fire traps.

LUBRICATION

a. Replenishing the projector mechanism with oil or refill with fresh oil

- In the case of a newly installed projector or replacement of essential parts, such as intermittent unit, gear wheels or main shaft; replenish with fresh oil:
after the first 20 running hours,
then after 50 running hours,
then after 100 running hours and
thereafter every 250 running hours.
- Always replenish the projector with oil whilst it is running.



Oil level in the oil-level gauge:

at any tilting angle backwards and } up to the top of
for angles up to 20° forwards } the red circle
for angles of more than 20° forwards: up to the bottom
of the red circle

Use at temperatures of:

40 °F (+5 °C) and lower light oil, type 3671
40 °F to 80 °F (+5 °C to +25 °C) .. medium oil, type 3672
80 °F (+25 °C) and higher heavy oil, type 3673

Note:

The lubrication of the driving mechanism is full-automatic and requires no special care; only check regularly through inspection glass "8" (fig. 2) whether the lubricating system is working correctly.

Drainage of the oil (fig. 2)

- When the projector is horizontal or tilted forwards:
unscrew drain plug "7";
when the projector is tilted backwards:
unscrew drain plug "4".
- Clean the combined gauze and magnetic filter located behind drain plug "7" as follows:
 - take out the filter, loosen the three screws for fixing the magnet one turn and take out the magnet;
 - clean the gauze in petrol; always replace it when it is damaged;
 - clean the magnet with a cloth;
 - fix the magnet in the gauze filter and insert the filter in the projector; tighten drain plug "7".

Replenishing with oil

- Remove filler plug "1" (fig. 5) and replenish the projector (whilst it is running!) with oil up to the required level (see above); quantity of oil: about $\frac{1}{3}$ gallon (1 litre).

b. Lubrication of the various parts

Once a week:

- Bearings of the lateral guide rollers of the runner plate:
 - with one drop of Esso-Handy oil (Philips No. C1 602 17).
- Outer bearing of Maltese-cross shaft (fixed to runner plate):
 - one drop of Esso-Handy oil (Philips No. C1 602 17) in the red-marked hole;
- Rollers of pad-roller units;
 - remove the rollers from the spindle and rub the latter light with Esso-Handy oil (Philips No. C1 602 17).
- Guide rollers:
 - remove ornamental screw, take the roller from the spindle, clean both roller and spindle, let one drop of Esso-Handy oil (Philips No. C1 602 17) fall on the spindle and spread it with a finger; mount the roller.

Once a month:

- Pivot points of the film-rupture device:
 - one drop of Esso-Handy oil (Philips No. C1 602 17).

Once every three months:

- Felt discs of friction couplings of upper and lower spool shafts:
 - with cardan oil, type 8657.
 - Gear-wheel transmission of driving mechanism of lower spool shaft:
 - grease with graphited grease, type EL 4852.
 - Sliding surfaces of lens holder:
 - take the lens holder from the slide and clean the contact surfaces of both lens holder and slide; then grease these surfaces with type 8657 cardan oil and fit the lens holder again.
- c. Parts to be lubricated preferably by a Philips technician.

Once a month:

- Spindle of the whole pad-roller unit:
 - remove the fixing screw, the spring holder, the torsion spring and the locking ring and push the unit from the spindle;
 - let a drop of type 8657 cardan oil fall on the spindle and spread it with a finger;
 - for re-assembling see page 22, a.
- Spindles of the levers for the pressure rollers of the optical and of the magnetic sound head:
 - lubricate with one drop of type 8657 cardan oil.
- Ball-bearings of the pressure rollers of the optical and of the magnetic soundhead:
 - remove the ornamental screw and take the rollers from their spindles;
 - lubricate the bearings which are fixed inside the rollers with one drop of oil (type 3671, 3672 or 3673; see page 27).

Once every three months:

- Coupling shaft "1" (fig. 3) for driving mechanism of lower spool shaft:
 - remove shaft "1", grease the ends abundantly with consistent grease or with type EL 4850 ball-bearing grease and mount the shaft again (see page 7, top).



MEMORANDUM FOR THE PROJECTIONIST

- Projector: Check whether all the parts required for either 70 mm film or 35 mm film are mounted.
Note: The runner plate and the pad-roller units for 70 mm film are provided with a red mark and those for 35 mm film with a blue mark.
- Lens holder: Check whether the pin of the lens holder snaps into the correct groove of the eccentric sleeve, viz.:
for 70 mm film groove "70 mm Todd-AO"
for 35 mm CinemaScope
aspect ratio 1:2.55 groove "35 mm C.M."
for 35 mm CinemaScope
aspect ratio 1:2.34 } groove "35 mm C.O.-NORMAL"
35 mm normal film.. }
35 mm wide-screen.. }
- Framing: Check before threading the film whether the framing device stands in its middle position (white indicating strip in the middle of the hole beside the intermittent sprocket); framing is then possible in both directions.
- Film speed: Check whether the belt-transmission is set for the required speed (24 or 30 frames/sec).
- Water cooling: Open the water-supply cock fully; when the projector was installed the control cock in the upper base has been adjusted so that the correct water supply is obtained with fully open main cock.
- Threading: Thread films with magnetic sound track in the magnetic soundhead and not in the optical head; thread films with optical sound track in the optical soundhead and not in the magnetic head.
After threading the film, check whether all the pad-roller units are closed and inch the projector a few times to make sure that the film passes well through the projector and that the framing is correct.
- Projection: Before starting the projector, see that indicator "1" stands on a white line on sprocket "2" (fig. 13); the Maltese cross has then just completed an intermittent movement and the projector starts easier.
- Focusing: Check whether the picture is correctly focused. For 70 mm films, focus on the point that lies at one third of the width from either side; do not focus on the centre of the picture.



Steadiness: Sub-titles are no criterion for the steadiness of the picture (they have been printed after the film was ready and may be unsteady while the picture is correct).

When the picture is not steady, turn the adjusting nut of the pressure bands (on the lower holder) clockwise until steadiness is just obtained.

Cleaning: Especially for 70 mm films, do not forget to clean the pressure bands and the runner plate before every next reel you put in the projector. Observe further rigorously the cleaning instructions. Keep a log-book.

Lubrication: Keep a log-book of the dates of lubrication with specification of the lubricated parts.



PROPOSED STOCK OF SPARES

A set of the most important spares should be available on the cinema premises, in order to minimise programme hold-ups that may arise on account of wear or damage to projector parts.

The various parts can be found in the drawing bearing the same initial letters of its order number (e.g. part AB05 is indicated in fig. AB).

Specification:

Quantity	Description	Order number
1	Felt disc for friction coupling	AB05 (=AT35)
2	Nylon guide rollers	AE14 (=AK02)
4	Rollers for 70 mm pad-roller unit	AH13 (=AH48)
4	Rollers for 35 mm pad-roller unit	AJ12 (=AJ48)
1	Set of velvet-covered pressure bands for 70 mm film	AL15A
1	Set of velvet-covered pressure bands for 35 mm film	AL16A
1	Dowser blade	AM20
1	Shutter blade	A013
1	Feed sprocket	AP07 (=AP18)
1	Hold-back sprocket	AP35
1	Novotext gear wheel for driving mechanism of shutter shaft	AQ11
1	Maltese-cross sprocket	AR01
1	Gauze for oil filter	AS25
1	Set of gear wheels for oil pump	AS29
2	V-belts	AU10
1	Photocell	3554
1	Exciter lamp	7251C
1	Framing lamp (inspection lamp)	8008N

ORDER NUMBERS OF THE PRINCIPAL PARTS

When ordering parts, always indicate:

1. the type of projector (EL 4000);
 2. the serial number of the projector;
 3. the order number of the part in question.
- } indicated on the number plate at the rear of the projector housing



Fig. AA - PROJECTOR HOUSING

Order number	Description
AA01	Right-hand part of rear cover
AA02	Screw
AA03	Washer
AA04	Left-hand part of rear cover
AA05	Screw
AA06	Washer
AA07	Screw
AA08	Nylon washer
AA09	Screw
AA10	Washer
AA11	Gasket for oil-inspection window
AA12	Screw
AA13	Cover of space for optical soundhead
AA14	Rubber gasket
AA15	Rear cover
AA16	Glass window of rear cover
AA17	Clamping ring for AA16
AA18	Oil-filler plug
AA19	Oil-drain plug
AA20	Gasket
AA21	Nut
AA22	Gasket
AA23	Oil-level gauge assembly
AA24	Screw
AA25	Clip for fixing the projector-door window
AA26	Washer
AA27	Nut
AA28	Hinge
AA29	Rubber frame for window AA45
AA30	Projector door
AA31	Holder for "PHILIPS"-shield
AA32	Screw
AA33	"PHILIPS"-shield
AA34	Screw
AA35	Washer
AA36	Hinge for door latch
AA37	Pressure spring for door latch
AA38	Door latch
AA39	Hinge pin
AA40	Screw
AA41	Washer
AA42	"A.O."-shield
AA43	Holder for "A.O."-shield
AA44	Strip for door latch
AA45	Glass window for projector door
AA46	Rubber bumper
AA47	Screw
AA48	Cover
AA49	Instruction plate



Fig. AB - UPPER SPOOL BOX and FIRE TRAP

Order number	Description
AB01	Protection cap for friction coupling
AB02	Knurled nut
AB03	Pressure spring for friction
AB04	Metal disc
AB05	Felt disc
AB06	Ring for ball bearing
AB07	Ball bearing
AB08	Screw for fixing AB01
AB09	Support for upper spool box
AB10	Spool shaft
AB11	Hinge with pins
AB12	Washer
AB13	Rear part of spool box
AB14	Washer
AB15	Screw
AB16	Lid of spool box
AB17	Hinge
AB18	Fixing nut for lid of fire trap
AB19	Washer
AB20	Window
AB21	Frame with time scale
AB22	Screw
AB23	Fixing screw for lid of fire trap
AB24	Lid of fire trap
AB25	Latch for spool-box door
AB26	Pin
AB27	Pressure spring
AB28	Screw
AB29	Washer
AB30	Strip for latch of spool-box door
AB31	Retainer for flanged roller of fire trap
AB32	Screw
AB33	Strip
AB34	Retainer for roller of fire trap
AB35	Ball bearing
AB36	Roller
AB37	Flanged roller
AB38	Fire-trap housing with spindles
AB39	Screw
AB40	Connecting cable for spool-box lamp
AB41	Connector for flexible tube
AB42	Screw
AB43	Flexible tube
AB44	Screw
AB45	Washer
AB46	Bracket for lamp socket
AB47	Spool-box lamp type 8008N
AB48	Washer
AB49	Screw
AB50	Connector for flexible tube



Fig. AC - UPPER BASE, LOWER BASE, MOUNTING TABLE
and LOWER SPOOL BOX WITH FIRE TRAP

Order number	Description
AC01	Mounting table
AC02	Washer
AC03	Screw
AC04	Hinge with pins
AC05	Washer
AC06	Fire-trap housing with spindles
AC07	Screw
AC08	Ball bearing
AC09	Roller for fire trap
AC10	Retainer for AC09
AC11	Screw
AC12	Strip
AC13	Retainer for flanged roller or fire trap
AC14	Flanged roller
AC15	Fixing screw for fire-trap lid
AC16	Fire-trap lid
AC17	Washer
AC18	Nut for fixing fire-trap lid
AC19	Hinge
AC20	Pressure spring
AC21	Latch for spool-box door
AC22	Pin
AC23	Washer
AC24	Screw
AC25	Lid of spool box
AC26	Strip for latch of spool-box door
AC27	Screw
AC28	Washer
AC29	Rear part of spool box
AC30	Screw
AC31	Washer
AC32	Removable cover of lower base
AC33	Washer
AC34	Screw
AC35	Bolt for fixing the lower lower base
AC36	Levelling bolt
AC37	Nut
AC38	Lower base
AC39	Screw for fixing cover AC40
AC40	Cover
AC41	Bolt for fixing the projector housing
AC42	Washer
AC43	Upper base



Fig. AD - LENS HOLDER ASSEMBLY

Order number	Description
AD01	Lens holder
AD02	Screw
AD03	Eccentric sleeve (inner dia. 4")
AD04	Stop
AD05	Screw
AD06	Slide
AD07	Support plate
AD08	Focusing screw
AD09	Focusing knob
AD10	Screw
AD11	Bushing
AD12	Protection ring
AD13	Rubber bumper
AD14	Washer
AD15	Spacer
AD16	Screw
AD17	Bolt
AD18	Centring pin
AD19	Screw
AD20	Washer
AD21	Spring plunger
AD22	Pin
AD23	Pressure spring
AD24	Spacer
AD25	Support
AD26	Screw
AD27	Bolt



Fig. AE - MECHANICAL PART OF MAGNETIC SOUNDHEAD

Order number	Description
AE01	Screw
AE02	Washer
AE03	Flywheel
AE04	Ball bearing
AE05	Toothed washer
AE06	Screw
AE07	Short spacer
AE08	Mounting plate
AE09	Resilient washer
AE10	Screw
AE11	Arm
AE12	Spindle on which pivots AE11
AE13	Spindle
AE14	Guide rollers
AE15	Ornamental screw
AE16	Short sound shaft
AE17	Long sound shaft
AE18	Screw
AE19	Plug
AE20	Adjusting screw
AE21	Torsion spring (anti-clockwise)
AE22	Spring holder
AE23	Screw
AE24	Resilient washer
AE25	Ornamental screw
AE26	Ball bearing
AE27	Pressure roller for 70 mm film
AE27A	Pressure roller for 35 mm film
AE28	Spring
AE29	Lever with spindle for pressure roller
AE30	Steel washer
AE31	Stop pin
AE32	Torsion spring (clockwise)
AE33	Lever with spindle for rollers AE14
AE34	Film-tension indicator, mounted on lever AE33
AE35	Screw
AE36	Film-tension indicator on mounting plate AE08
AE37	Gasket
AE38	Long spacer



Fig. AF - MAGNETIC SOUNDHEAD and JUNCTION BOX

Order number	Description
AF01	Screw
AF02	Washer
AF03	Protection plate
AF04	Screw
AF05	Protecting cap with fixing screw
AF06	Bracket with female plug and wiring
AF07	Magnetic soundhead for ten sound tracks
AF08	Flexible tube
AF09	Mounting plate
AF10	Cover
AF11	Screw
AF12	Washer
AF13	Text plate
AF14	Junction block
AF15	Screw
AF16	Junction block
AF17	Washer
AF18	Screw



Fig. AG - OPTICAL SOUNDHEAD

Order number	Description
AG01	Milled nut
AG02	Washer
AG03	Photocell type 355 ⁴ .
AG04	Photocell holder
AG05	Screw
AG06	Toothed washer
AG07	Mounting plate
AG08	Resilient retainer of ball bearing
AG09	Cap
AG10	Ball bearing
AG11	Flywheel
AG12	Ring
AG13	Exciter-lamp cable
AG14	Screw
AG15	Clamp
AG16	Steel washer
AG17	Plug
AG18	Screw
AG19	Lever with spindle
AG20	Adjusting screw
AG21	Screw
AG22	Collar
AG23	Ball bearing
AG24	Snap ring
AG25	Pressure roller
AG26	Ornamental screw
AG27	Locking ring
AG28	Screw
AG29	Spring holder
AG30	Torsion spring (anti-clockwise)
AG31	Guide roller
AG32	Holder with glass rod and condenser lens
AG33	Screw
AG34	Ornamental screw
AG35	Guide roller
AG36	Ornamental screw
AG37	Exciter-lamp holder
AG38	Exciter lamp type 7251C
AG39	Sound drum
AG40	Guide roller
AG41	Pin
AG42	Screw
AG43	Screw
AG44	Lid with glass window and mirror
AG45	Micro-lens
AG46	Eccentric pin
AG47	Locking plate
AG48	Screw
AG49	Screw
AG50	Washer
AG51	Mounting plate
AG52	Slit-bush and condenser lens



Fig. AH - RUNNER PLATE and PAD-ROLLER UNITS
FOR 70 mm FILM

Order number	Description
	<u>Pad-roller units for the upper feed sprocket and for the hold-back sprocket:</u>
AH01	Support with hollow spindle and stop pin
AH02	Screw
AH03	Screw
AH04	Adjusting collar
AH05	Set screw
AH06	Plug
AH07	Spindle
AH08	Torsion spring (clockwise)
AH09	Spring holder
AH10	Screw
AH11	Adjusting pin
AH12	Ornamental screw
AH13	Roller
AH14	Holder with shaft
AH15	Washer
AH16	Screw
	<u>Runner plate:</u>
AH17	Nut
AH18	Guide pin
AH19	Casting of runner plate with pins
AH20	Adjusting screw
AH21	Torsion spring
AH22	Film stripper
AH23	Screw
AH24	Stop bush
AH25	Lateral guide roller
AH26	Adjusting screw
AH27	Winged nut
AH28	Nut
AH29	Screw
AH30	Strip
AH31	Centring pin
AH32	Screw
AH33	Washer
AH34	Outer bearing of Maltese-cross shaft
AH35	Tightening pin
AH36	Runner plate
AH37	Screw
AH38	Nylon protecting ring
AH39	Spindle for film stripper
AH40	Screw
AH41	Nut
AH42	Set screw
AH43	Strip
AH44	Leaf spring
AH45	Strip



Fig. AJ - RUNNER PLATE and PAD-ROLLER UNITS
FOR 35 mm FILM

Order numbers	Description
	<u>Pad-roller units for the upper feed sprocket and for the hold-back sprocket:</u>
AJ01	Support with hollow spindle and stop pin
AJ02	Screw
AJ03	Spindle
AJ04	Holder with shaft
AJ05	Collar
AJ06	Screw
AJ07	Torsion spring (clockwise)
AJ08	Spring holder
AJ09	Screw
AJ10	Adjusting pin
AJ11	Ornamental screw
AJ12	Roller
AJ13	Set screw
AJ14	Plug
AJ15	Washer
AJ16	Screw
AJ17	Tightening pin
	<u>Runner plate:</u>
AJ18	Nut
AJ19	Guide pin
AJ20	Casting of runner plate with pins
AJ21	Torsion spring
AJ22	Film stripper
AJ23	Screw
AJ24	Stop bush
AJ25	Lateral guide roller
AJ26	Strip
AJ27	Spring
AJ28	Strip
AJ29	Adjusting screw
AJ30	Winged nut
AJ31	Nut
AJ32	Screw
AJ33	Screw
AJ34	Washer
AJ35	Centring pin
AJ36	Outer bearing of Maltese-cross shaft
AJ37	Tightening pin
AJ38	Runner plate
AJ39	Screw
AJ40	Nylon protecting ring
AJ41	Spindle for film stripper
AJ42	Screw
AJ43	Adjusting screw
AJ44	Nut
AJ45	Strip



Fig. AJ - RUNNER PLATE and PAD-ROLLER UNITS
FOR 35 mm FILM

Order number	Description
	<u>Pad-roller units for the lower feed sprocket</u> <u>and for the intermittent sprocket</u> (with the exception of their torsion spring, these pad-roller units are identical)
AJ46	Screw
AJ47	Washer
AJ48	Roller
AJ49	Holder with shaft
AJ50	Ornamental screw
AJ51	Adjusting pin
AJ52	Screw
AJ53	Spring holder
AJ54	Torsion spring (clockwise) of pad-roller unit for intermittent sprocket
AJ54A	Torsion spring (anti-clockwise) of pad-roller unit for lower feed sprocket
AJ55	Adjusting ring
AJ56	Screw
AJ57	Plug
AJ58	Set screw
AJ59	Spindle



Fig. AK - GUIDE ROLLERS, FILM STRIPPER, FRAMING DEVICE

Order number	Description
AK01	Spindle
AK02	Roller
AK03	Ornamental screw
AK04	Spindle of film stripper
AK05	Film stripper
AK06	Washer
AK07	Screw
AK08	Fixing stud
AK09	Pointer
AK10	Washer
AK11	Screw
AK12	Oil seal
AK13	Gasket
AK14	Screw
AK15	Casting for framing shaft
AK16	Framing shaft
AK17	Screw
AK18	Framing knob
AK19	Fixing screw
AK20	Washer
AK21	Spindle
AK22	Screw
AK23	Strip



Fig. AL - COOLING-PLATE ASSEMBLY

Order number	Description
AL01	Locking pin
AL02	Pin
AL03	Pressure spring
AL04	Nut
AL05	Washer
AL06	Resilient washer
AL07	Locking-pin holder
AL08	Nut
AL09	Toothed washer
AL10	Screw
AL11	Washer
AL12	Centring pin
AL13	Clip
AL14	Upper pressure-band holder
AL15	Set of pressure bands for 70 mm film
AL15A	As AL15, but velvet-covered
AL16	Set of pressure bands for 35 mm film
AL16A	As AL16, but velvet-covered
AL17	Aperture plate for 70 mm film
AL17A	" " 1:1.37 for normal 35 mm film
AL17B	" " "C.M." 1:2.55 for CinemaScope
AL17C	" " "C.O." 1:2.34 for CinemaScope
AL17D	" " 1:1.85 for wide screen
AL17E	" " 1:1.75 for wide screen
AL17F	" " 1:2.00 for wide screen
AL17G	Blind aperture plate
AL18	Screw
AL19	Centring screw
AL20	Lower pressure-band holder
AL21	Clip
AL22	Screw
AL23	Resilient washer
AL24	Spacer
AL25	Snap ring
AL26	Knurled nut
AL27	Threaded pin
AL28	Centring pin
AL29	Knob
AL30	Screw
AL31	Washer
AL32	Clamp for flexible tube
AL33	Flexible tube for water cooling
AL34	Cooling plate



Fig. AM - COOLING-PLATE HOLDER

Order number	Description
AM01	Washer
AM02	Screw
AM03	Leaf spring
AM04	Washer
AM05	Screw
AM06	Knob
AM07	Lever
AM08	Cotter pin
AM09	Spindle
AM10	Magnet for dowser
AM11	Washer
AM12	Bracket
AM13	Toothed washer
AM14	Screw
AM15	Toothed washer
AM16	Screw
AM17	Dowser arm
AM18	Screw
AM19	Washer
AM20	Dowser
AM21	Ceramic spacer
AM22	Toothed washer
AM23	Nut
AM24	Screw
AM25	Yoke
AM26	Cotter pin
AM27	Washer
AM28	Bracket
AM29	Terminal block
AM30	Square washer
AM31	Washer
AM32	Screw
AM33	Strip
AM34	Cooling-plate holder
AM35	Resilient washer
AM36	Washer
AM37	Screw
AM38	Safety strip
AM39	Strip
AM40	Washer
AM41	Pin



Fig. AN - FILM-ROPTURE PROTECTOR and
SAFETY DEVICE FOR THE SHUTTER

Order number	Description
AN01	Microswitch
AN02	Bracket
AN03	Nut
AN04	Washer
AN05	Screw
AN06	Leaf spring
AN07	Support
AN08	Spindle
AN09	Arm
AN10	Screw
AN11	Arm with spring holder
AN12	Spacer
AN13	Washer
AN14	Screw
AN15	Screw
AN16	Tension spring
AN17	Screw
AN18	Nut
AN19	Screw
AN20	Screw
AN21	Washer



Fig. AO - SHUTTER ASSEMBLY

Order number	Description
A001	Shutter shaft
A002	Pin
A003	Ball bearing
A004	Disc
A005	Fixing ring
A006	Screw
A007	Centring disc
A008	Block
A009	Screw
A010	Pressure spring
A011	Collar
A012	Screw with conical head
A013	Shutter blade
A014	Screw
A015	Washer
A016	Nut
A017	Cast shutter bracket
A018	Retaining ring for ball bearing
A019	Ball bearing
A020	Thrust ring
A021	Locking nut
A022	Screw
A023	Screw



Fig. AP - UPPER and LOWER FEED SPROCKETS
and HOLD-BACK SPROCKET

Order number	Description
	<u>Upper feed sprocket:</u>
AP01	Tightening pin
AP02	Gear-wheel (right-hand)
AP03	Bracket
AP04	Pin
AP05	Oil retainer
AP06	Sprocket shaft
AP07	Sprocket marked "F"
AP08	Screw
AP09	Resilient washer
AP10	Centring pin
AP11	Screw
	<u>Lower feed sprocket:</u>
AP12	Tightening pin
AP13	Gear-wheel (left-hand)
AP14	Bracket
AP15	Pin
AP16	Oil retainer
AP17	Sprocket shaft
AP18	Sprocket marked "F"
AP19	Threading-indicator
AP20	Screw
AP21	Screw
AP22	Resilient washer
AP23	Centring pin
AP24	Screw
	<u>Hold-back sprocket:</u>
AP25	Screw
AP26	Centring pin
AP27	Tightening pin
AP28	Gear-wheel (right-hand)
AP29	Bracket
AP30	Pin
AP31	Oil retainer
AP32	Sprocket shaft
AP33	Resilient washer
AP34	Screw
AP35	Sprocket marked "H"
AP36	Inching knob



Fig. AQ - MAIN-SHAFT ASSEMBLY

Order number	Description
AQ01	Screw
AQ02	Washer
AQ03	Disc
AQ04	Screw
AQ05	Washer
AQ06	Retaining ring
AQ07	Ball bearing
AQ08	Retaining ring
AQ09	Ball bearing
AQ10	Hub
AQ11	Novotext gear wheel for driving the shutter shaft
AQ12	Fork
AQ13	Gear wheel for driving the intermediate gear
AQ14	Screw
AQ15	Resilient washer
AQ16	Tightening pin
AQ17	Centring pin
AQ18	Main shaft
AQ19	Key
AQ20	Ball bearing
AQ21	Main-drive gear
AQ22	Protecting cap
AQ23	Tightening pin
AQ24	Screw
AQ25	Stop screw

Fig. AR - INTERMITTENT UNIT and
INTERMEDIATE GEAR WHEEL

Order number	Description
AR01	Intermittent sprocket
AR02	Nut
AR03	Screw
AR04	Resilient washer
AR05	Screw
AR06	Framing disc
AR07	Intermittent unit
AR08	Nut
AR09	Oil pipe
AR10	Screw
AR11	Toothed washer
AR12	Disc
AR13	Intermediate gear-wheel for intermittent unit
AR14	Intermediate gear-wheel for framing device
AR15	Bracket with spindle
AR16	Gasket
AR17	Screw



Fig. AS - OIL PUMP and DRIVING SHAFT

Order number	Descripción
AS01	Driving shaft
AS02	Ball bearing
AS03	Tightening pin
AS04	Driving hub
AS05	Rubber bushing
AS06	Retaining ring
AS07	Screw
AS08	Toothed washer
AS09	Centring pin
AS10	Screw
AS11	Toothed washer
AS12	Driving-shaft bracket
AS13	Retaining ring
AS14	Ball bearing
AS15	Gear wheel for driving shaft
AS16	Tightening pin
AS17	Gear wheel for oil-pump drive
AS18	Short screw
AS19	Long screw
AS20	Pump body
AS21	Pin
AS22	Screw
AS23	Ring
AS24	Magnet of oil filter
AS25	Gauze of oil filter
AS26	Filter holder
AS27	Screw
AS28	Covering plate
AS29	Set of gear wheels with shafts
AS30	Screw
AS31	Washer
AS32	Oil pipe (complete)
AS33	Hollow screw for fixing the oil pipe



Fig. AT - DRIVING MECHANISM OF LOWER SPOOL SHAFT

Order number	Description
AT01	Spool shaft
AT02	Coupling bush
AT03	Tightening pin
AT04	Coupling shaft
AT05	Coupling bush
AT06	Nylon bush
AT07	Pin
AT08	Tightening pin
AT09	Counterweight
AT10	Spring
AT11	Bracket for counterweight
AT12	Pin
AT13	Spindle
AT14	Washer
AT15	Screw
AT16	Ball bearing
AT17	Spacer
AT18	Small gear wheel
AT19	Pin
AT20	Bracket for lower spool shaft
AT21	Nut
AT22	Knurled ring
AT23	Pressure spring
AT24	Bracket
AT25	Washer
AT26	Screw
AT27	Microswitch
AT28	Screw
AT29	Pin
AT30	Screw
AT31	Locking plug
AT32	Set screw
AT33	Large gear wheel
AT34	Locking ring
AT35	Felt disc
AT36	Metal disc
AT37	Pressure spring
AT38	Knurled nut
AT39	Ball bearing
AT40	Locking ring
AT41	Spacer
AT42	Washer
AT43	Screw
AT44	Resilient washer
AT45	Screw



Fig. AU - BELT TRANSMISSION and MOTOR

Order number	Description
AU01	Bolt
AU02	Belt guard
AU03	Pulley for motor shaft (50 c/s)
AU04	Washer
AU05	Nut
AU06	Motor (50 c/s, $\frac{1}{4}$ HP, 1500 r.p.m.)
AU07	Key
AU08	Screw
AU09	Hinge pin
AU10	V-belt
AU11	Complete friction coupling (50 c/s)
AU12	Cover
AU13	Rubber plug
AU14	Knurled nut
AU15	Bolt
AU16	Hinge pin

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AU 01, AU 02, etc.

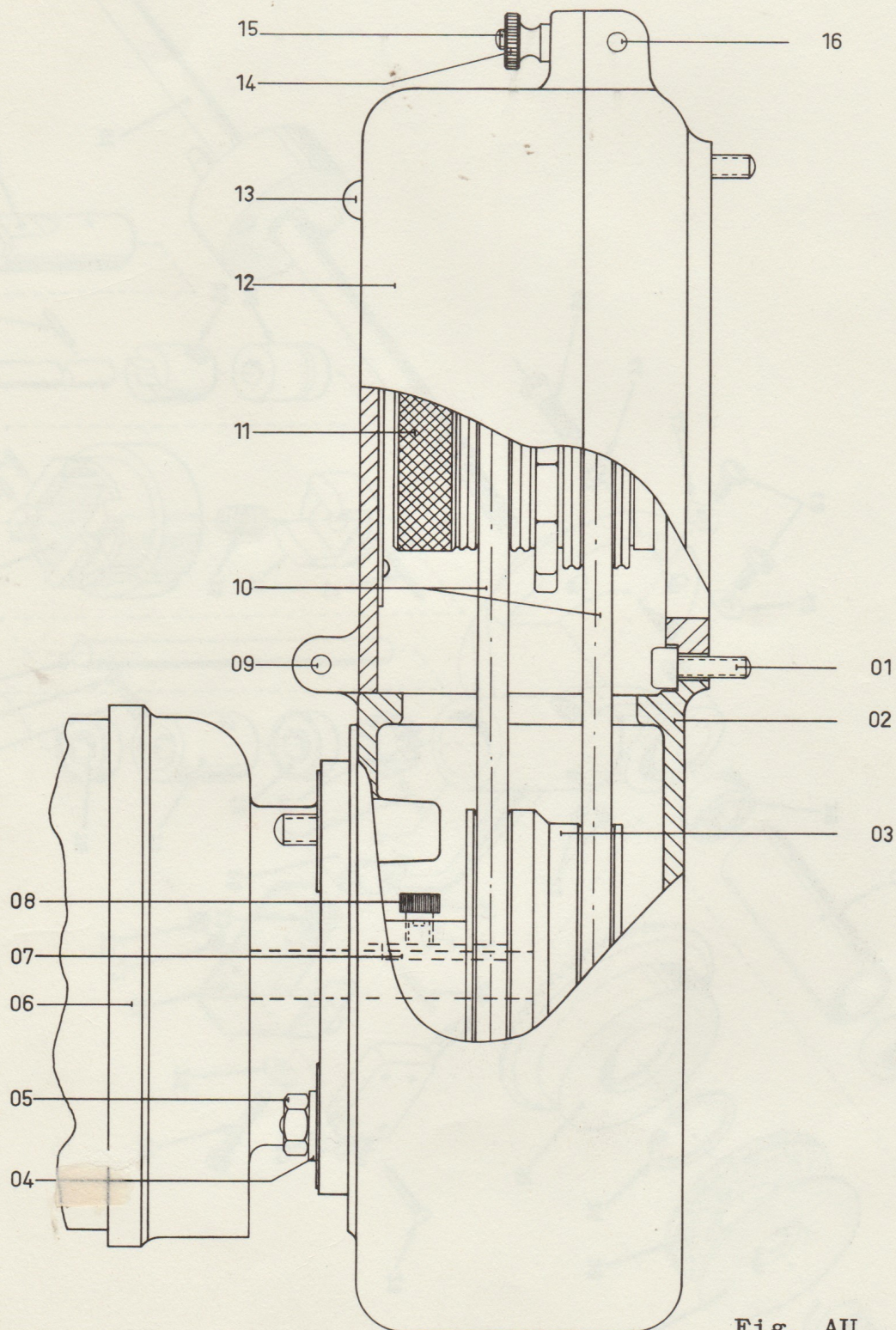


Fig. AU

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AT 01, AT 02, etc.

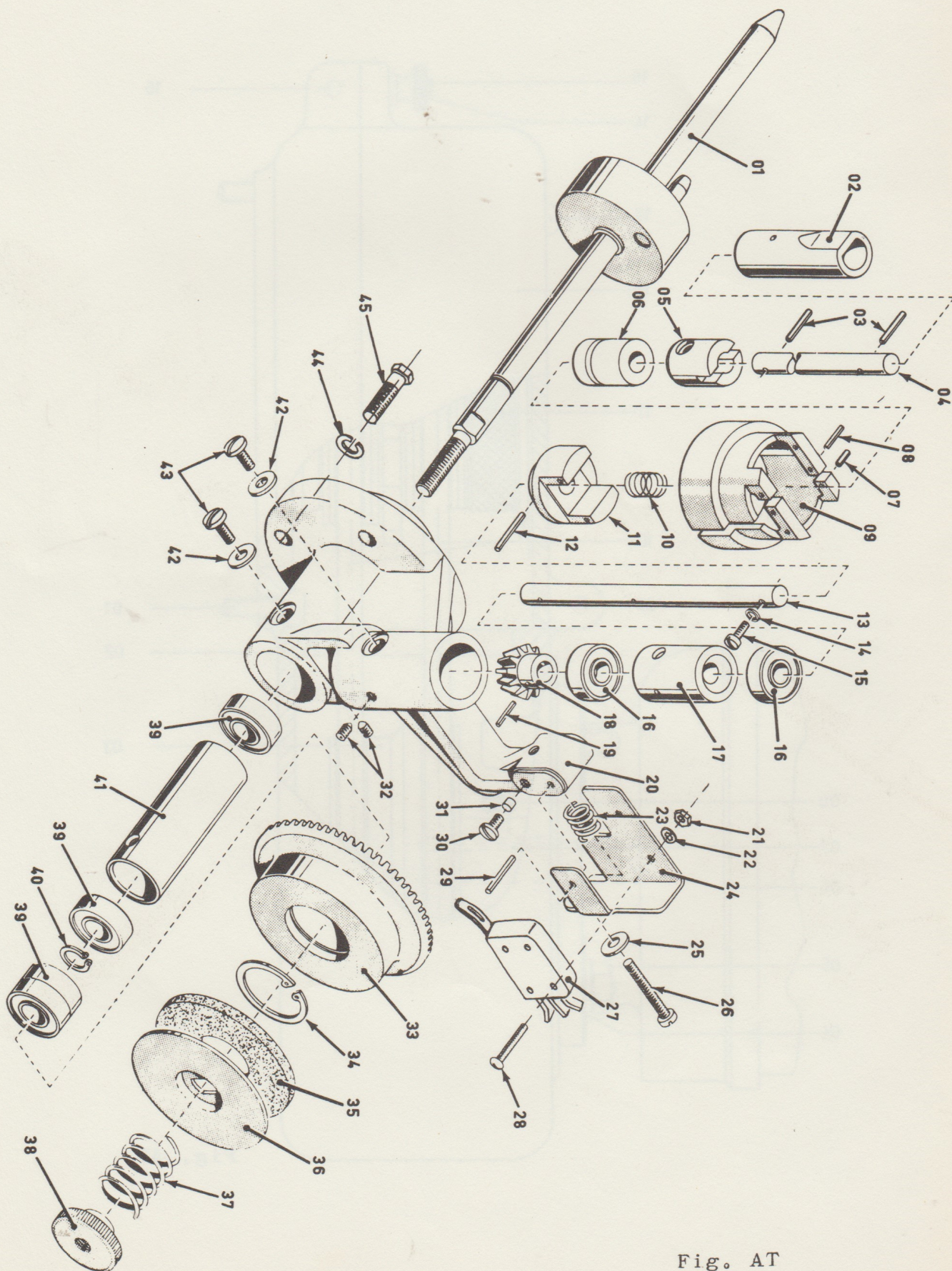
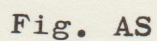


Fig. AT

AS 01, AS 02, etc.



Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AR 01, AR 02, etc.

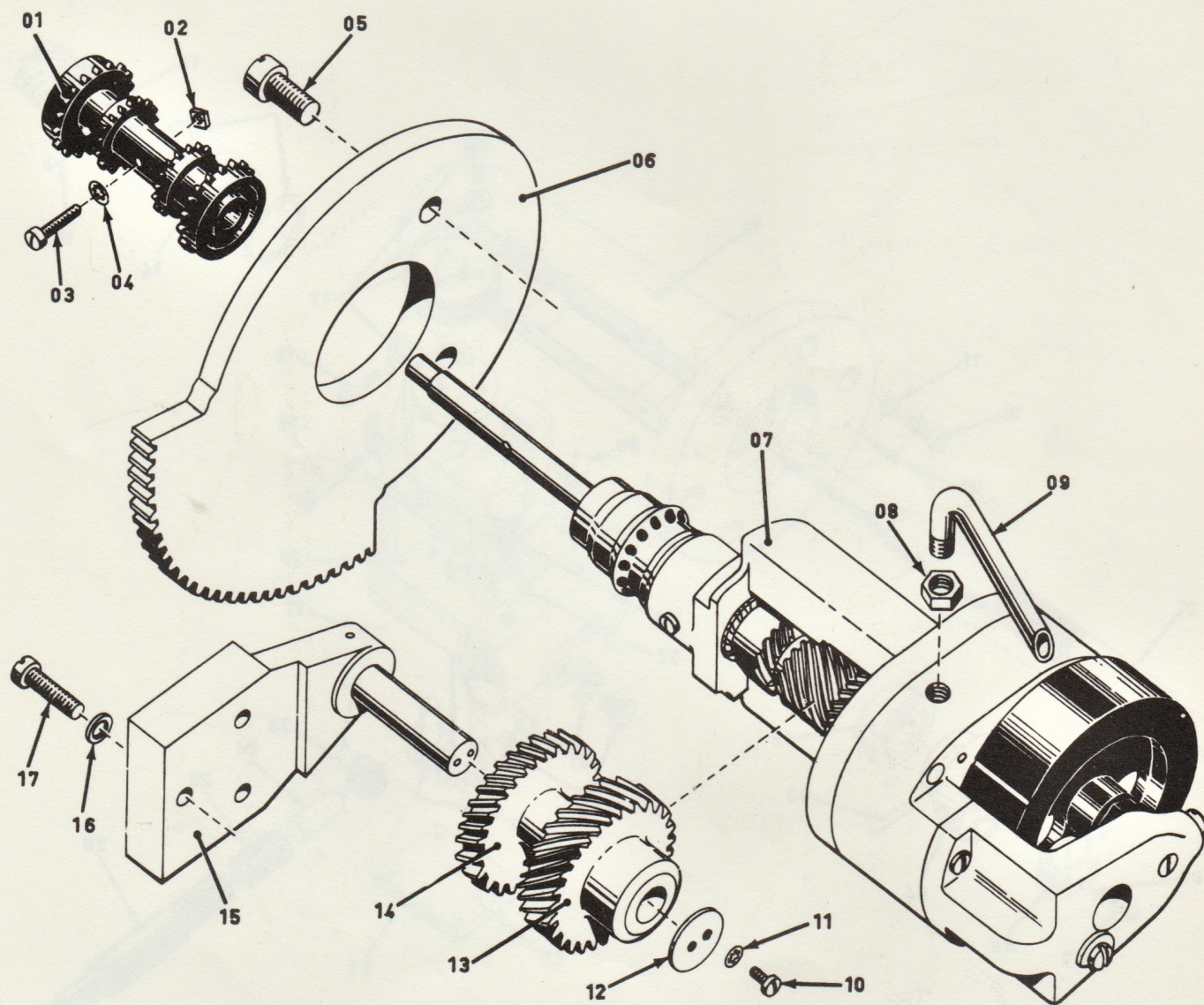


Fig. AR

Please order these parts under No. } AQ 01, AQ 02, etc.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

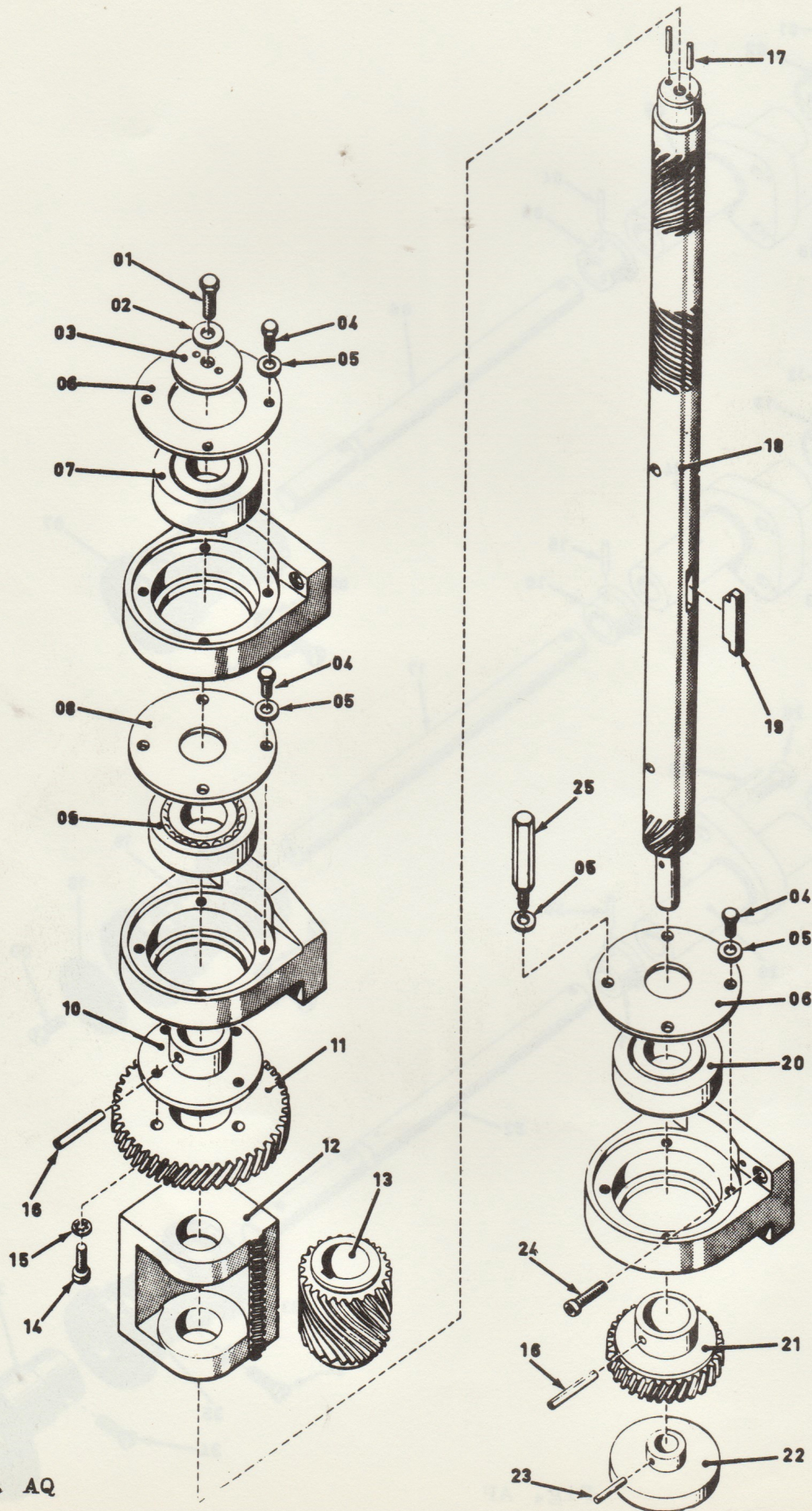


Fig. AQ

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AP 01, AP 02, etc.

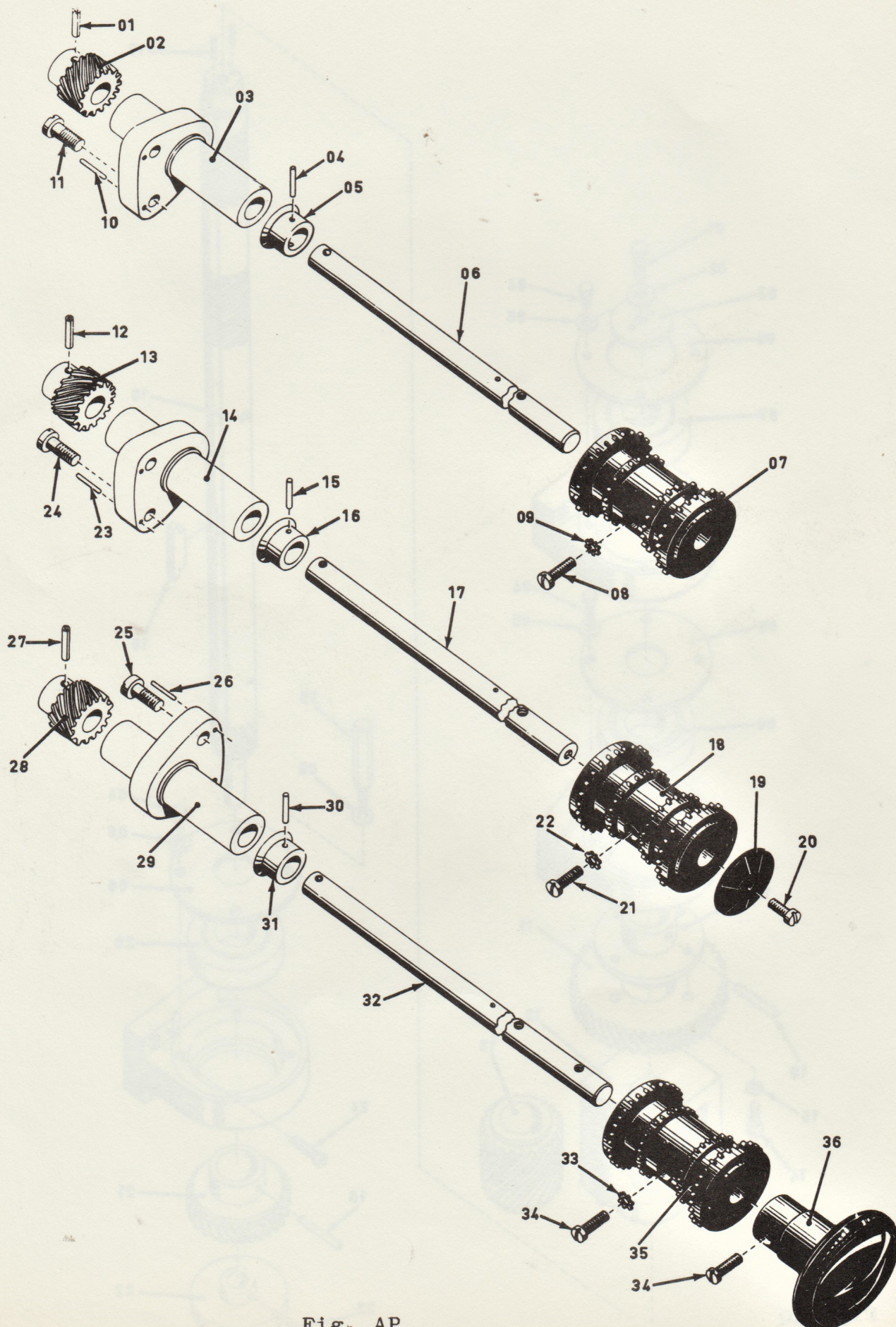


Fig. AP

Please order these parts under No. } A0 01, A0 02, etc.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr. }

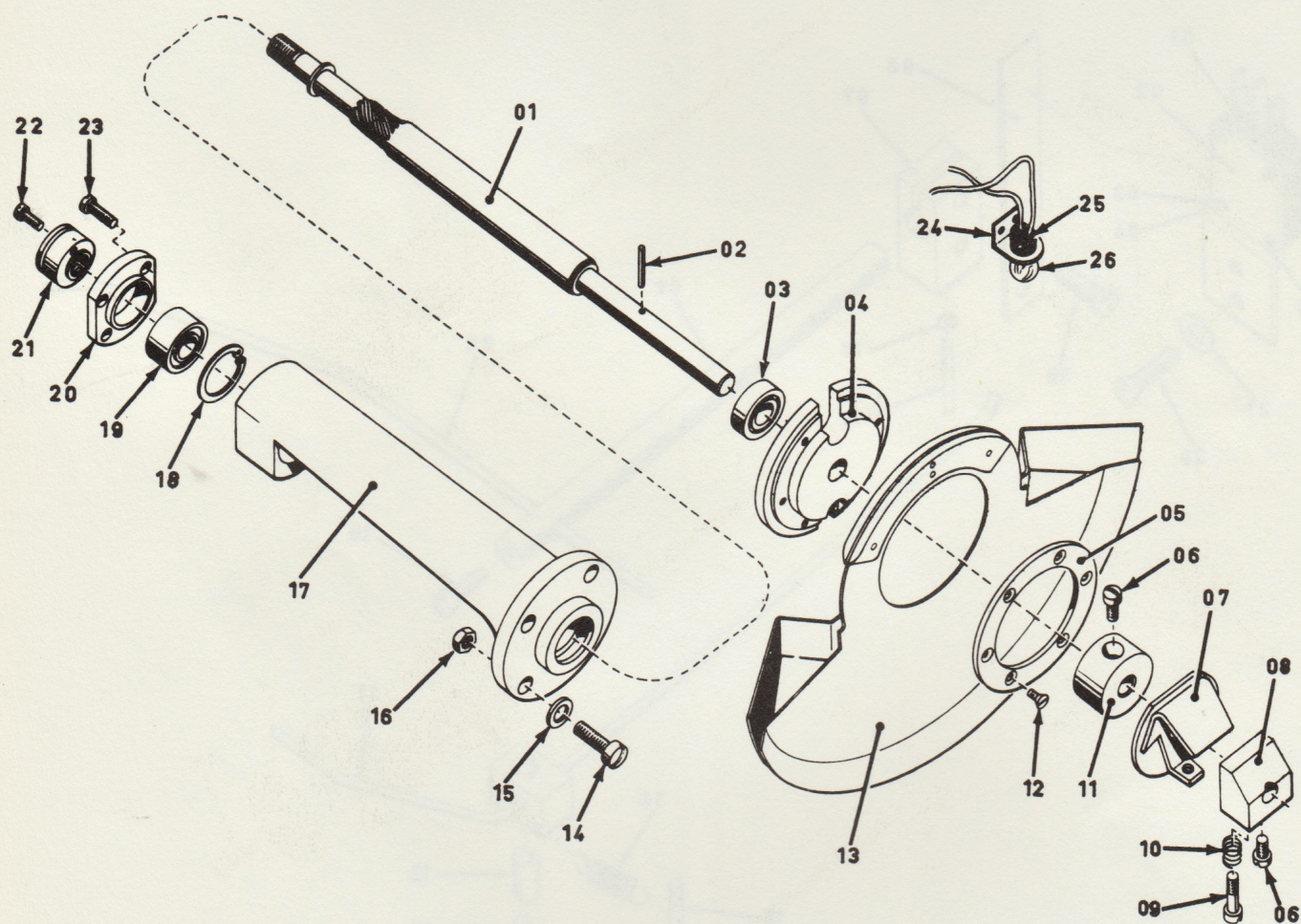


Fig. A0

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AN 01, AN 02, etc.

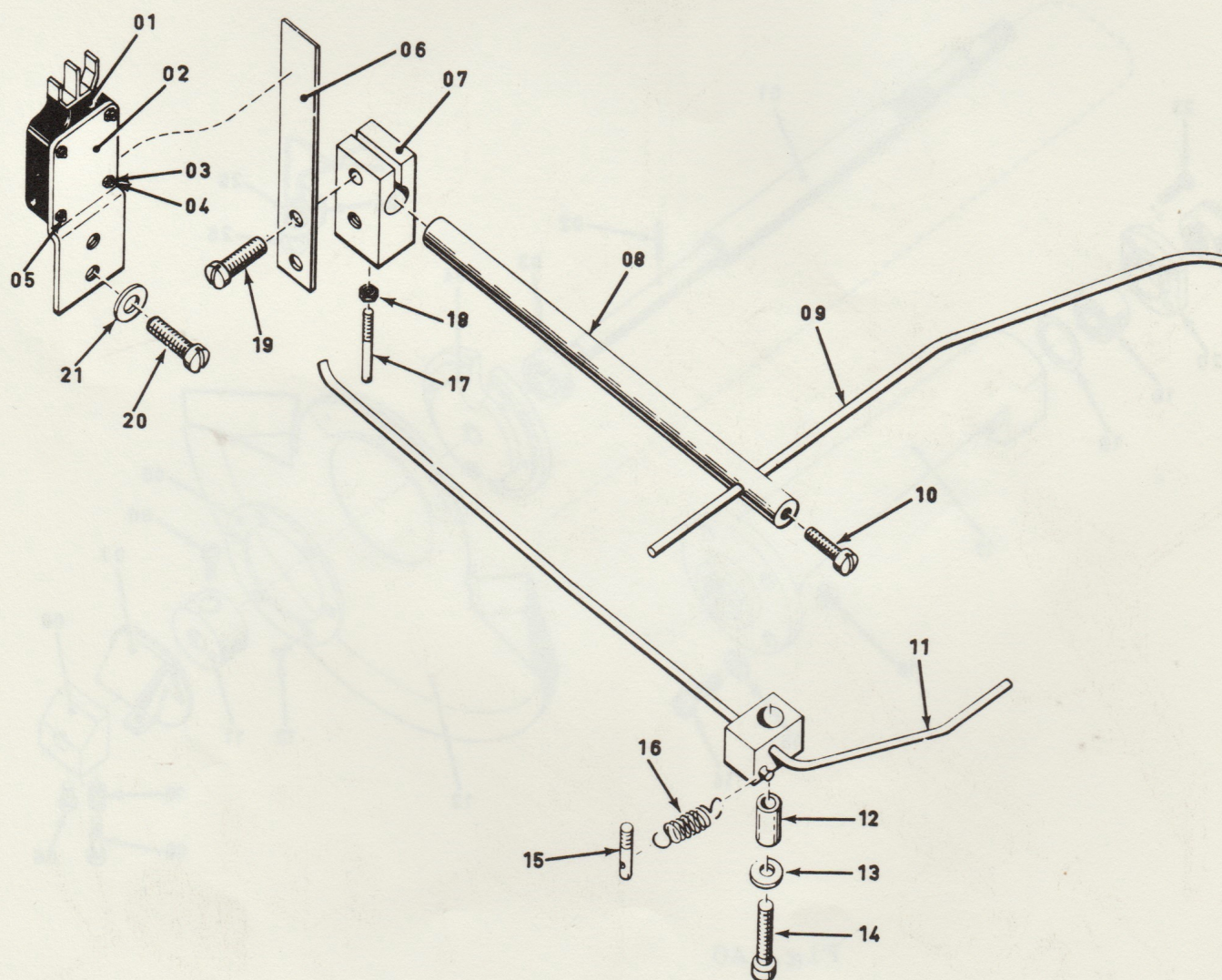


Fig. AN

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AM 01, AM 02, etc.

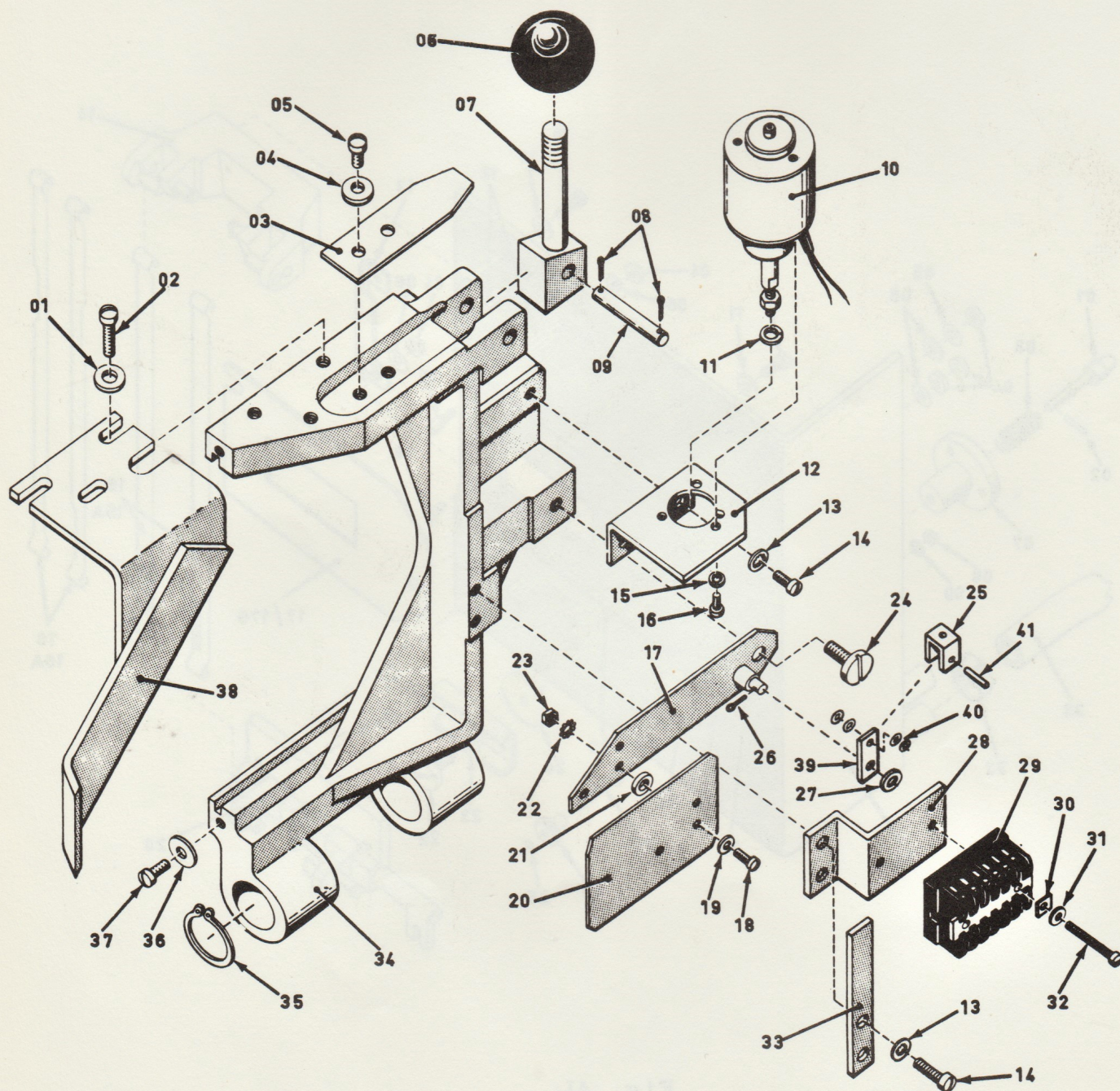


Fig. AM

Please order these parts under No. } AL 01, AL 02, etc.
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 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr. }

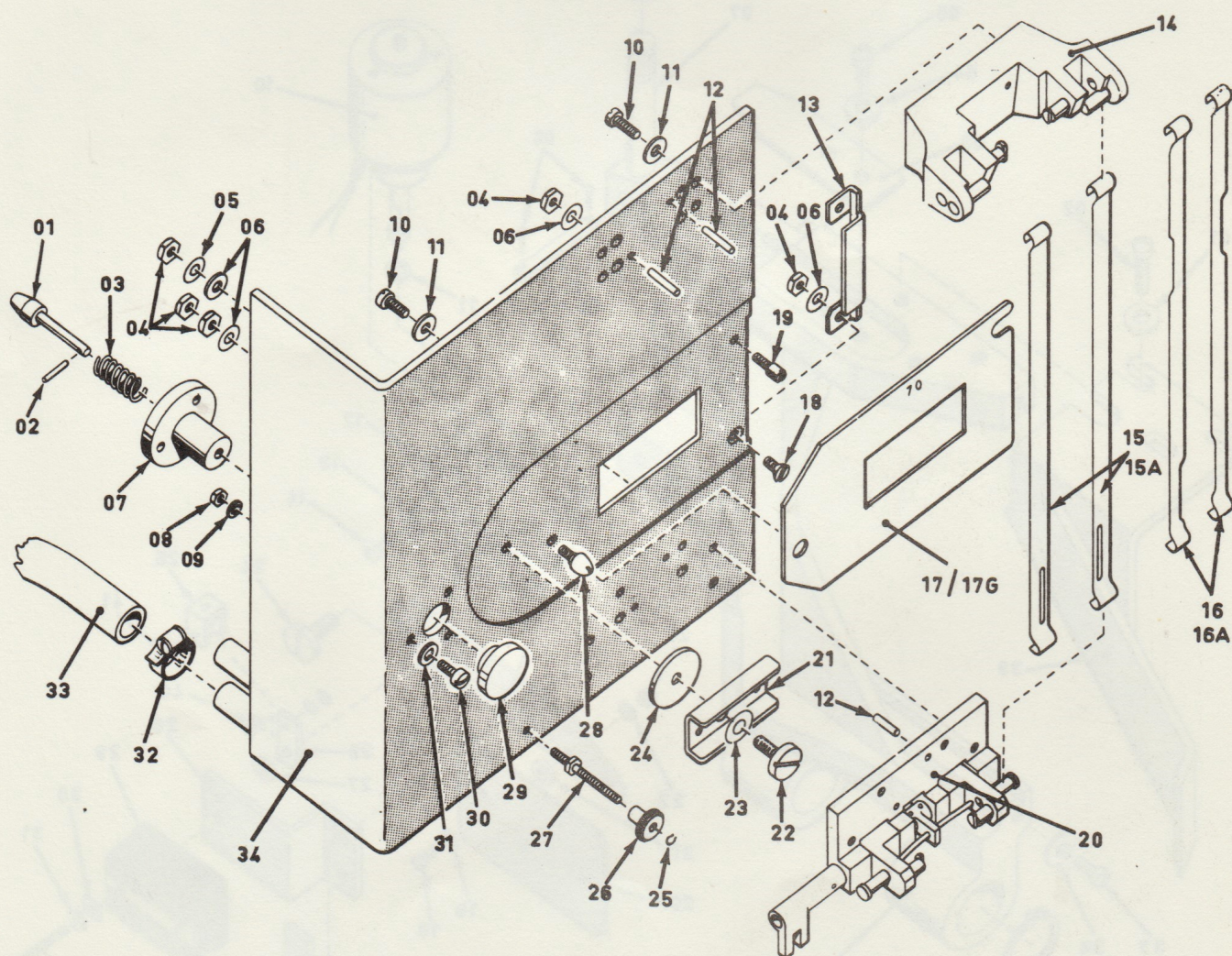


Fig. AL

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No.
 Diese Einzelteile bestellen unter Nr.

AK 01, AK 02, etc.

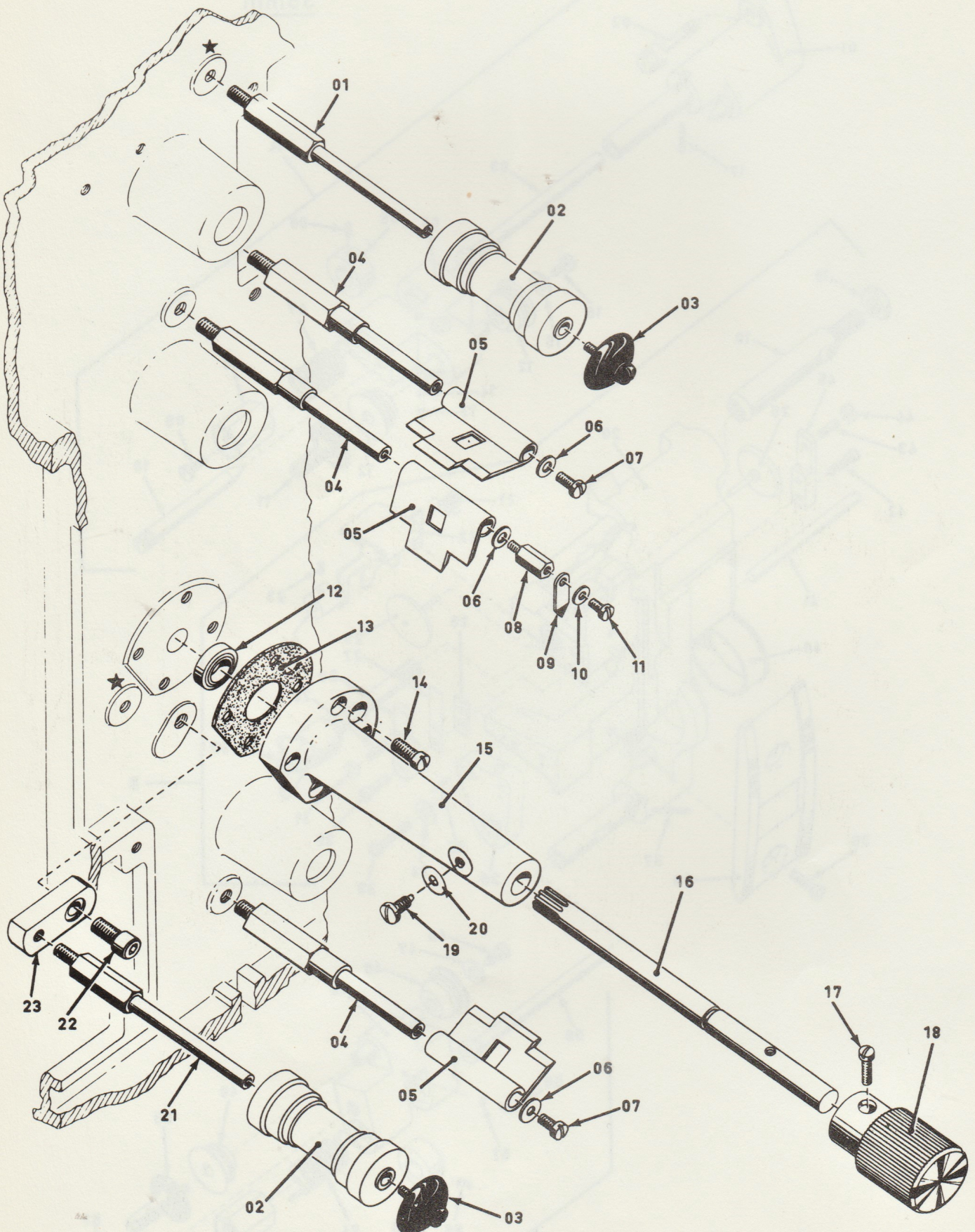


Fig. AK

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AJ 01, AJ 02, etc

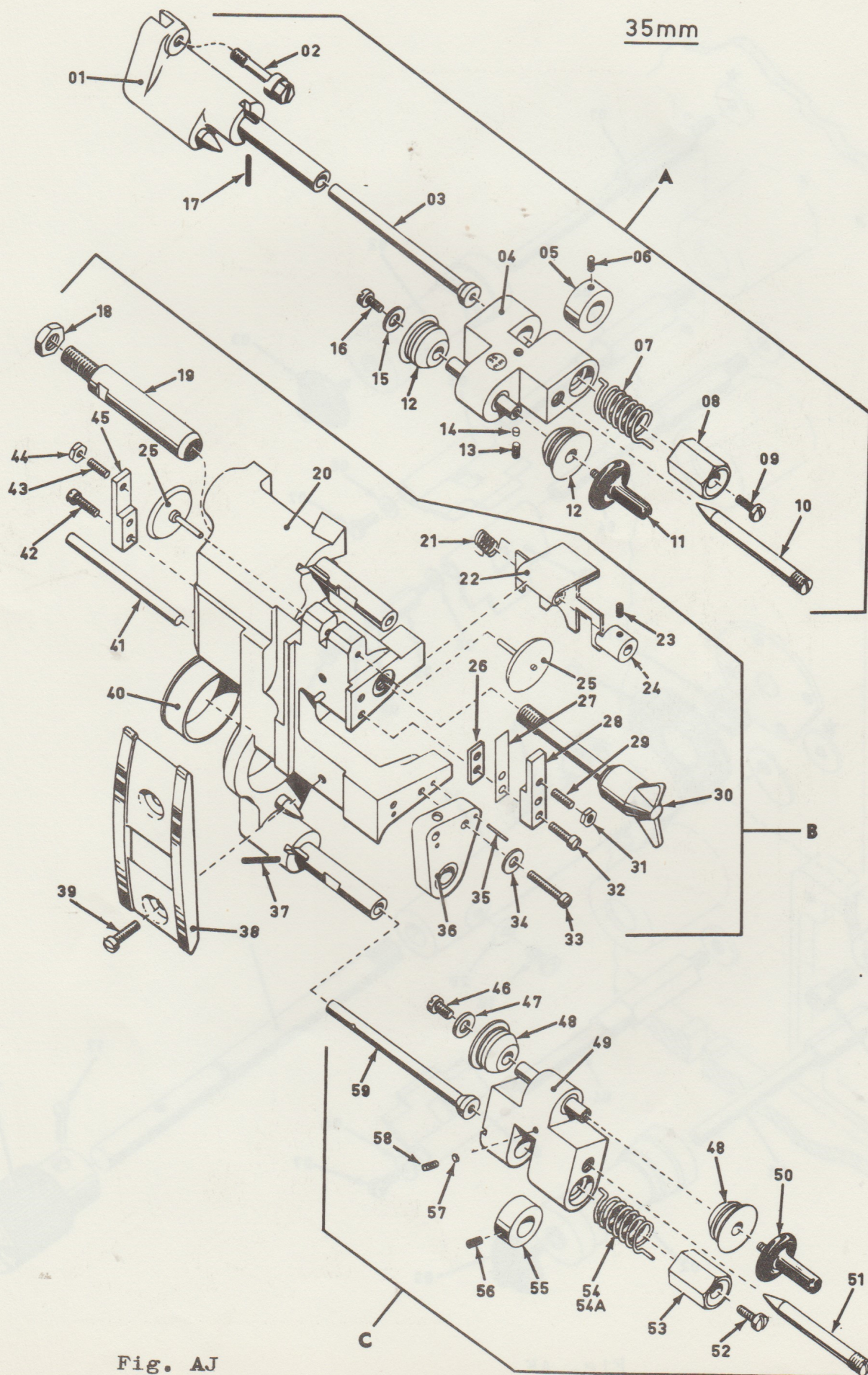


Fig. AJ

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AH 01, AH 02, etc.

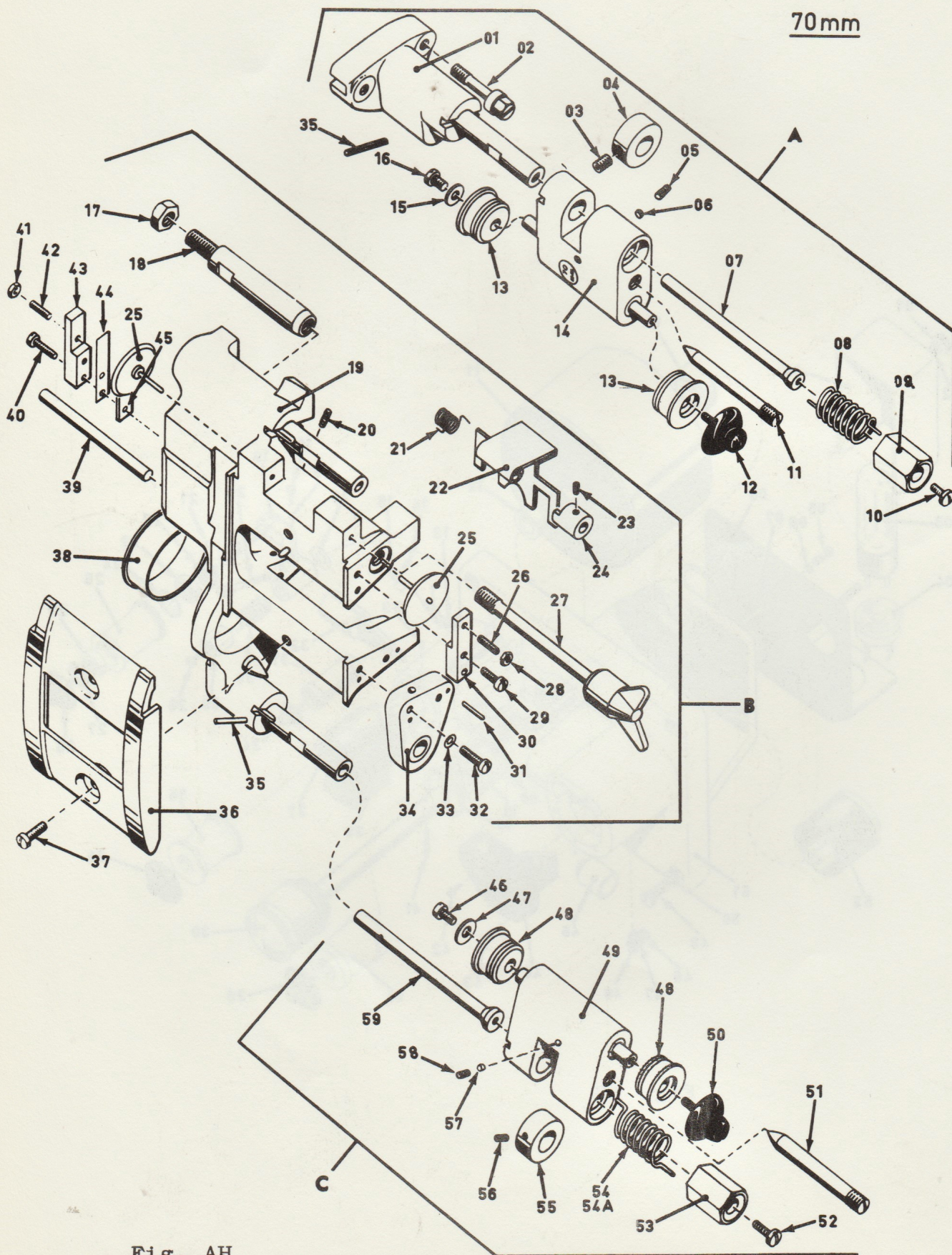


Fig. AH

Please order these parts under No. }
 Pídanse estas piezas bajo el No. } AG 01, AG 02, etc.
 Commander ces pièces sous le No }
 Diese Einzelteile bestellen unter Nr. }

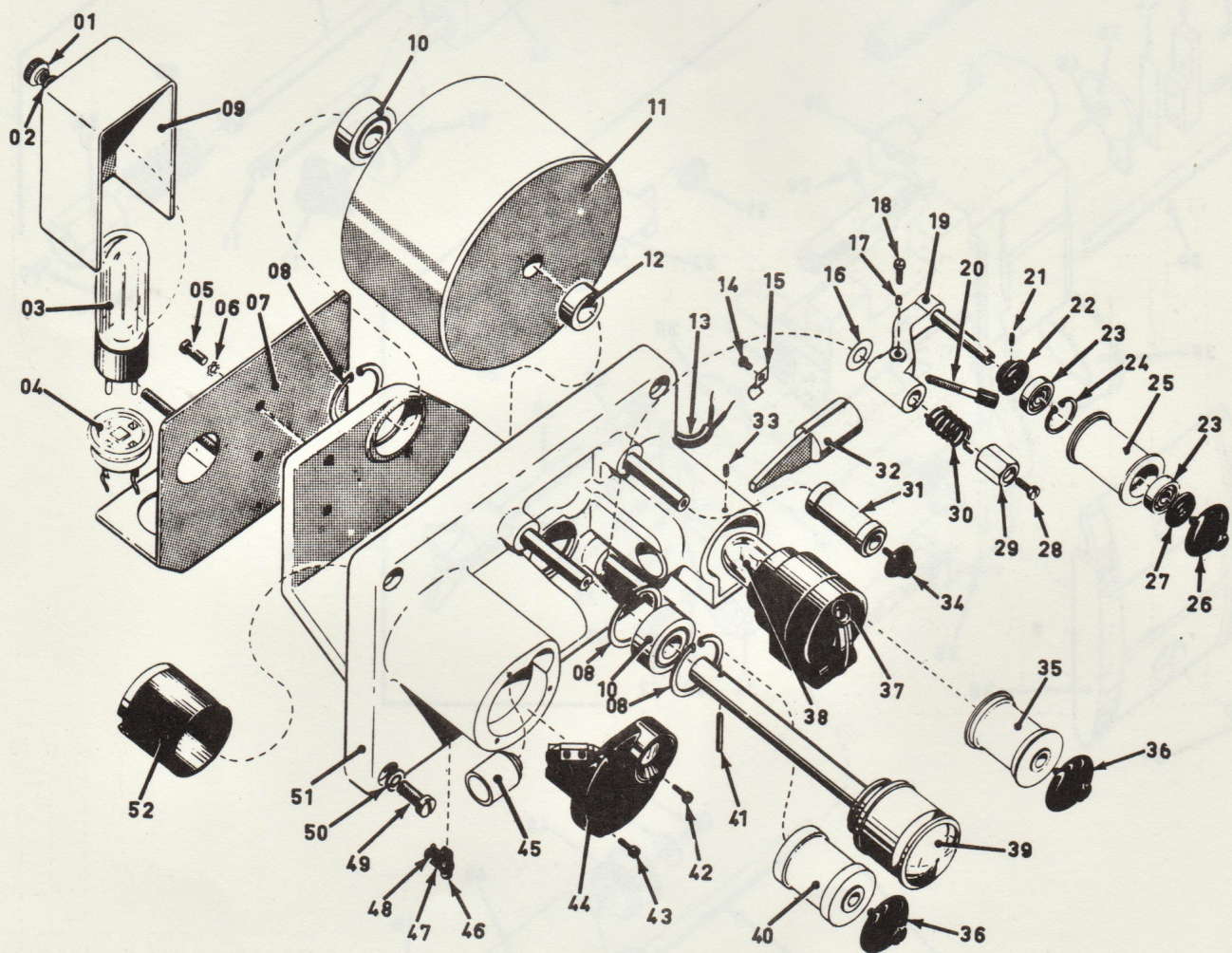


Fig. AG

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AF 01, AF 02, etc.

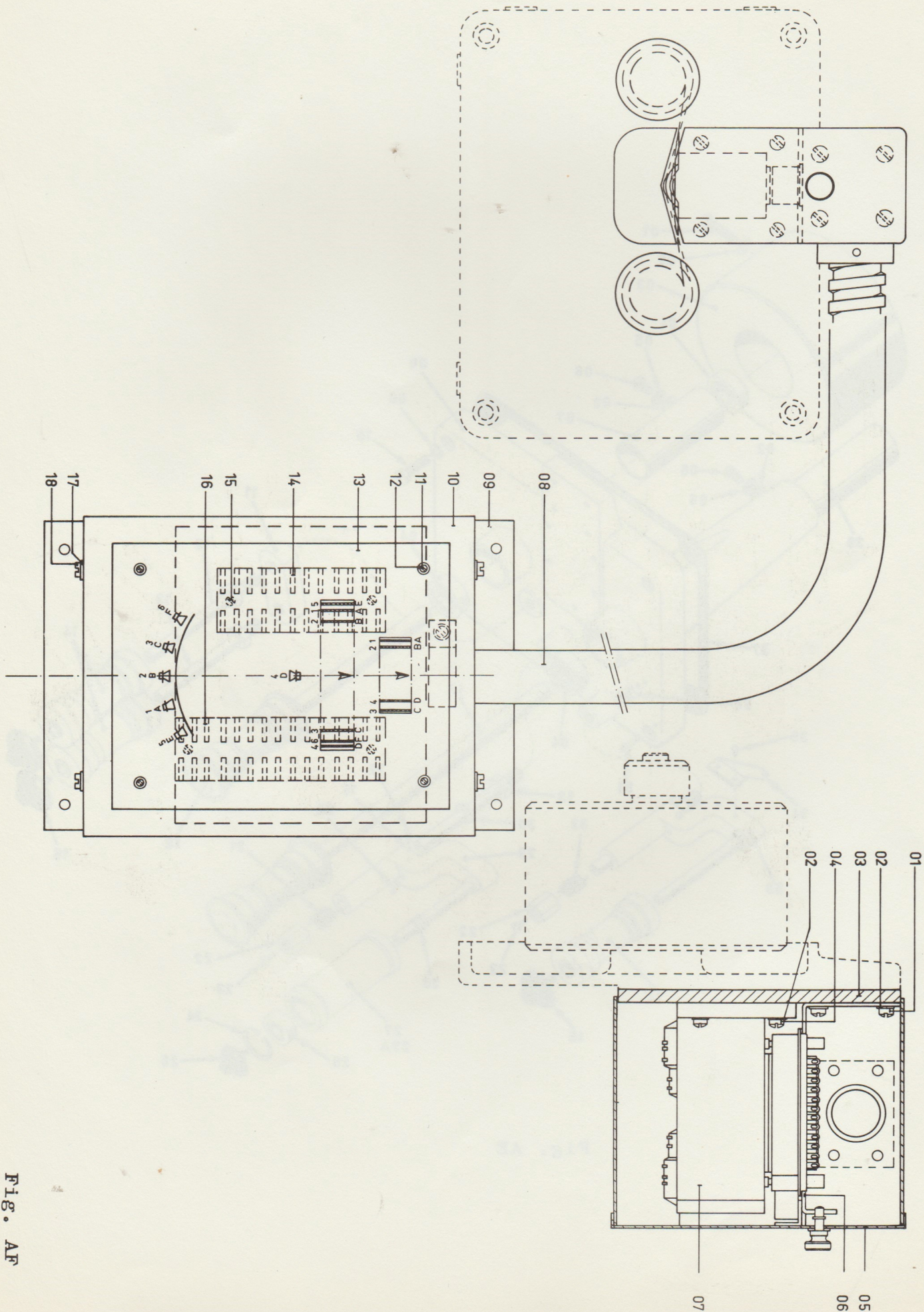


Fig. AF

Please order these parts under No. } AE 01, AE 02, etc.
 Pídanse estas piezas bajo el No. }
 Commander ces pièces sous le No }
 Diese Einzelteile bestellen unter Nr. }

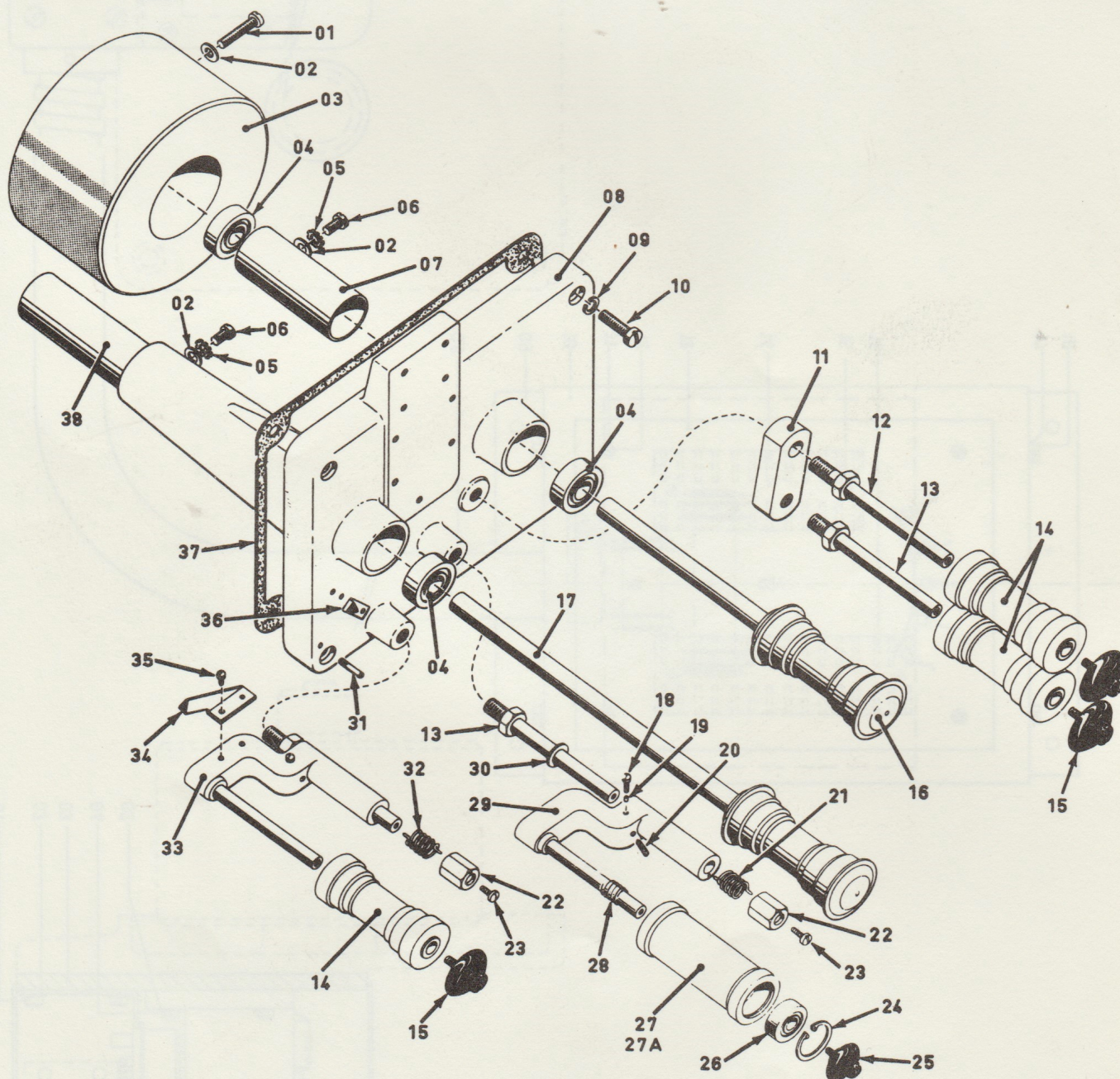


Fig. AE

Please order these parts under No. }
 Pídanse estas piezas bajo el No. }
 Commander ces pièces sous le No. }
 Diese Einzelteile bestellen unter Nr. }

AD 01, AD 02, etc.

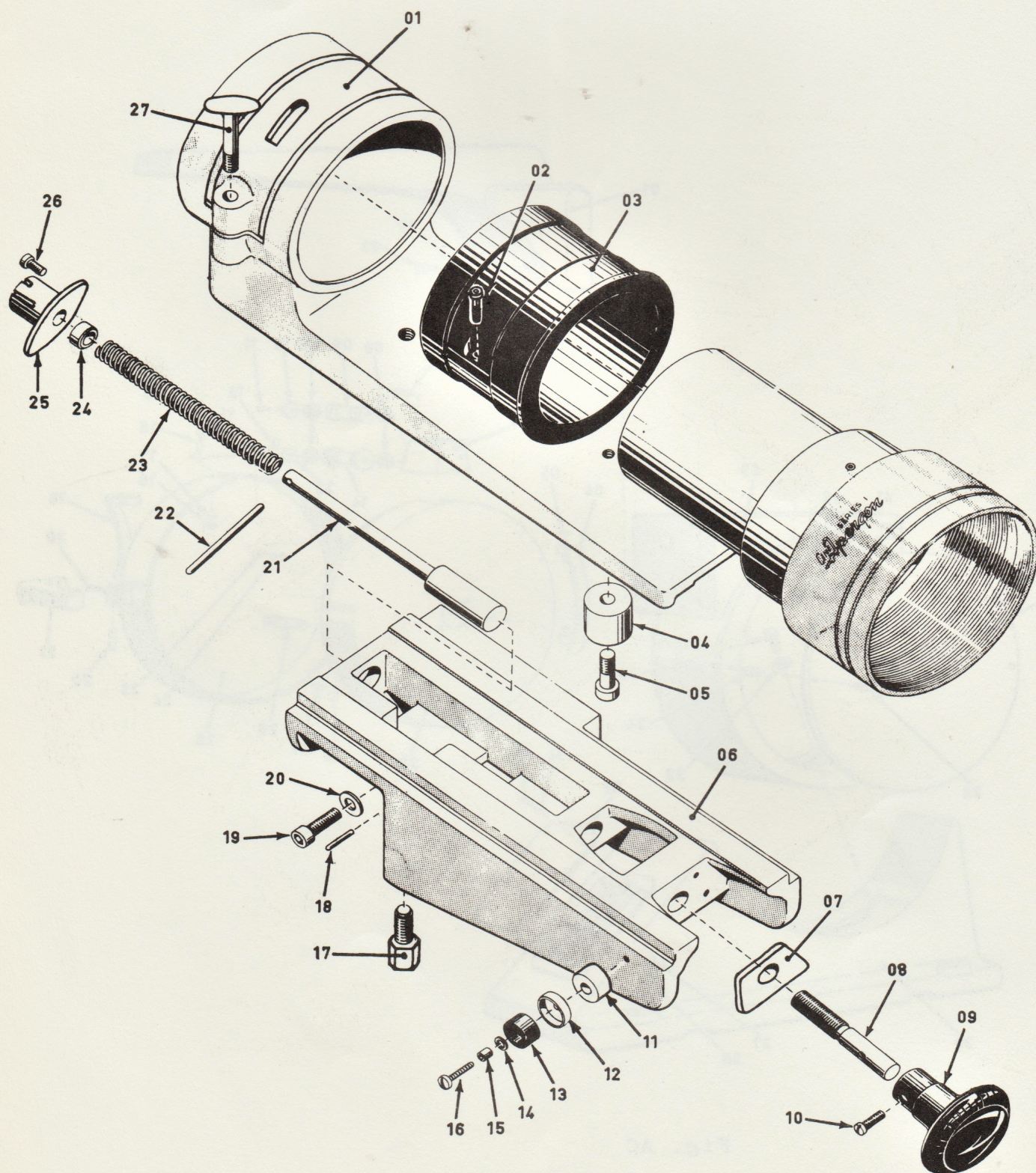


Fig. AD

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AC 01, AC 02, etc.

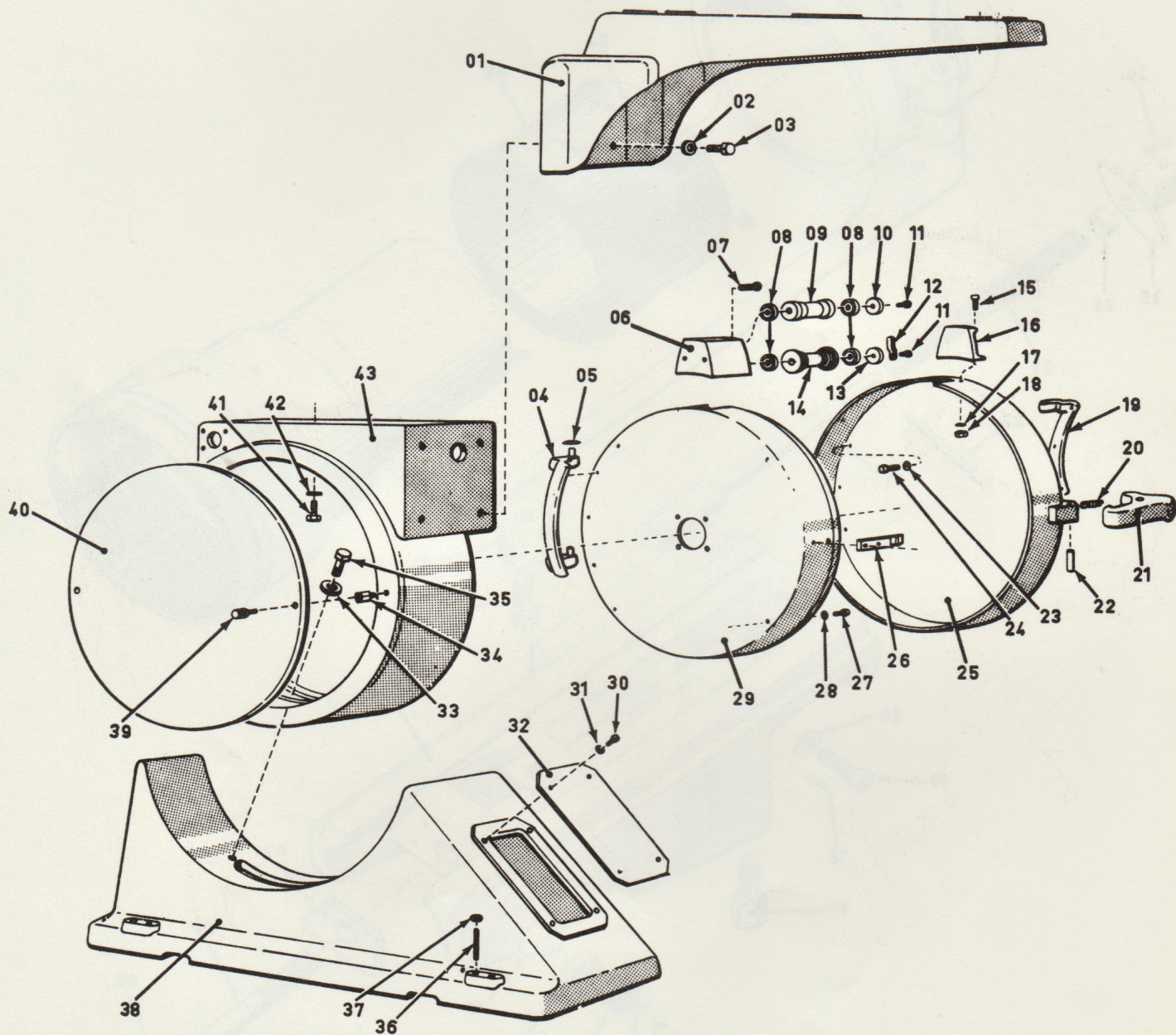


Fig. AC

Please order these parts under No. } AB 01, AB 02, etc.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

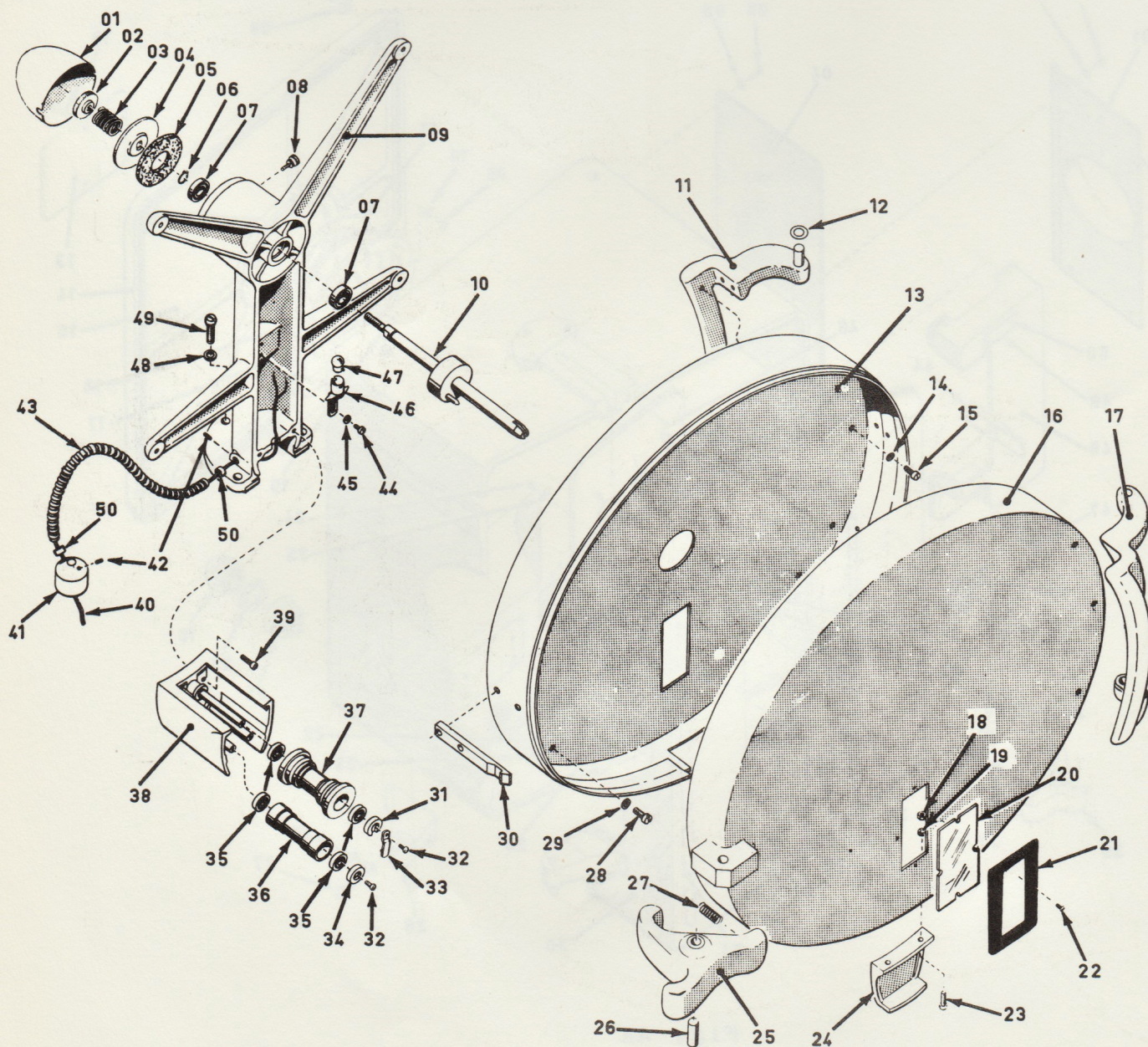


Fig. AB

Please order these parts under No.
 Pídanse estas piezas bajo el No.
 Commander ces pièces sous le No
 Diese Einzelteile bestellen unter Nr.

AA 01, AA 02, etc.

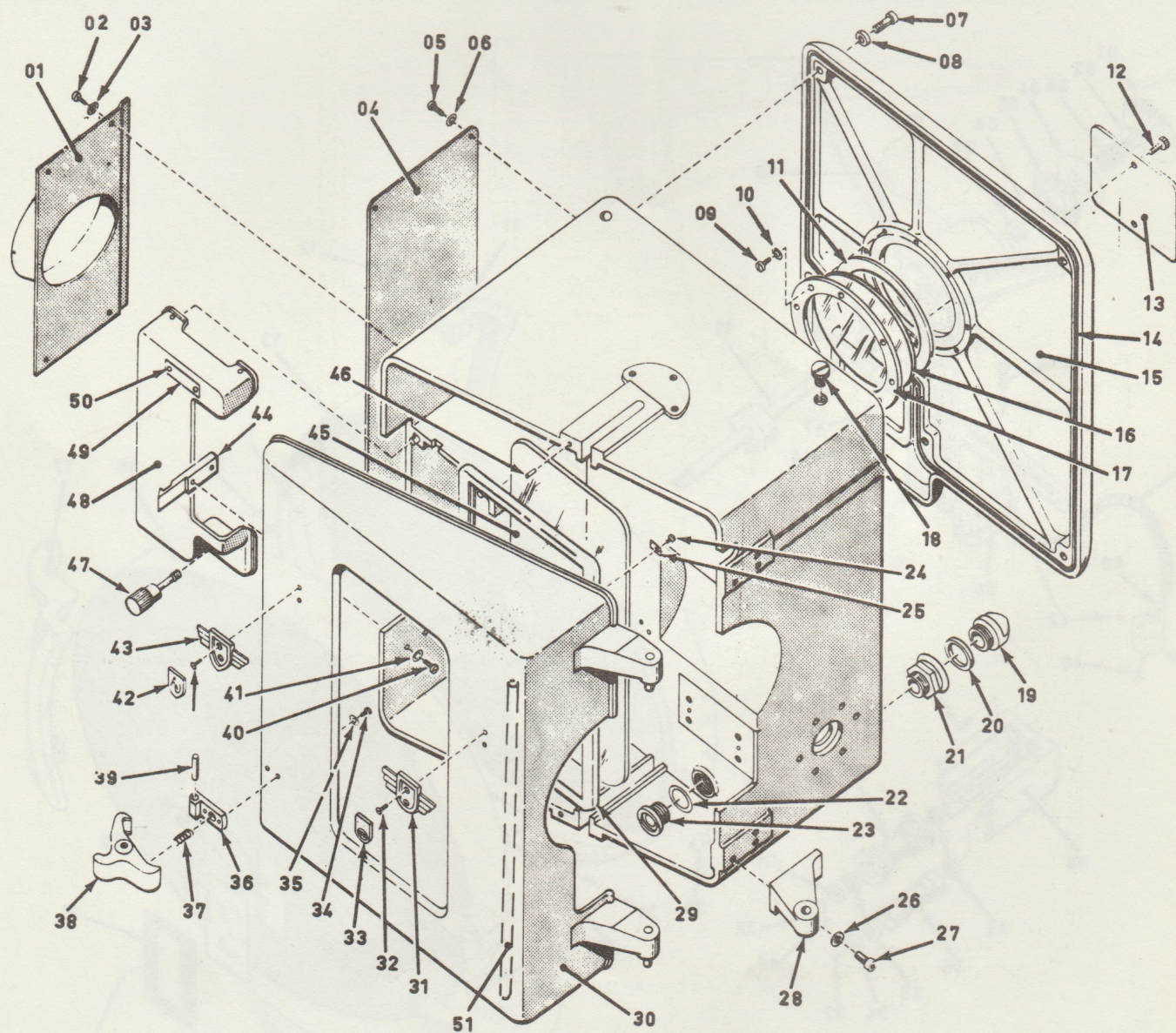


Fig. AA

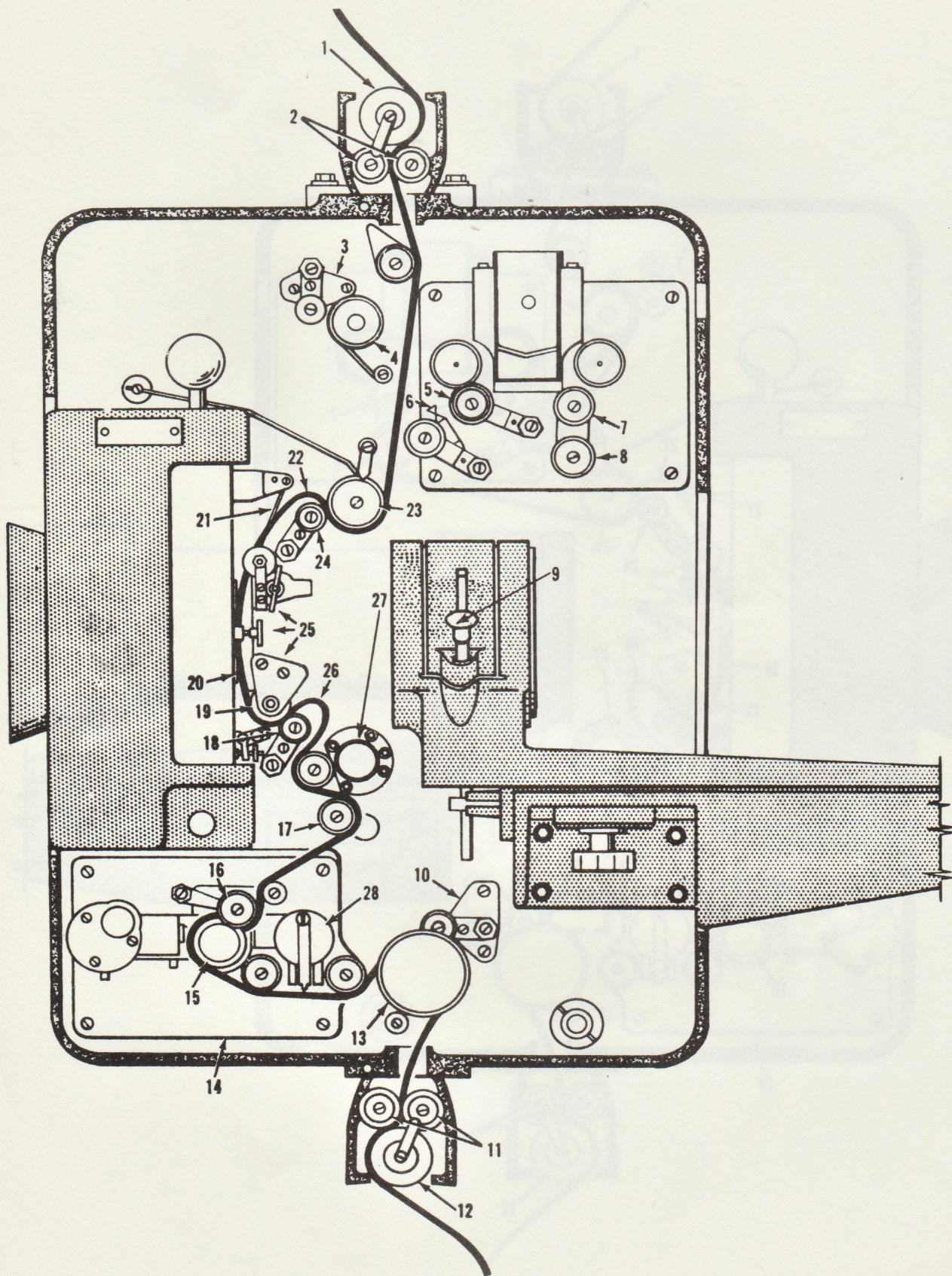


FIG.20

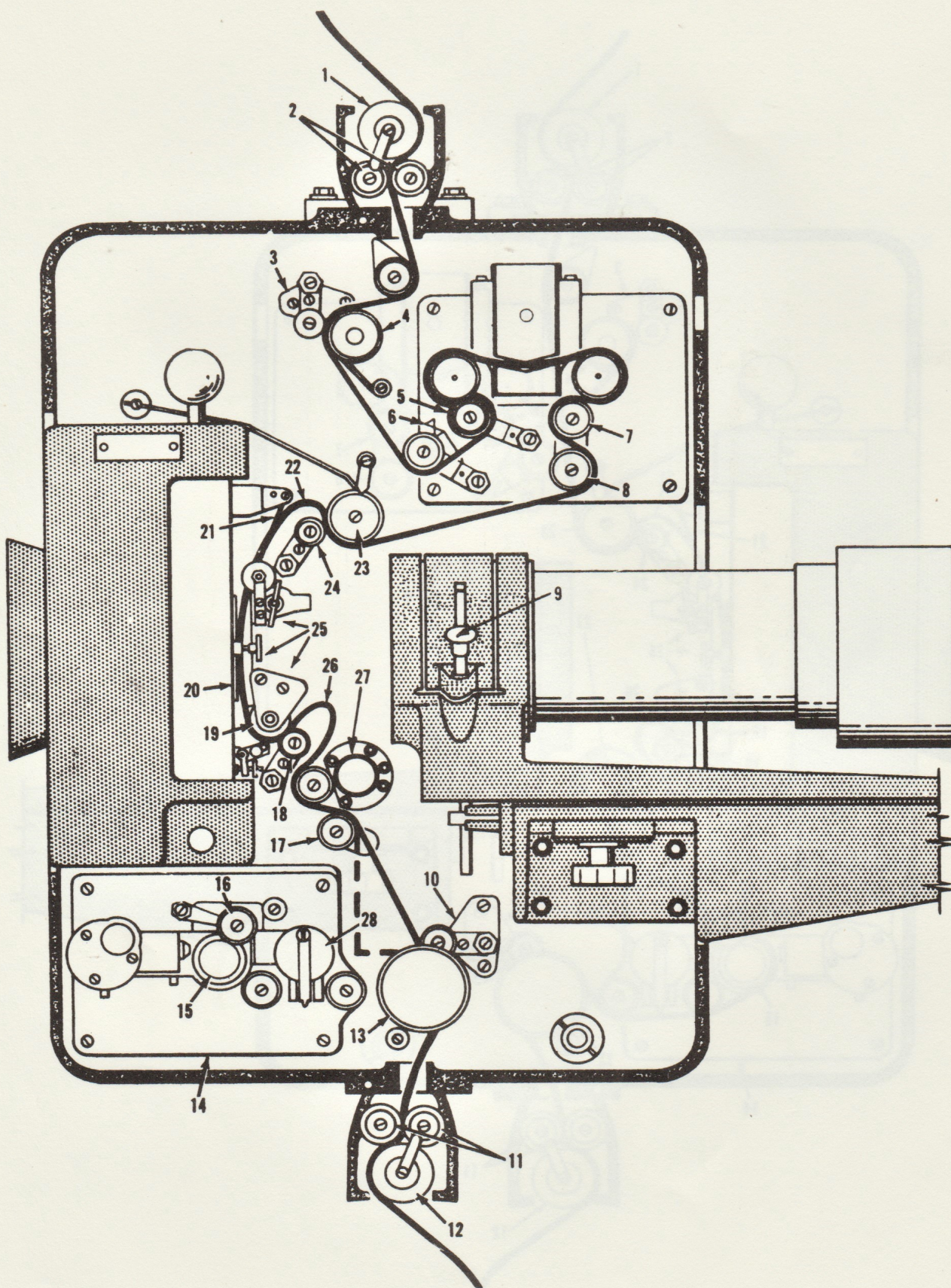


FIG. 19

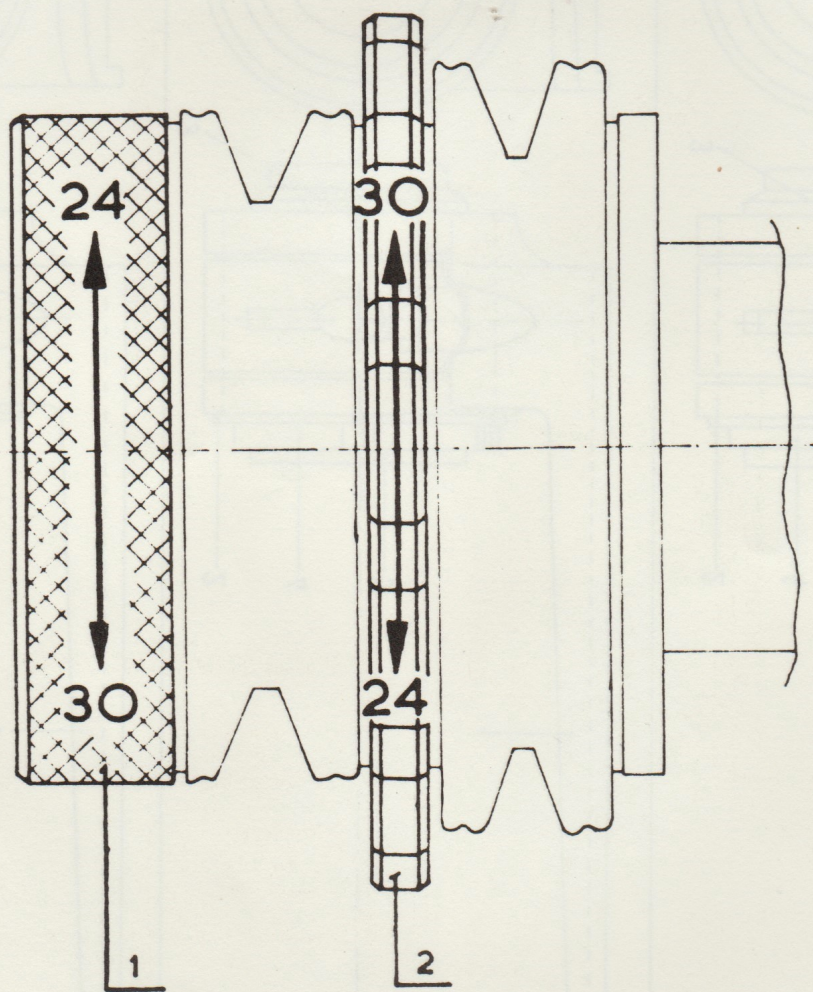
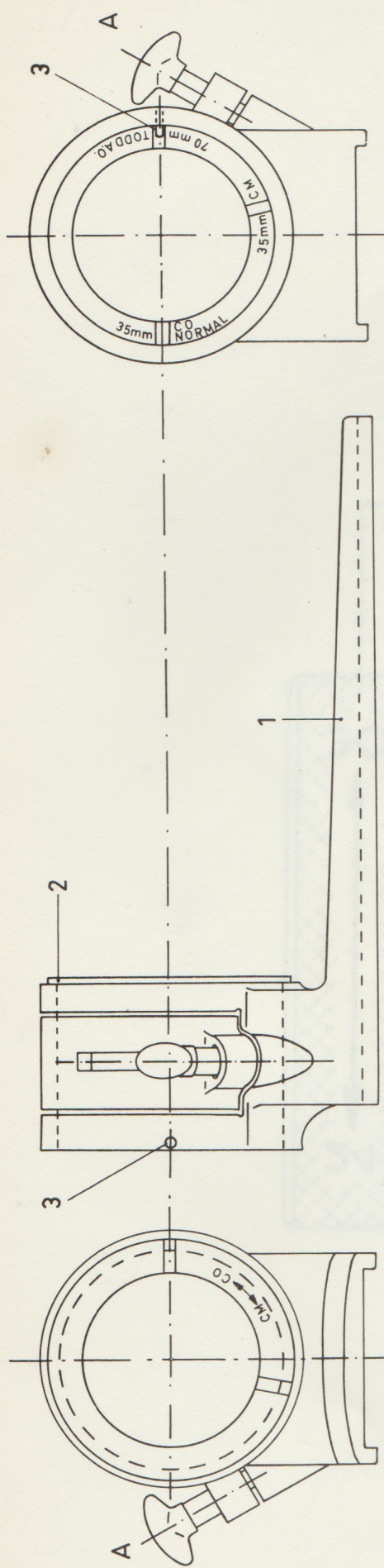


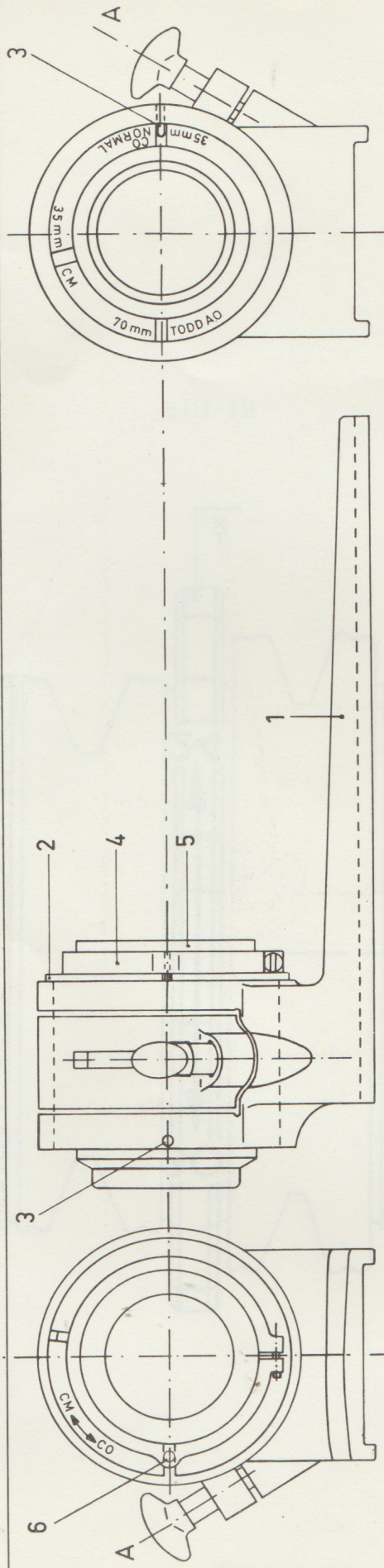
FIG. 18

FIG. 17

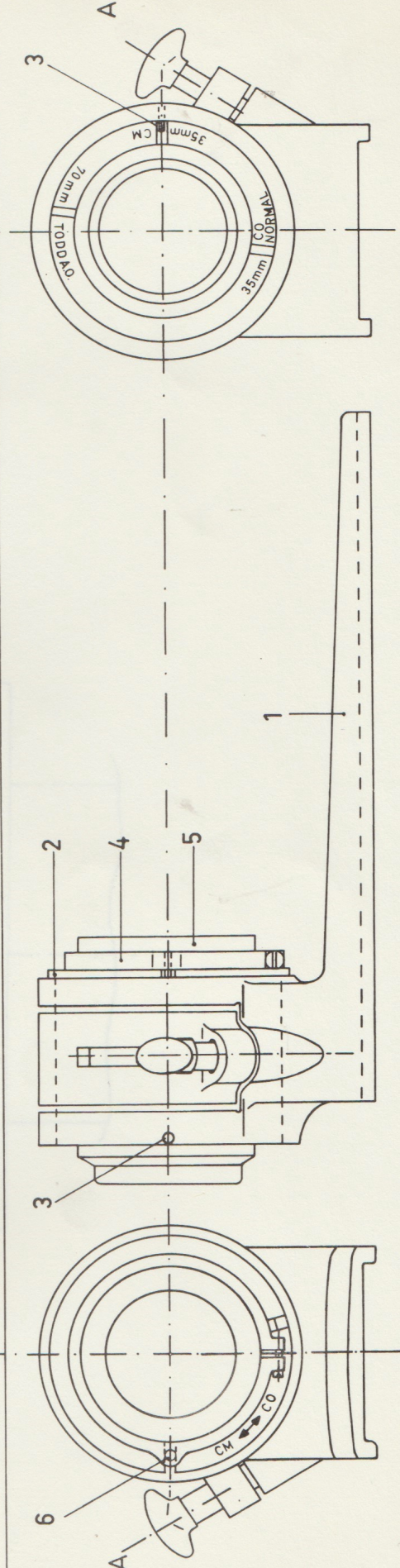
I



II



III



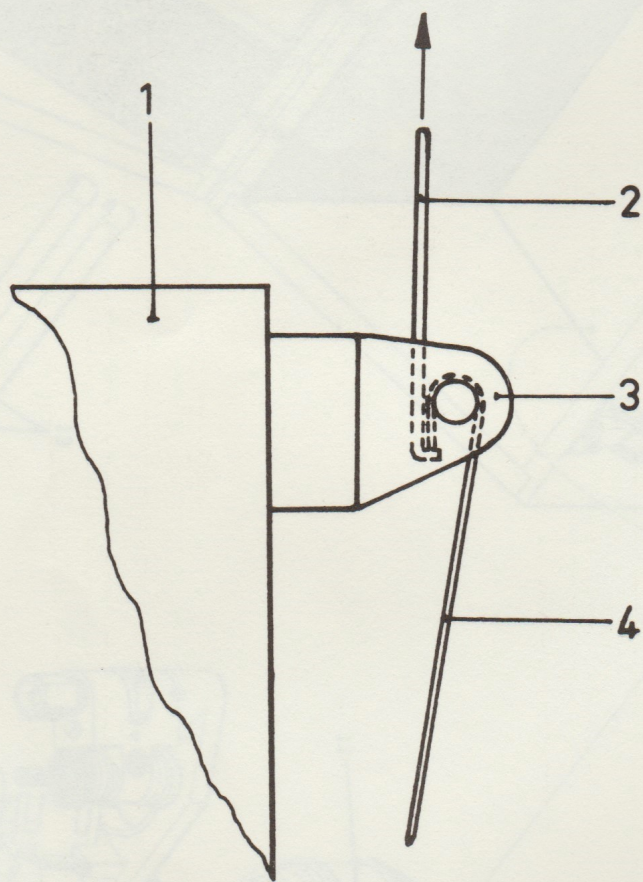


FIG. 16

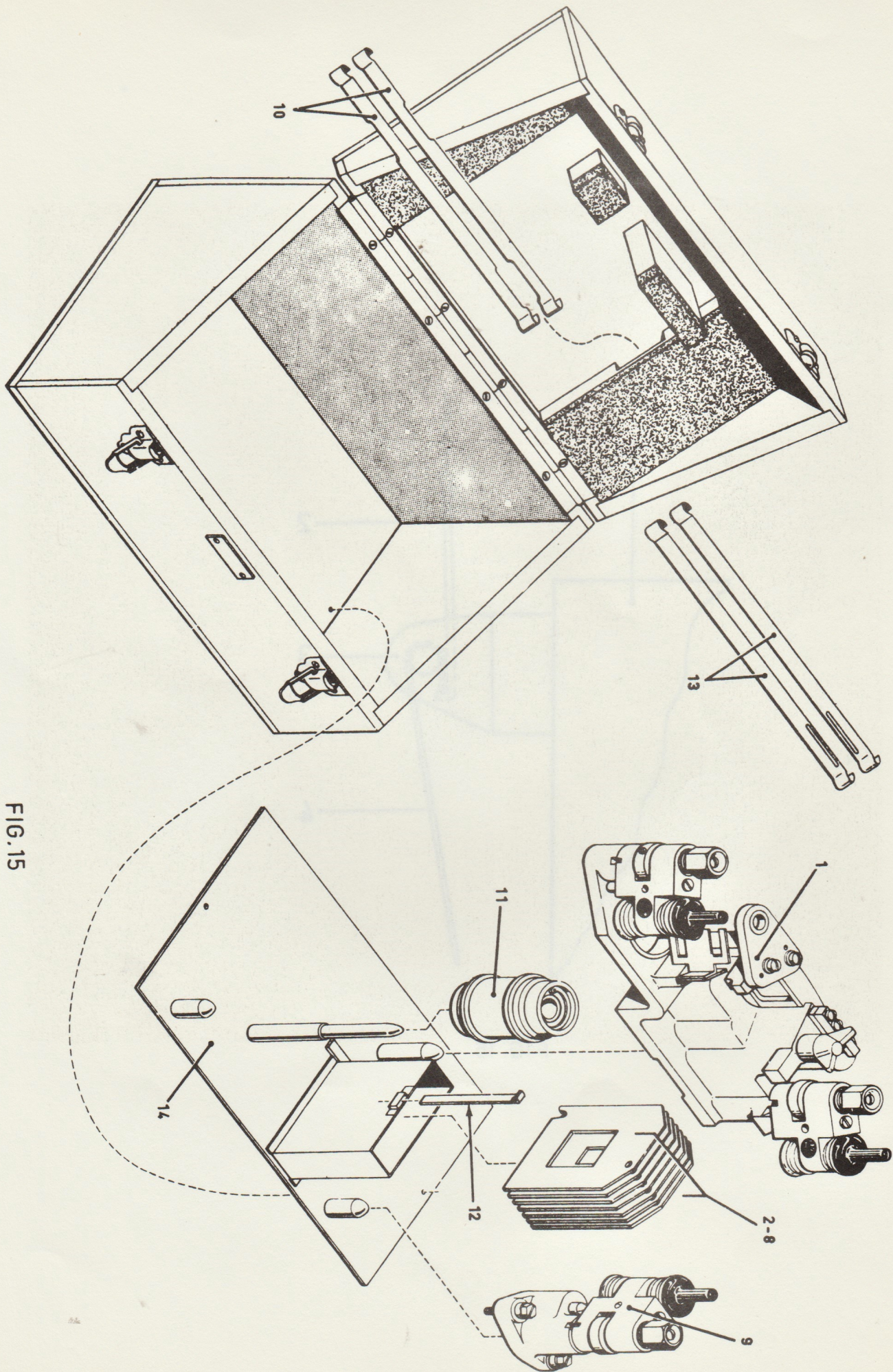


FIG. 15

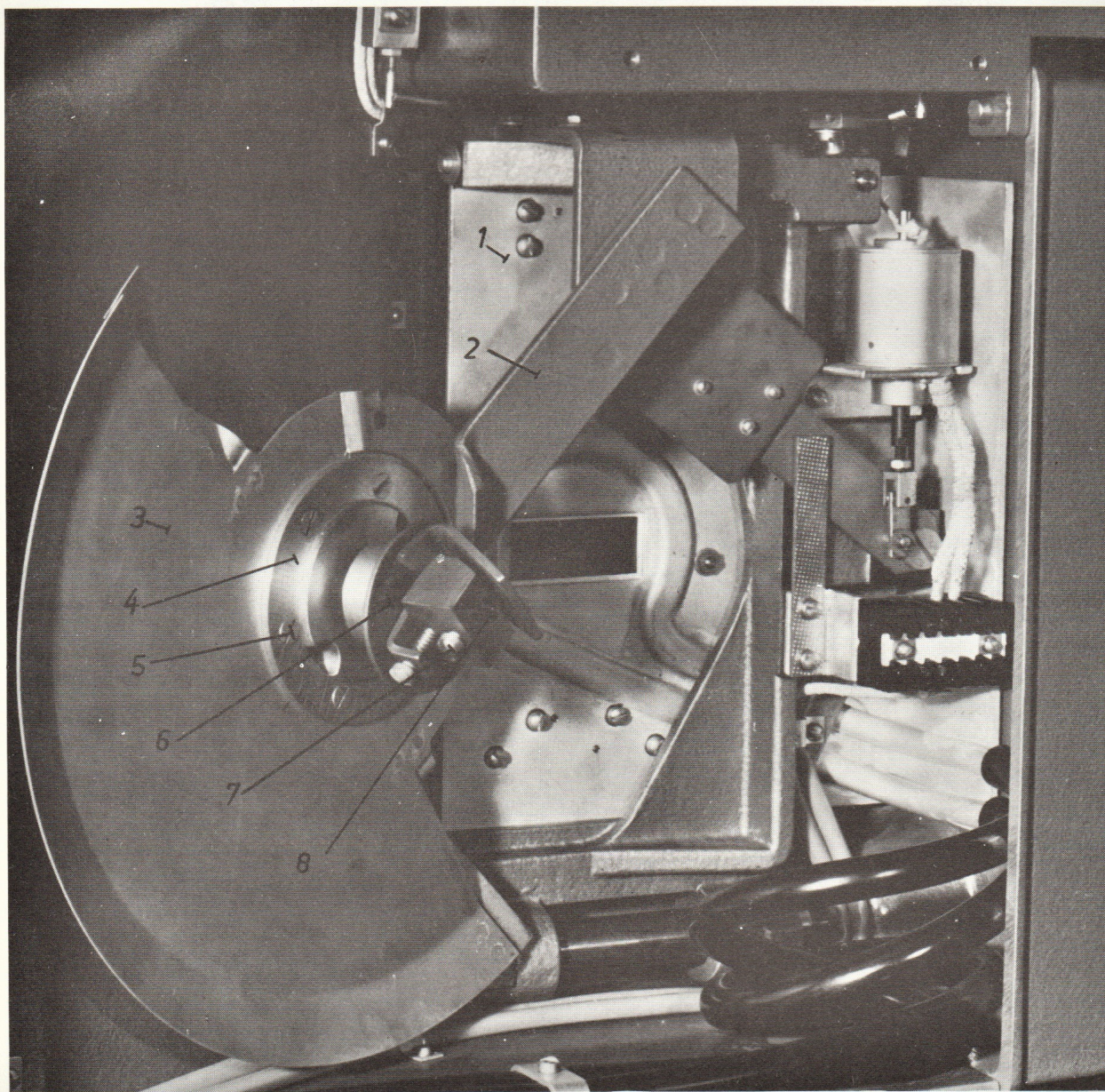


FIG.14

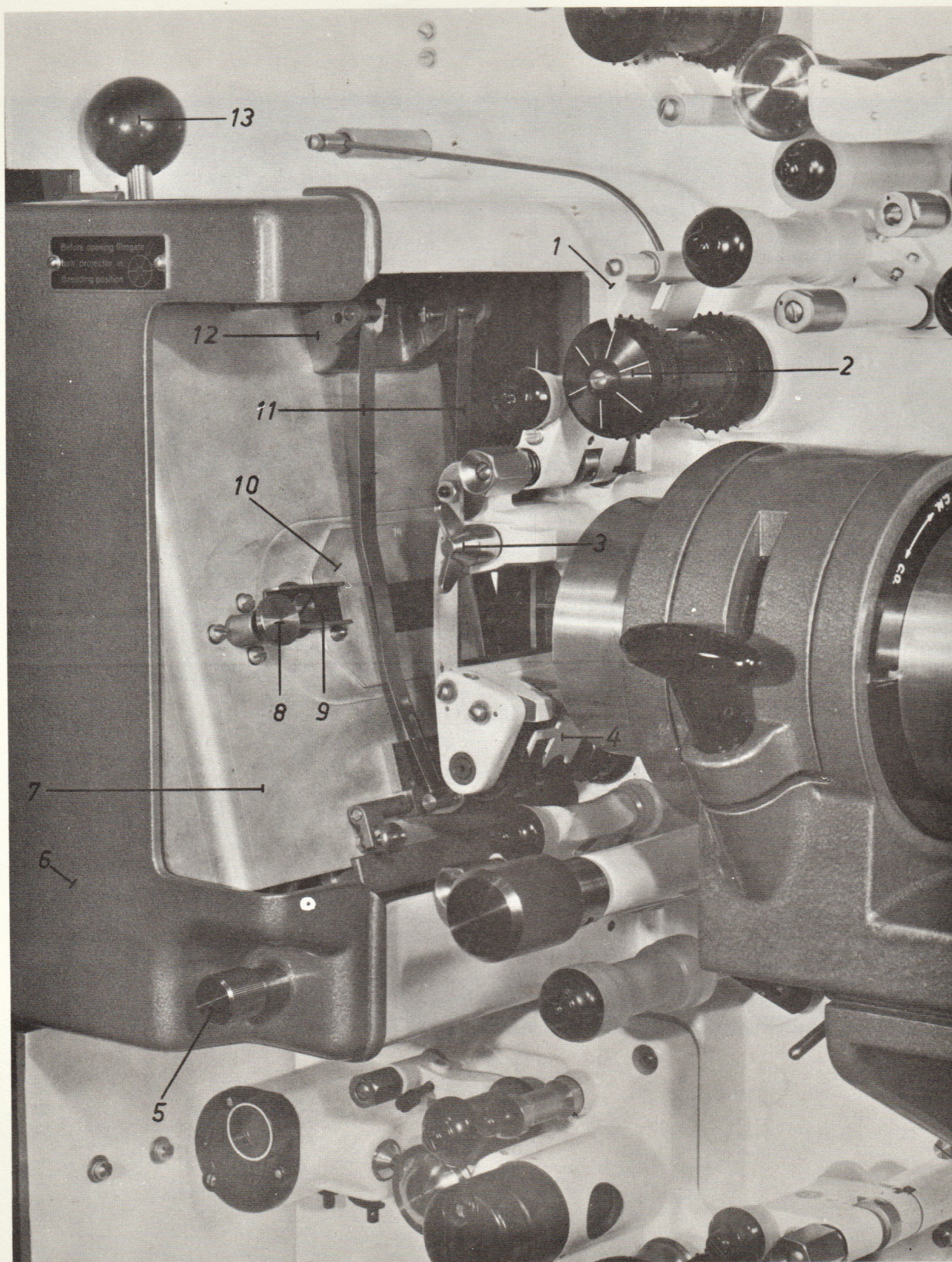


FIG.13

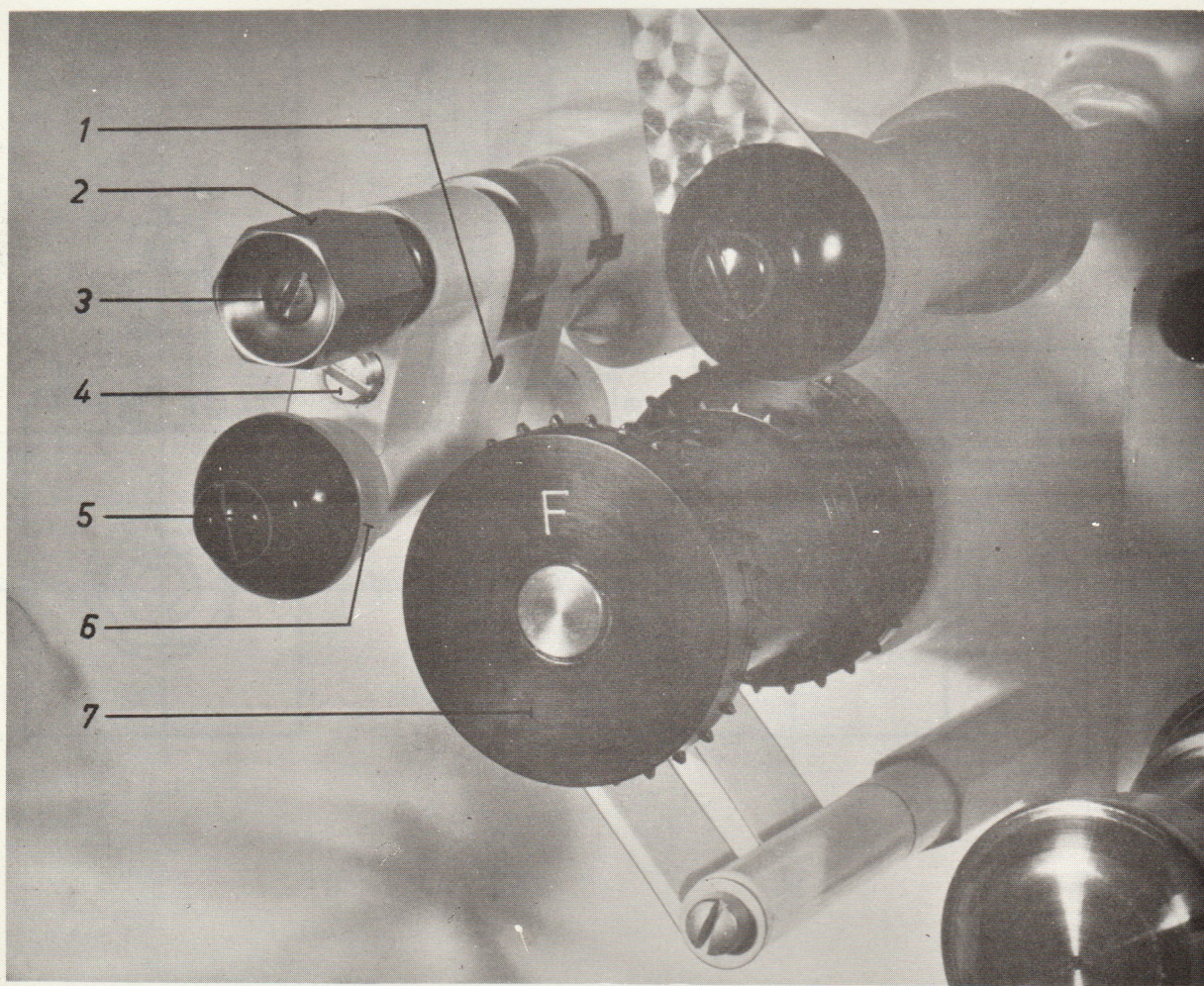


FIG.12

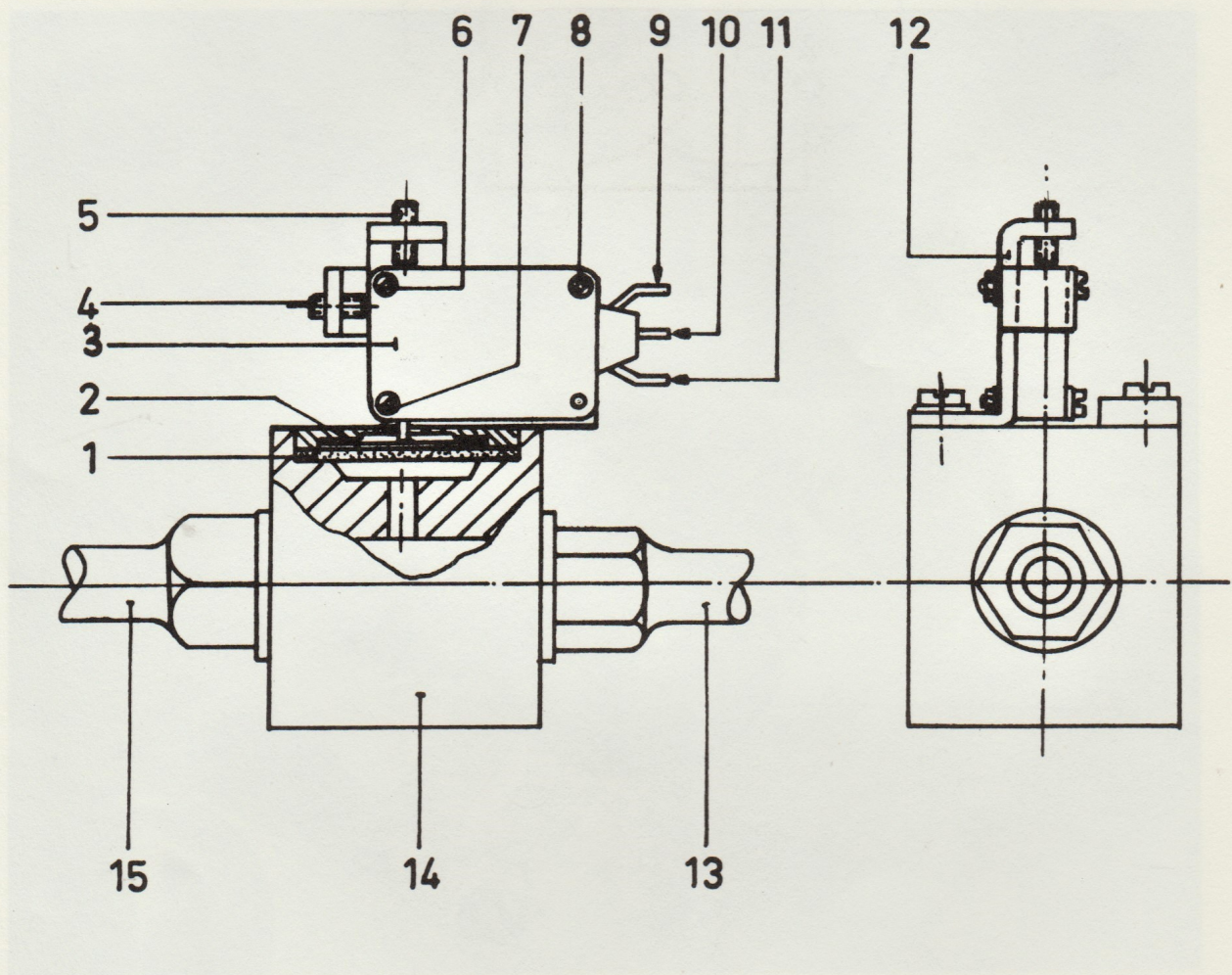


FIG.11

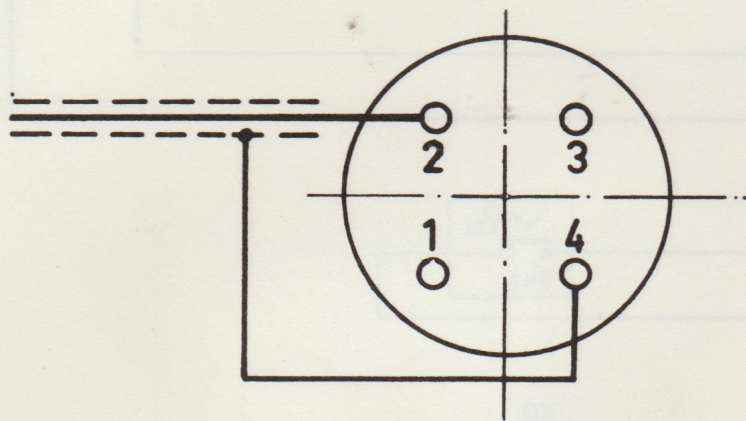


FIG. 10

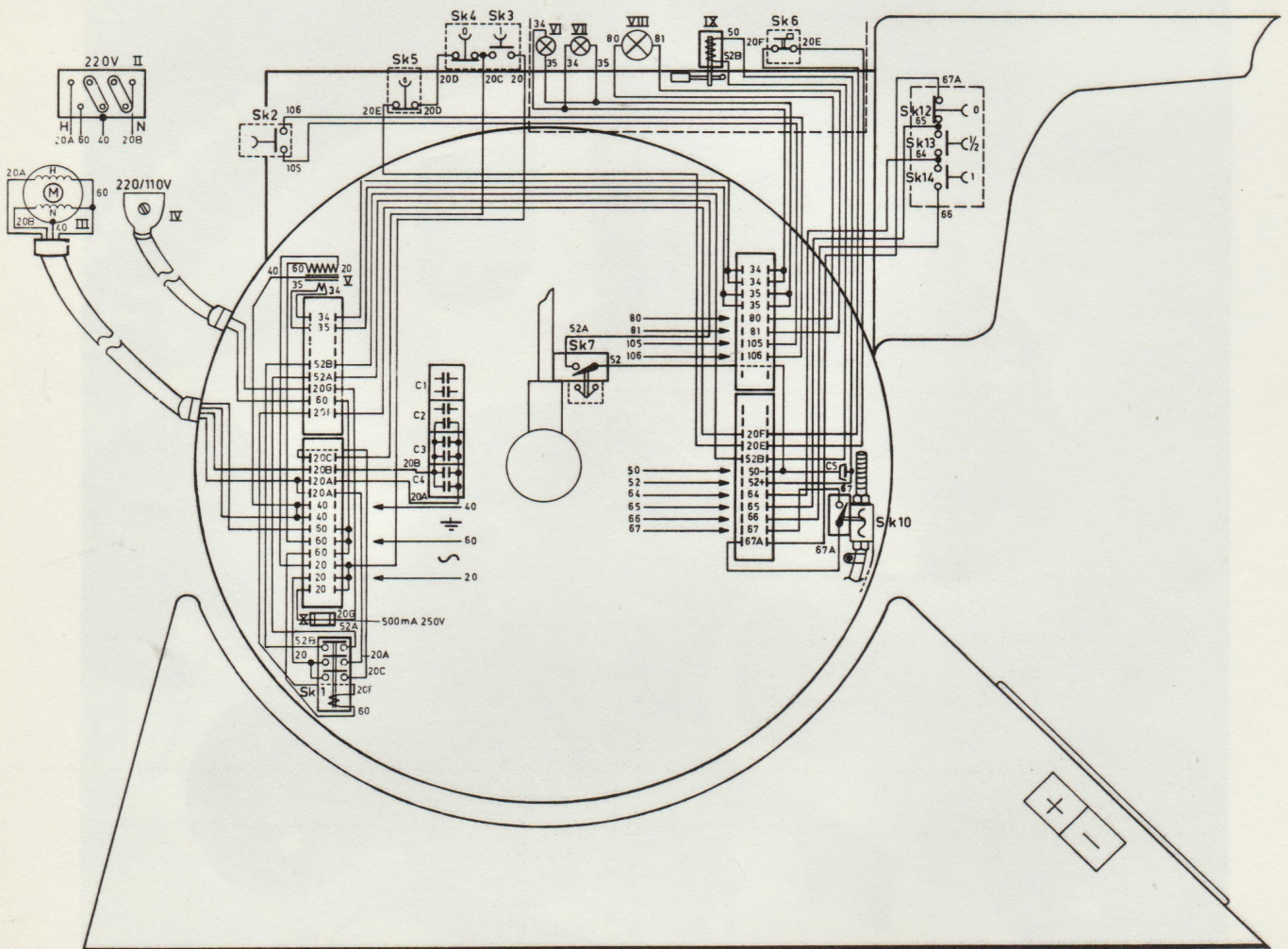


FIG. 8

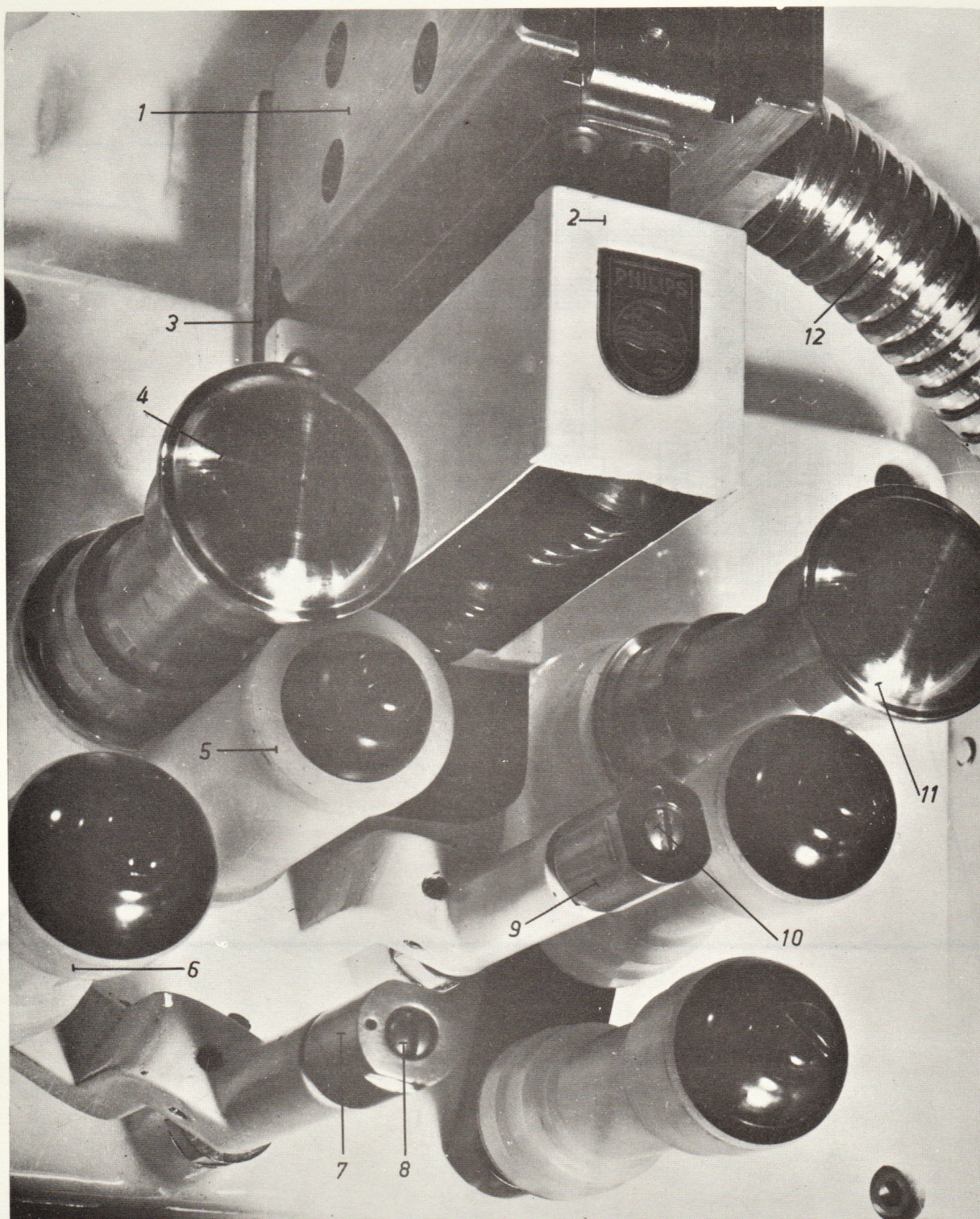


FIG.7

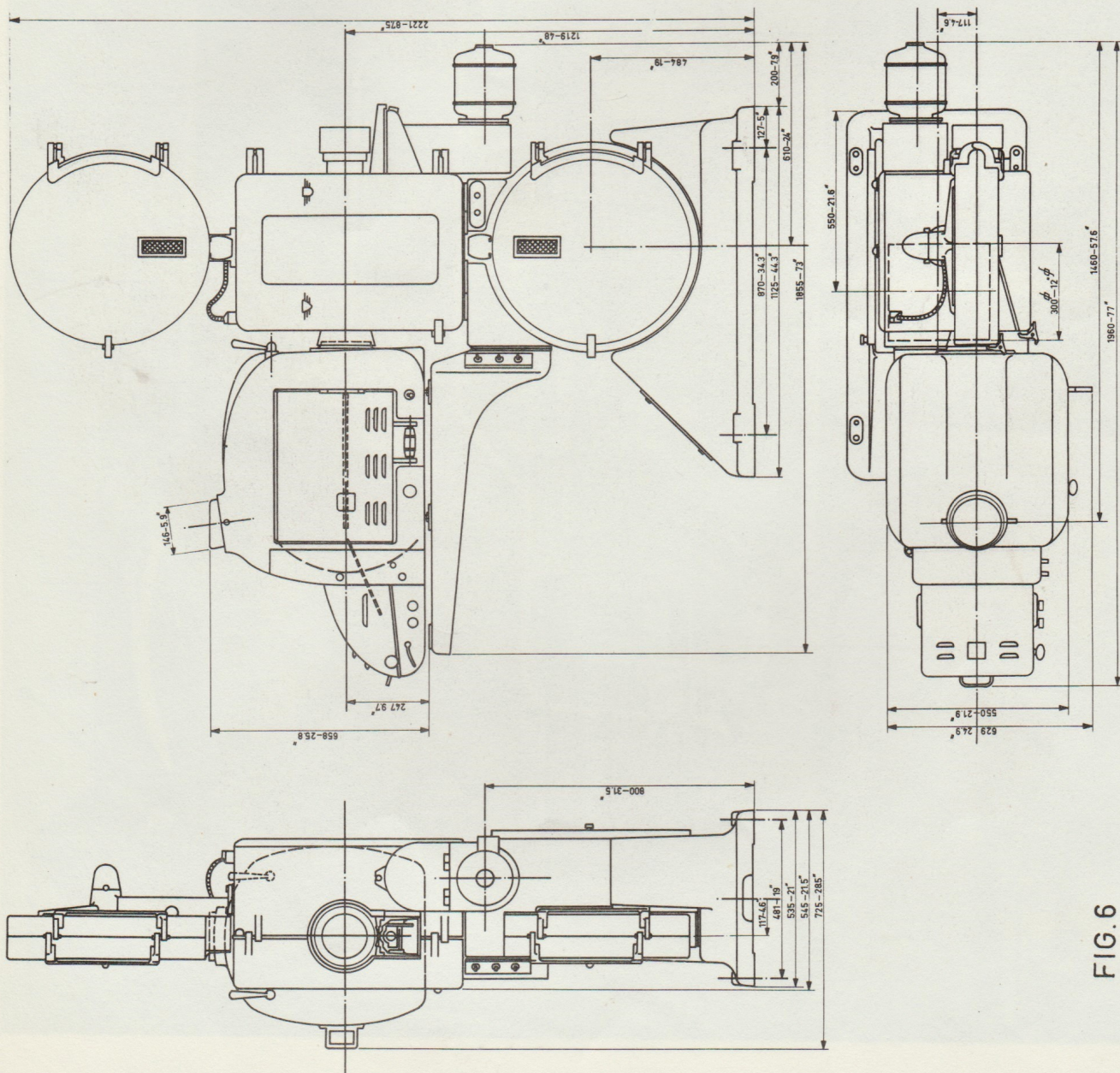


FIG. 6

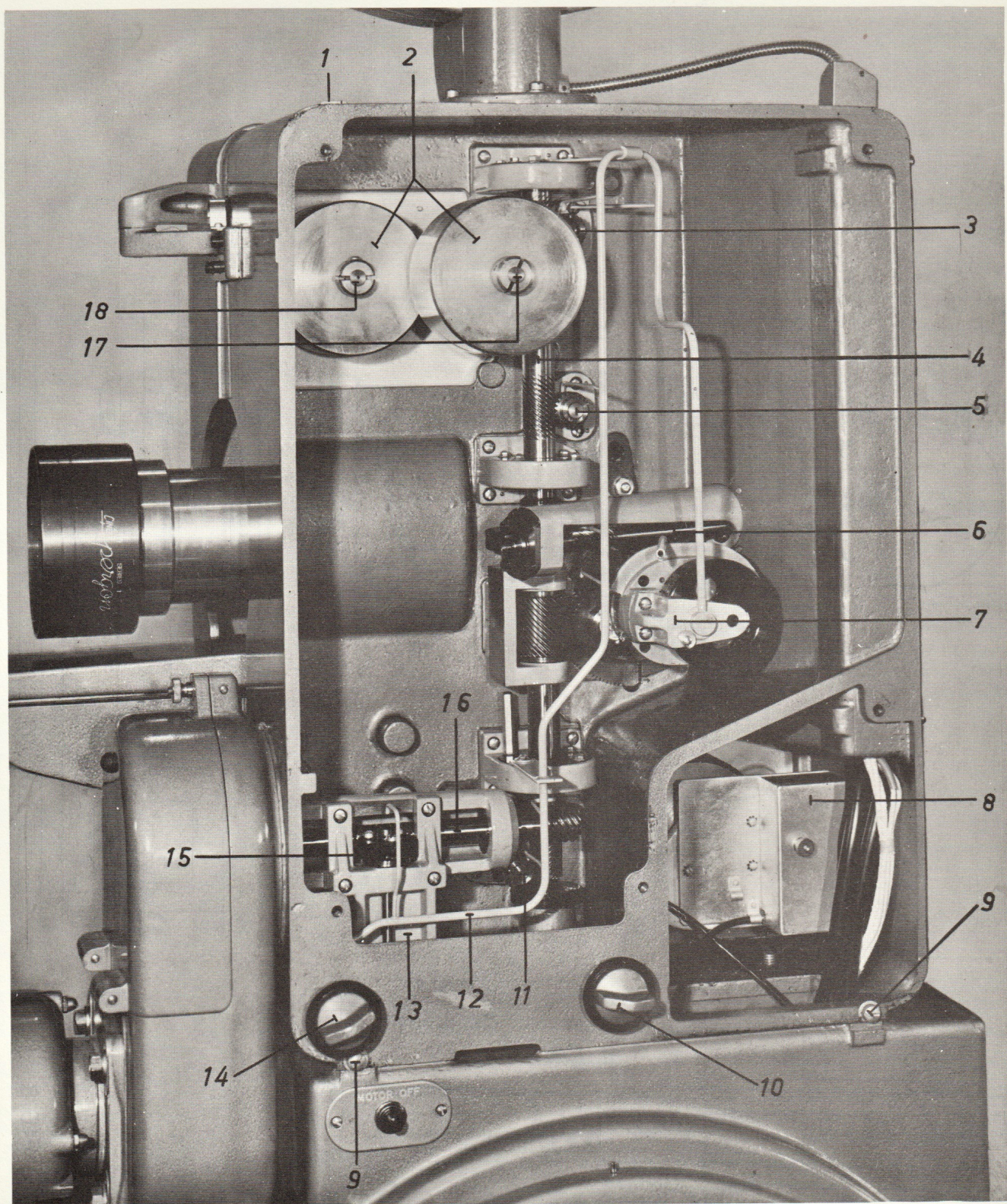


FIG. 5

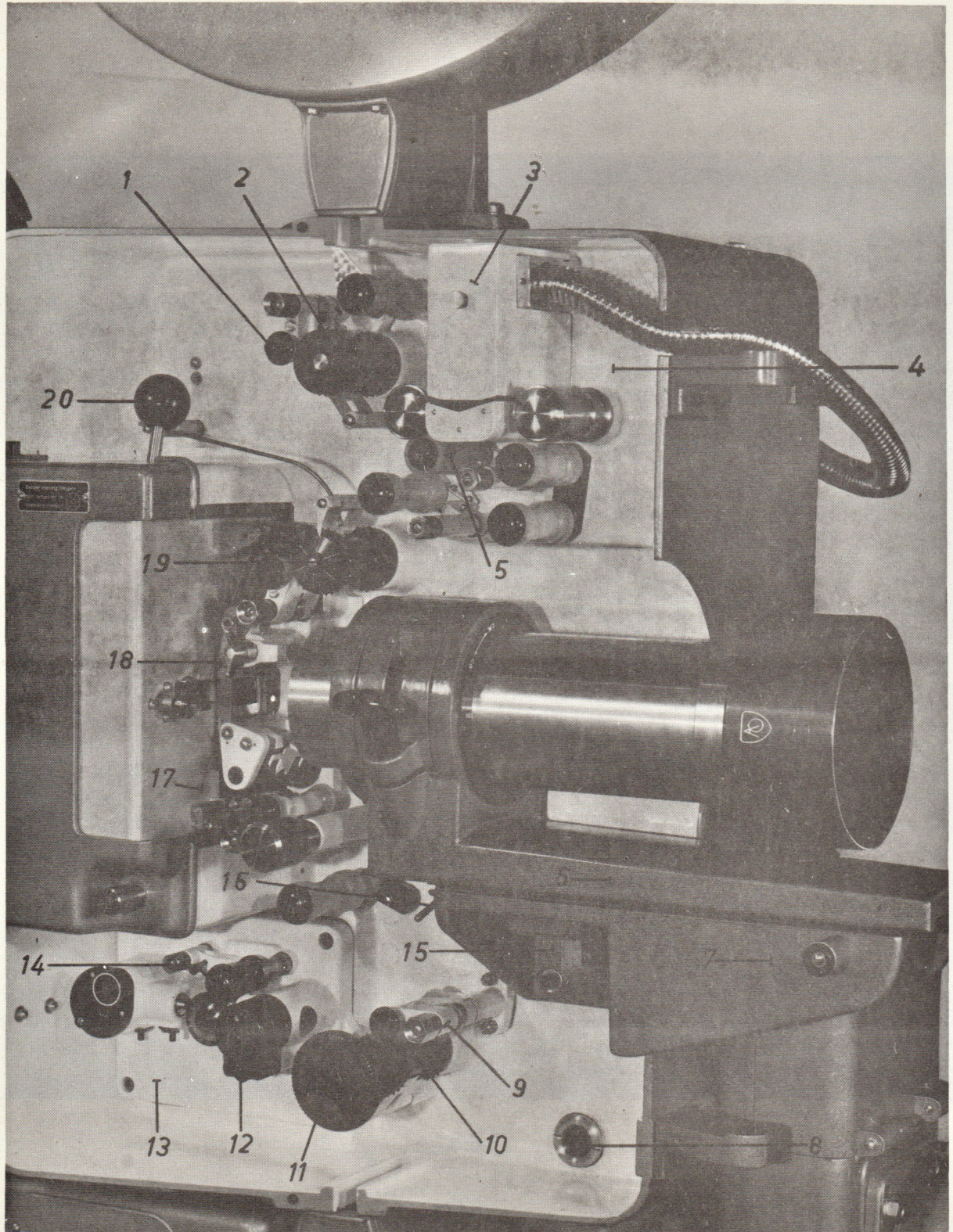


FIG.4

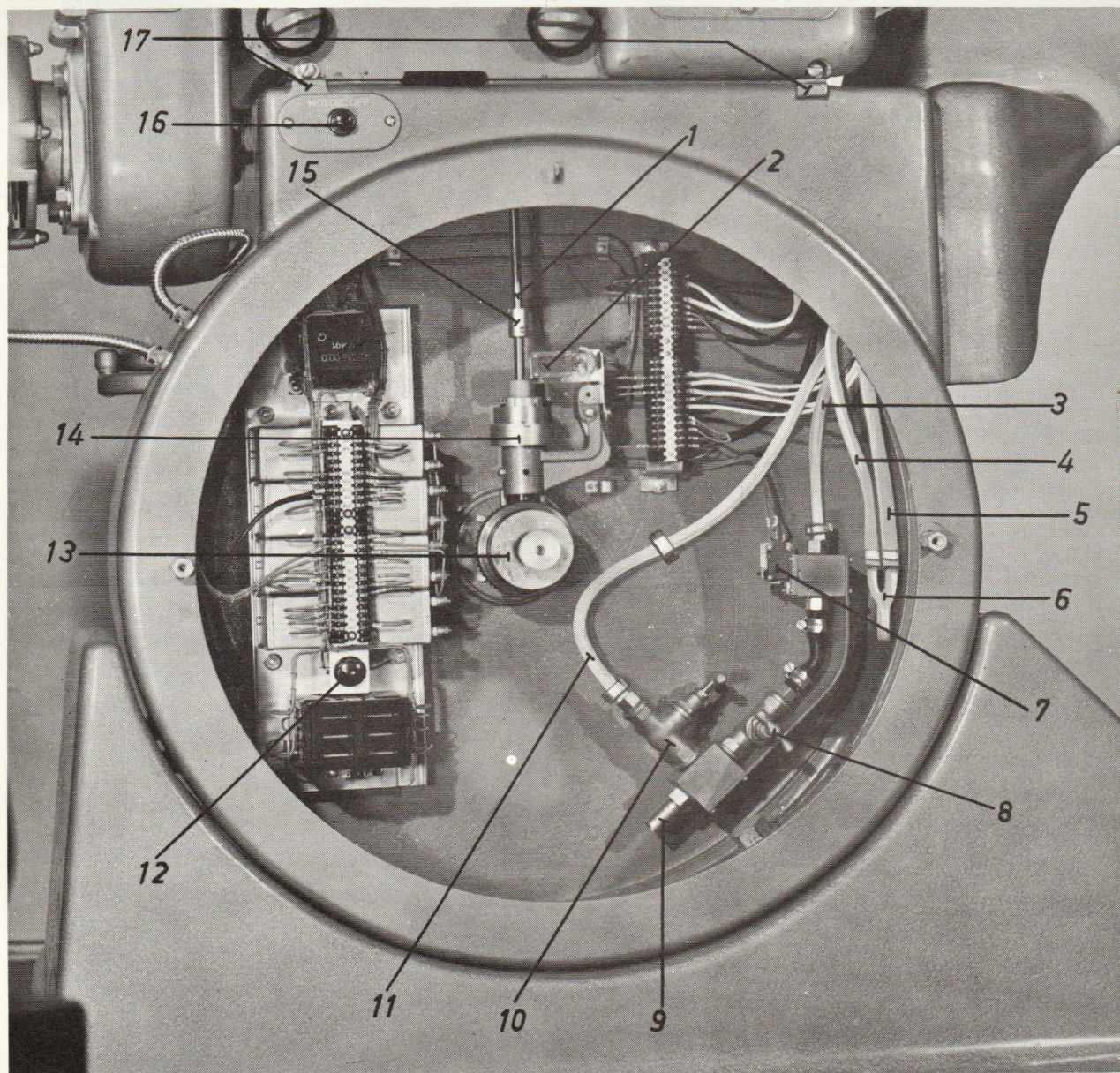


FIG.3

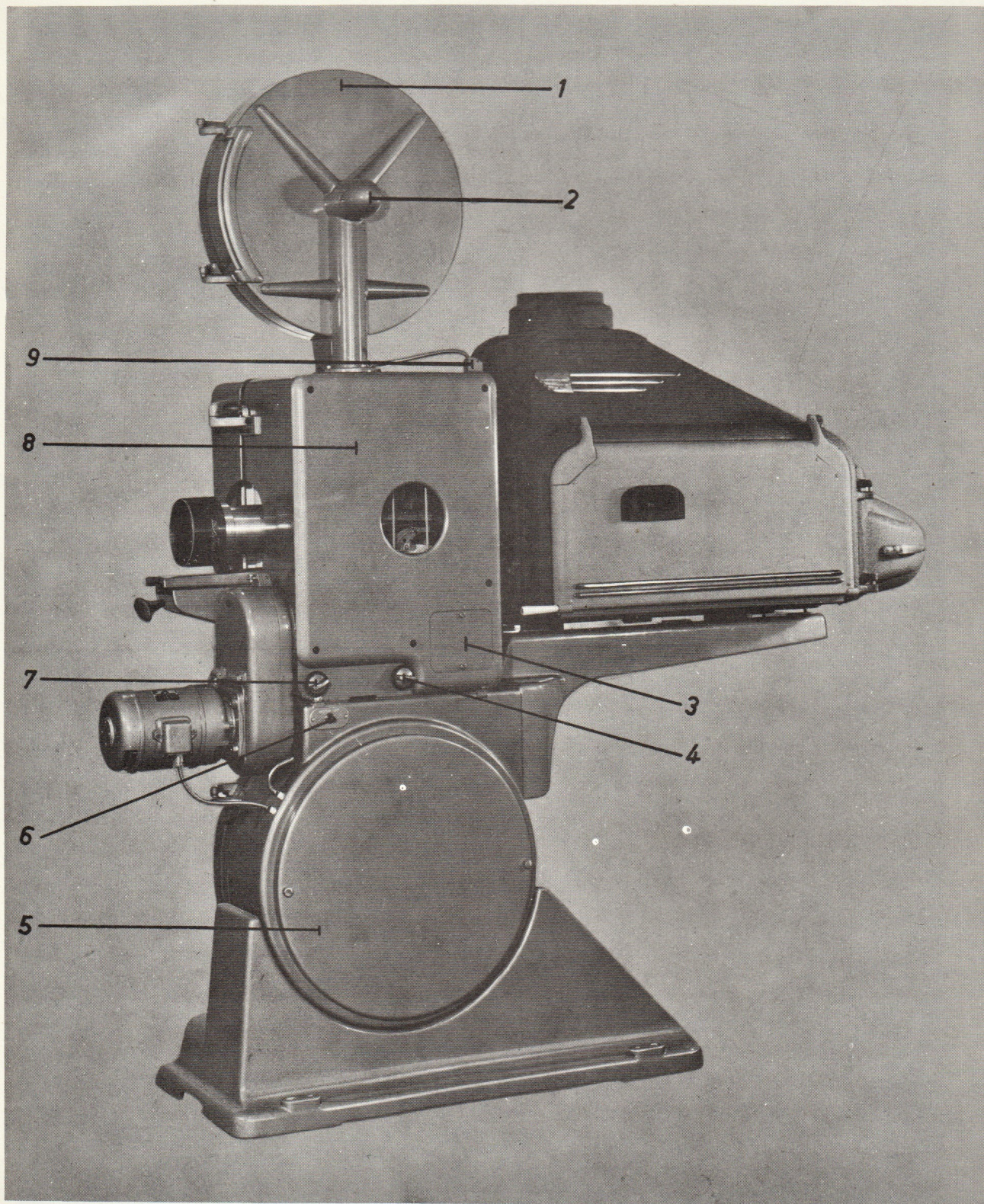


FIG.2

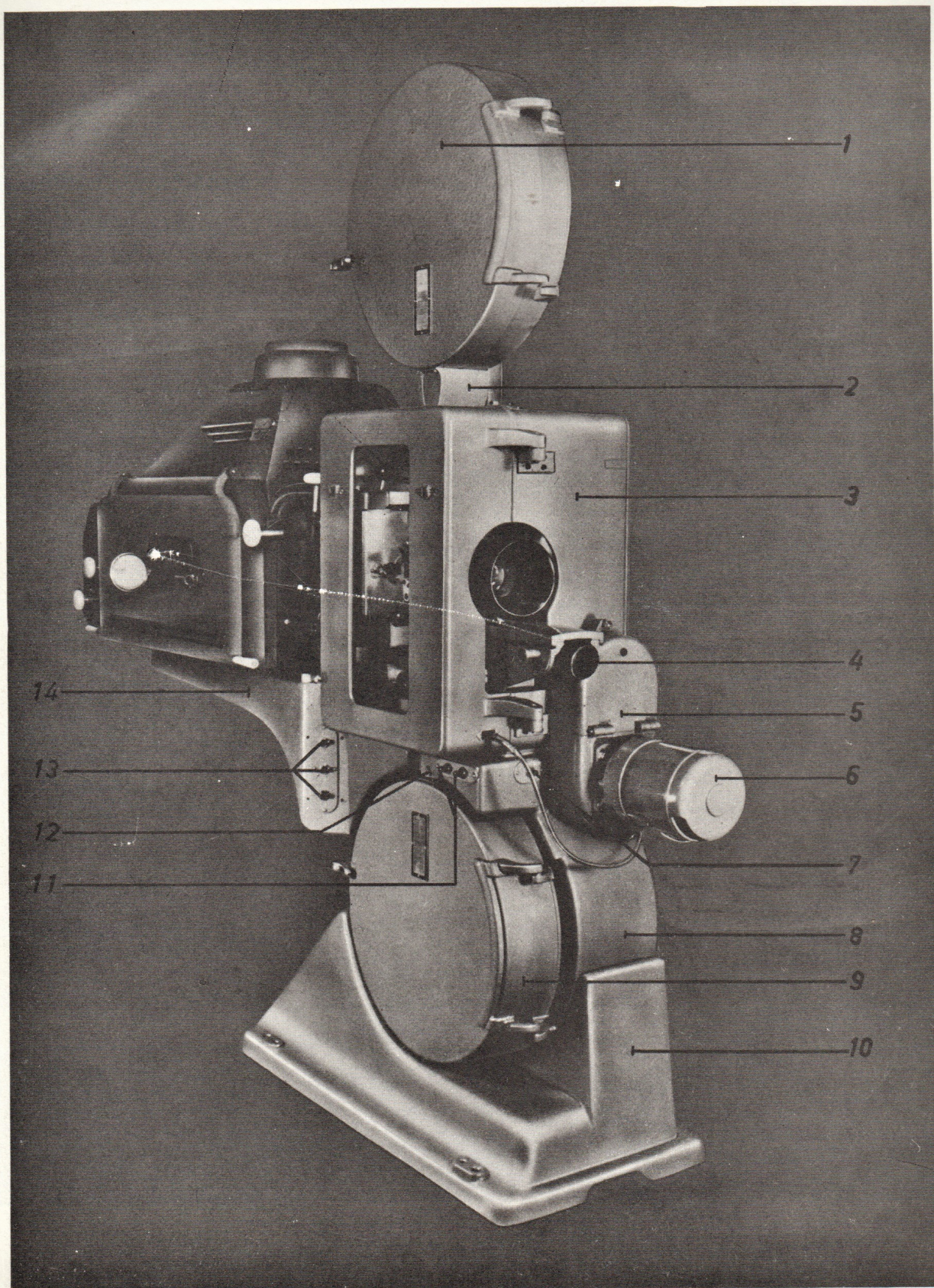


FIG.1

