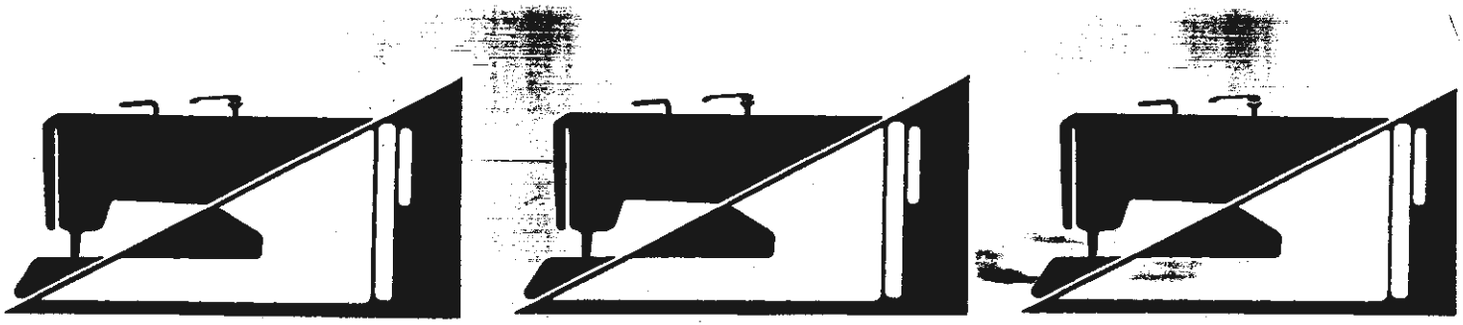


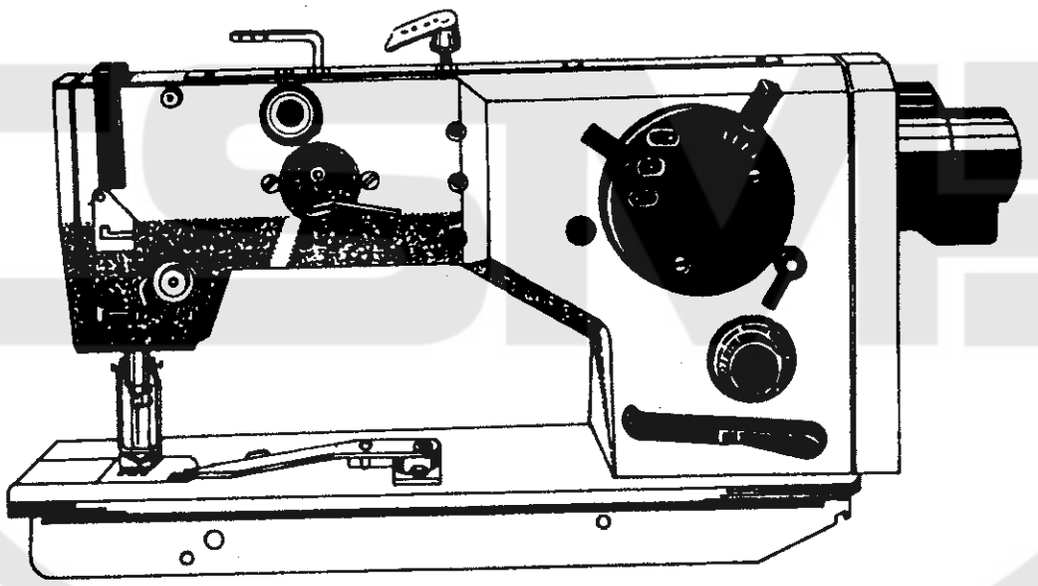
GLOBAL® ZZ 564 TD

INSTRUCTIONS FOR ADJUSTMENT AND SERVICING AND LIST OF PARTS FOR SINGLE NEEDLE FLAT BED ZIGZAG INDUSTRIAL SEWING MACHINE FOR ATTACHING LACE WITH SIMULTANEOUS CUTTING OF WORK UNDER THE LACE AND WITH TRIMMER DEVICE FOR UPPER AND LOWER THREADS

ZZ 564 TD

SINGLE NEEDLE FLAT BED ZIGZAG INDUSTRIAL SEWING MACHINE FOR ATTACHING LACE WITH SIMULTANEOUS CUTTING OF WORK UNDER THE LACE AND WITH TRIMMER DEVICE FOR UPPER AND LOWER THREADS

ZZ 564 TD



Use of Machine

The machine is used in the linen industry for sewing lace to fine materials, e.g., to silon, dederon, lace, batiste, etc., in the production of ladies', girls', and children's underwear, as well as for fine tablecloths decorated with lace.

Specifications

Speed	up to 4,400 stitches per min., according to the theads and sewn work applied
Stitch	two-thread zigzag lockstitch
Stitch length	steplessly adjustable between 0 and 3 mm
Stitching	forward stitching: reverse stitching for bar tacking is possible
Stitch width	0 to 4 mm
Zigzag stitch position	median, left, right
Needle	134 Nos. 80 - 100 Schmetz 797 CF CF Nos. 80 to 100
Threads	cotton threads: 10 tex x 2 x 2 7.4 tex x 2 x 2 6 tex x 2 x 2 synthetic threads: PES 10 tex x 3 10 tex x 3
Hook	R 235
Presser foot stroke	5 mm with hand lever 7 mm with left treadle
Distance between the needle axis in the right end position of needle and the work cut line	1.7 mm
Thickness of sewn work	up to 2 mm
Thickness of cut work	up to 1 mm
Clear work space	120 m x 265 mm
Bed plate dimensions	476 x 178 mm
Power consumption of machine	750 W or less
Length of cut thread ends	16 mm or less
Weight of machine head	37 kg or less
Spontaneous increase of stitch length when adjusted at 3 mm	15% or less
Acoustic power level	LPa 97 /dBPa/

Technical description

The machine is a single needle flat bed zigzag industrial sewing machine with zigzag stitch width up to 4 mm, with two thread lockstitch, equipped with a device for cutting the work under the lace and with trimmer device for upper and lower threads. The zigzag stitch width is adjustable from 0 to 4 mm by means of lever situated on the front face of the vertical column of the machine head. Likewise situated there is the adjusting element for choosing the median, right, or left, position of the zigzag stitch. The machine is designed for forward stitching with the possibility to use reverse stitching for bartacking, and is fitted with a built-in nondisconnectable automatic work cutting device consisting of a moving knife located on a spring - biased holder, adapted for vertical reverse oscillating motion, and cooperating with a stationary knife located in the throat plate for cutting sewnwork. The main functional movement of the moving knife is derived from the lifting eccentric of th feed mechanism and is positively timed with it.The cutting plane is situated at a distance of 1.7 mm from the right-side needle punch, the centre of the cutting edge of the knife lies 2.5 mm (approximately, depending on the adjustment carried out) behind the needle hole axis.The reverse stitching can be actuated by the hand lever situated on the front face of the vertical part of the machine arm or by the left treadle, while the lifting of the presser foot is controlled by a knee lever or by another hand lever located on the machine arm.
The drive is transmitted from the electric motor to the upper shaft of the machine by a V-belt, from the upper to the lower shaft by an indented belt and from the lower to the hook shaft by a gearing seated in the hook box. The hook is equipped with a positive bobbin case opening for easier upper thread passage.
The machine has group wick lubrication with automatic additional lubrication of the hook. The trimmer device, situated under the throat plate, cuts the two threads on the lower side of the sewn work. A stop motor equipped with a contacless detector of the upper shaft angular position and with an electronic control circuit serves for positioning the needle at the machine stop. The principal parts of the machine mechanisms are seated in rolling-contact bearings.
To protect the operator from accidents the machine is fitted with a finger guard near the needle and with a thread take-up lever guard. A belt guard is provided for both above and below the bed plate.
The machine is supplied without lighting but fitted with a screw and washer for fixing a suspension-type lighting the machine arm.

Machine equipment and its use

Equipment No.	Order No.	Name
201	522 792 112 010	Incorporated bobbin winder
202	522 791 947 001	Adjusting set
207	522 791 995 032	Cover for work cutting device
250	522 791 995 068	Equipment for left-side treadle actuated reverse stitching
295	522 791 995 014	Plug covering the mounting hole for bobbin winder

The Equipment is supplied only on special order.

I. INSTRUCTIONS FOR SERVICING THE MACHINE

A. GENERAL INSTRUCTIONS

1. Read the instructions of the manual carefully and adhere to them.
2. During transport and while unpacking the machine, proceed in accordance with the instructions and marks on the packing.
3. Report any damage which has occurred during transport to the railway authorities or to the forwarding agents at once. Immediately after unpacking, check the contents against the order and report any discrepancies to us. We cannot recognize claims submitted at a later date.
4. Having transported the machine to its work site, remove the preserving grease coating and all impurities from the machine head. Make sure that no machine part has become loose and that its mechanism is free of any foreign body.
5. Lubricate the machine daily. Before lubrication, always check whether the lubrication places are clean. It is advisable to lubricate frequently in small quantities. Those parts of the machine which are exposed to increased friction or strain should be lubricated several times a day as needed. Refill oil into the hook lubrication tank as required.
6. Clean the machine daily, especially the parts which become choked by impurities from the sewn material. During the cleaning, carefully check whether any machine parts have become loose.
7. During thorough cleaning once a week carefully check the whole machine to see that no parts are damaged and that all machine mechanisms operate correctly. Any faults ascertained must be repaired immediately. Once a year, a general overhaul should be carried out. The machine should be dismantled, thoroughly cleaned, individual pieces as well as the parts of the electrical equipment inspected

and faulty or worn out pieces repaired or exchanged.

8. Adhere to the safety regulations.
Never clean the machine or repair defects until the machine is at rest. Do not remove covers or other safety devices.

9. The electrical equipment of the machine should be kept in a good and faultless state in accordance with the electrotechnical and safety regulations. If the machine is provided with a plug make sure always before plugging in that all switches are off. The lead-in cable supplied as a part of the machine has a cross section of 4 x 1 mm^2 and must be safeguarded appropriately in each phase. Never try to repair any defects of the electrical equipment yourself but call in a qualified electrician.

10. Unless adjustable in height, the stand plate is situated at a standard height of 780 mm above the floor. The working area has been designed so as to permit all operating movements of the operator to be carried out unobstructedly including coming to the work site and leaving it again. The working position of the operator, chosen with respect to the needle axis, permits easy access to all control and function elements.

11. We cannot assume any responsibility for the consequences resulting from the non-observance of these instructions.

B. PACKING, UNPACKING, CLEANING AND LUBRICATION OF MACHINE

1. Packing the machine

The machine head is seated in a separate case, the stand either in crating or in another case (for severe climate conditions).

2. Unpacking the machine

When taking over the machine from the railway authorities or in the works ascertain whether it has arrived in good order. Report any damage which has occured during transport to the railway authorities or to the forwarding agents immediately. Unpacking should be carried out carefully so as to prevent damage to machine parts. Further check the accessories of the machine againts the order and report any discrepancy immediately, as we cannot consider belated claims.

3. To set the machine on stand

After the machine has been brought to its work site, set it on the rubber washers of the stand. When seated properly, a gap of approximately 1.5 mm will appear between the bed plate and the rim of the stand plate on the whole of its circumference. Check the lifting of the presser foot by means of the left-side treadle. Insert the connector of the synchronizer cable into the synchronizer socket and secure it by the coupling nut. Pass the cable with the connector from the electric motor through the machine tank, insert it into the socket provided on the machine bed plate, and also secure it by the coupling nut. As for the rest, the machine is supplied in a mounted and ready-to-work state.

To observe:
When assembling the machine head with the stand be sure that the original composition is maintained, i.e., that the machine is mounted on the stand which it was sewn off. The correct stand No. is indicated on the check slip attached to the machine head.

4. To set and fix the machine
Fix the machine using the levelling foot of the stand fitted with an adjusting screw. Otherwise, the machine is designed as a stable unit with the stand and requires no fixing to the floor.

5. To clean and lubricate the machine (Fig. 1)
Before putting the unpacked machine into operation, remove the protective grease coating and clean the machine thoroughly. For lubrication of all machine mechanisms and hook it is recommended to use oil with viscosity 50 at 20 °C $mm^2 . s^{-1}$. With an oil can, drip oil into marked holes of the machine arm once a day before the beginning of the work shift. Check also the oil level at the indicator of the hook oil tank. The gear wheels of the hook gear box receive oil from the felt inlay situated on the gear box bottom. The hook and its mechanism should be cleaned several times a day. Apply two or three drops of kerosene to all soiled parts of the hook and the surrounding mechanism, let the machine run at high speed, then stop it, wipe off flushed-out dirt and oil the hook with its mechanism with with oil. This cleaning should be carried out daily, especially after the end of the work shift in order to prevent dirt from drying on the hook and its mechanism. From time to time, use the grease nipple to refill pos. (43) and (5) with lubrication grease V1 or V2 (see Table 15). Before proceeding to clean the ma-

chine, unthread it and take the hook boboin out of the hook. Once a week, the machine should be thoroughly freed of settled oil and of all impurities.

6. To adjust hook lubrication (Fig. 2)
To adjust the oil flow to the hook, use a screwdriver to turn adjusting pin (1) located on the right side wall of hte oil tank under the bed plate from zero to maximum (to the left, anticlockwise). Adjusted at zero, the regulation still provides for a minimum oil flow to the hook preventing it from seizing. After the machine has been put into service, check the oil level both in the hook oil tank and in the oil tank situated on the machine arm at regular intervals.

NOTE:
Before starting work after a relatively long interval, e.g. at the beginning of the morning shift, to prevent the sewn work from getting soiled by oil it advisable to first remove the gathered superfluous oil from the hook by either letting the machine run idly for a short period or sewing few stitches (approximately 20 cm) on test material.

C. PREPARING THE MACHINE FOR SEWING

1. General inspection

Inspect the machine thoroughly for loose parts as well as for the presence of foreign bodies. Rotating the hand wheel by hand, check first whether it revolves freely and whether the machine is adjusted correctly. Further check the correct working of the mechanism controlling the lifting and sinking of the presser foot by means of the knee lever and the reverse stitching by means of the hand lever or of the left treadle.

2. Sense of rotation

The correct sense of rotation of the machine hand wheel is anticlockwise, viewing the machine from the side of the hand wheel.

3. Electrical equipment

An electrician connects the machine to the mains. Switch on the electric motor and check whether the pulley turns in the correct direction, i.e., to the left. If this is not the case, the plug of the lead-in cable must be taken out and the cable must be switched over on the plug or on the terminal board of the electric motor. An incorrect sense of rotation of the pulley is inadmissible.

4. V-belt and its tension (Fig. 10)

The V-belt can be easily tensioned by means of the stopmotor that can be displaced in the groove of its holder after loosening the screws. The correct belt tension ensures transmission of full power with losses reduced to minimum. To check the tension of the V-belt, depress it lightly in the middle part between the hand wheel and the pulley; if the belt tension is correct, the pressed part will yield some 20 mm sideways. Excessive tension of the V-belt reduces machine output and increases both the power consumption and the wear of the bearings. To remove the V-belt, proceed as follows:

Screw out the screws of the synchronizer flange and remove the synchronizer from the shaft, then screw out the screws /4/, remove the upper belt guard /1/ and then the lower one. Tilt the machine head and remove the v-belt. To mount it, proceed inversely. To ensure the correct needle stop positions, be sure to maintain the correct angular position of the shaft with respect to that of the handwheel. Before proceeding to carry out any adjustment of the machine, be sure that the machine has been switched off.

5. To lift the presser foot (Fig. 8)
The lifting and sinking of the presser foot is controlled by the knee lever mechanism. The hand lifting lever situated at the rear side of the machine arm can also be used to lift the presser foot and to lock it in the lifted position. To sink the presser foot onto the sewn work, first slifhtly depress the knee lever thus disengaging the locking of the lifted presser foot by tilting the hand lever, and then release the knee lever to let the presser foot sink onto the sewn work.
Never start the machine if the presser foot has been sunk onto the throat plate directly with no material between them.

6. Needles and threads
The machine requires the use of needles 134 Nos. 80-100 or needles Schmetz 797 CF CF Nos. 80 - 100. Considering the high machine performance and the resulting needle heating, it is advised to use chromium plated needles. The size of the needle depends on the size of the thread since it must pass freely through the eye of the needle. It is advisable to choose a rather thin needle, just permitting the free passage of the thread through the eye but partially preventing the upper thread from unthreading at the beginning of stitching after the previous thread

trimming. The needle size should be adequate to the thickness of the sewn work. A too thin needle with respect to the thickness of the sewn work is subject to excessive strain (impacts at the needle punches into the work, upper thread tension, heat generated by friction between the needle and the sewn work, etc.) and is exposed to the risk of deviations from the correct needle course followed by irregular formation of the upper thread loops and resulting in skipped stitches.
Only good quality threads should be used. Especially suitable are conical cross-wound bobbins. S-twist thread should be used for the needle, while both S-twist and Z-twist thread is suitable as lower thread. A coarse thread or one which has to overcome considerable resistance when passing through the eye of the needle reduces the machine performance and increases its trouble incidence. With synthetic threads, the sewing speed should be reduced accordingly.

7. To insert the needle

For easier insertion of the needle sink the presser foot onto a bit of material and rotate the hand wheel toward you until the needle bar has reached its top position, i.e., until the greatest possible distance between the needle bar and the throat plate has been obtained. Loosen screw (8) on the lower part of the needle bar and insert the needle up to the stop. Be sure that the long groove of the needle is directed toward the operator. Looking through the cross slot provided in the needle bar check whether the needle shaft has arrived up to the bottom of the needle channel, and fix the needle by tightening the screw. Each time a new needle is inserted check whether it is straight and whether is passes through the centre of the needle hole provided in the throat plate. Never use a needle chosen haphazardly but choose it with respect to the character of the sewn work and to the thread size.

8. To thread the upper thread (Fig.3)

Put the bobbin on the bobbin stand, unwind a sufficient portion of it and pass it through the thread guide of the bobbin stand, then through thread guide (4) and ancillary thread tensioner (1) between tensioner disks (8), then lead it through adjusting spring (2) around thread guides (3 and 6) into thread take-up lever (A), then downwards through thread guide (6) and lower thread guide (7) to the thread guide (5) on the needle bar, and from there to the needle. Thread it into the eye of the needle from the front side (i.e., from the operator) to the rear side.

Caution:

For stitching edges, joining curtains and for stitching thin materials, the upper thread should be threaded into the lower aperture of thread guide (5) provided on the needle bar. For current stitching operations, it should be threaded into the upper aperture of thread guide (5).

9. To wind the hook bobbin (Fig.4)

To wind the lower thread on the hook bobbin, a built-in bobbin winder, supplied separately as Equipment No. 201, can be mounted onto the front side of the machine arm. Lead the thread from the bobbin stand through the aperture provided on the arm of the bobbin stand through thread guide (6) to the bobbin mounted on the winder shaft, wind it a few times anticlockwise on the bobbin, lead the thread end to spring (2), insert it between the spring coils and apply a mild pressure so as to cut it with the knife located inside the spring. When mounting the bobbin on the winder shaft take care that the carrier spring enters the notch of the bobbin front. By swinging control lever (5) between the bobbin fronts the bobbin winder becomes operative. After switching on the electric motor and depressing the right treadle, the machine is started and the winder as well. During winding the thread is evenly distributed along the whole of the bobbin width. As soon as the bobbin is fully wound, the control lever springs off thus discon-

necting the winder drive and braking the winder shaft. The winding is now completed. Using the knife located in spring (2) cut off the thread end.
For timing the winding stop, loosen screw (4) of control lever (5) mounted on disconnecting úin (3), hold the disconnecting pin by means of a screwdriver in its position and change the angular position of the control lever on the disconnecting pin as required.

10. To take out the hook bobbin

Rotate the hand wheel until the thread take-up lever has reached its top position. Open the lock of the bobbin case with your left hand and take the bobbin case out. Release the lock and take the bobbin out of the bobbin case. As long as the bobbin case lock is open, the bobbin is held in the bobbin case. Loosen the lock, turn the bobbin case upside down, and the bobbin will fall out.

Caution:

When taking the bobbin case out of the hook , hold your feet away from the treadles in order to avoid an accidental start of the machine.

11. To thread the lower thread

Insert the fully wound bobbin into the bobbin case and the thread end first into the notch of the bobbin case and then under the pressure spring of the bobbin case. Insert the bobbin case with the bobbin into the hook . To prevent the bobbin from falling out of the case, while being inserted into the hook , tilt the lock fixing the bobbin in the case. With your thumb, push the bobbin case until you hear a short distinct click. The correct position of the bobbin case in the hook signalled by this sound is very important, because otherwise the needle may break or another breakdown could occur when starting the machine.

Caution:
In machines equipped with a trimmer device for upper and

lower threads, the lower thread tension should be somewhat reduced to ensure reliable operation of the trimmer device, but remain high enough to provide for high quality stitch formation.

12. To catch the lower thread

Hold the end of the upper thread lightly with your left hand without stretching it. With your right hand revolve the hand wheel towards you until the threaded needle reaches subsequently its bottom and top positions, thereby catching the lower thread. Then draw the upper thread lightly until the lower thread shows through the aperture provided in the throat plate and then draw the bottom thread out. Lay the two thread ends in the direction behind the needle. While threaded, the machine may be started only after a bit of material has been inserted under the presser foot. Both when starting and when finishing the sewing without the use of the trimmer device, the thread take-up lever must be placed in its top position to avoid the risk that the upper thread will unthread and possibly catch in the hook course. In machines equipped with trimmer device, the above operation is not needed after the thread trimming.

13. Sewing - the work proper

Insert the material to be sewn under the presser foot and switch on the stop motor. For reliable beginning of stitching, be sure that the upper thread comes to lie under the presser foot sunk onto the sewn work. Start the machine gradually depressing the right treadle. The sewing speed increases up to the maximum obtained when the treadle has reached its lowest position. By releasing the treadle, the clutch of the stop motor is disengaged, the drive pulley braked, and the machine stopped in the lower dead position of the needle. During the sewing, avoid pulling the material and only guide it. By pulling the material, the needle is bent with the risk of breaking it in case of a collision with the edge of the needle aperture provided in the throat plate. Repeated collisions of this kind burr the

needle aperture which, in its turn, causes the thread to break. After the stitching operation is completed, heel the right treadle to start the automatic thread trimming operation that will proceed during the needle movement from its bottom to its top position. For removing the sewn work, lift the presser foot only after the machine stops in the needle top position to obtain correctly cut threads and so that the machine is ready for the next stitching. Premature presser foot lifting can result in thread trimming failure or in unthreading the upper thread out of the needle eye.

Note:

When putting a new machine in use do not charge it fully from the very beginning. During the first two to four weeks, when the machine is running-in, increase its speed gradually from about 4,000 stitches per min. and check its running carefully. Throughout this time, pay special attention to the machine lubrication. By keeping to these rules you will obtain a long service life and perfect precision of the machine even at full performance.

14. Needle position check

Disconnect the trimmer connector on the switch box of the stop motor, and set the needle position lever switch on the switch box to the "needle down" position marked by the symbol under the switch. Toe (depress forwards) the control treadle for a short time and release it. The machine shall start and stop in the needle down position. Then heel (depress backwards) the control treadle. The machine shall make about a half-turn and stop between 0 and 5^{o} after the upper dead point of the thread take-up lever. If the machine stops in other than these positions, adjust the positions as specified in the Instructions of servicing of the stop motor Quick.

II. INSTRUCTIONS FOR ADJUSTMENT OF MACHINE MECHANISMS

This section describes adjustments of the type that can be carried out on the work site. Larger adjustments, requiring more time, should be carried out by a qualified sewing machine mechanic.

1. Adjustment of stitch length (Fig. 5)

The stitch length can be steplessly adjusted by turning knob (4) provided on the vertical part of the machine arm in the range between 0 and 3 mm. By turning it in the sense of the arrow "A" (i.e., to the right) you increase the stitch length, whereas by turning it in the sense of the arrow "B" (i.e., to the left), you decrease it. For reverse stitching, depress either the left treadle, or hand lever (1) towards the machine bed plate. When released, the lever automatically resumes its previous position and the machine restarts forward stitching.

2. To adjust the zigzag stitch width and position (Fig. 5)

Before any adjustment of the zigzag stitch width or position, the machine must be stopped with the needle outside the sewn work. The locking lever (5) must be turned to the left (anticlockwise) and held there until the adjustment is carried out since its original position (i.e., turned to the right) serves to lock the adjusted stitch width and position.

The stitch width can be steplessly adjusted from 0 to 4 mm by means of lever (3) protruding over the cover of the zigzag stitch mechanism. By displacing the lever to the right, i.e., towards the hand wheel, you increase the zigzag stitch width up to the maximum, by displacing it to the left, you decrease the stitch width down to zero. The zigzag stitch position is controlled by lever (2) protruding on the side of cover (6) of the zigzag stitch mechanism. The basic, i.e., the median position, is adjusted by the central position of lever (2), i.e., on the mark ⊂·⊃ in which the lever enters the fixing notch. To change the adjustment, slightly depress the lever in the direction away from the operator and displace it either to the mark ⊂·⊃ to obtain the right, or to the

mark ⊂•⊃ to obtain the left zigzag stitch position. After the adjustment, turn locking lever (5) to the right to lock the chosen stitch position. When used with straight stitch, the machine should be set to the median stitch position, i.e., to the mark ⊂•⊃ .

3. Thread tension adjustment

The tension of the upper and the lower thread must be so interrelated that the stitch binding takes place in the middle of the layer of the sewn material. To adjust the upper thread tension, turn the tensioner nut either to the right, i.e., clockwise, to increase the tension, or inversely to decrease it. To adjust the lower thread tension, use the screw located in the middle part of the pressure spring on the bobbin case. By turning the screw to the right you increase the pressure of the spring on the bobbin case (the thread passes between the spring and the bobbin case) and, consequently, the lower thread tension, and inversely. If the lower thread tension has been originally adjusted correctly, the adjustment of the upper thread tension by means of the tensioner nut will be sufficient as a rule to restore the desired quality of stitching.

To ensure correct thread trimming operation, special care should be paid to the above described thread tension adjustment. Also adjust the upper thread tension on the ancillary thread tensioner whose influence on the stitching itself and on the stitch formation is negligible but which affects the length of the upper thread end in the needle eye after the trimming operation is carried out. By increasing its tension you shorten the end and increase the quality of the subsequent start of stitching, however, with increased risk of the needle eye unthreading in that phase. On the other hand, too small tension of the ancillary tensioner means too long thread ends and impairs the stitch quality on the underside of the sewn work at the beginning of the next stitching. Therefore, due care should be paid to the correct tension adjustment on the ancillary thread tensioner.

4. To adjust the feed-dog height above the throat plate (Fig.7)

The feed-dog (A) height should be adjusted so that its teeth show above the throat plate by 0.8 to 1.2 mm according to the kind of sewn material. To adjust it, loosen screw (2) of lifting lever (8) on shaft (6), adjust the required height of the feed-dog teeth and retighten the screw firmly with a screwdriver. To adjust the teeth horizontally, loosen screw (1) of feed lever (9) on shaft (7) and adjust the rear part of the teeth by correspondingly adjusting the angular position of eccentric pin (5), then retighten screw (1) firmly. For adjusting the feed-dog height, use gauge (6) or gauge (5) belonging to Equipment No. 202.

5. To adjust the movement of the needle with respect to the feed-dog

Loosen the two screws of the lower belt wheel and turn the lower shaft so as to set the feed-dog to a position in which the feeding movement ends and the feed-dog teeth are level with the throat plate, then rotate the hand wheel to position the needle point during its downward movement approximately 5 mm above the throat plate, and retighten the screws of the belt wheel.

6. To adjust the throat plate (Fig. 7)

The throat plate (B) must be firmly seated and fixed by screws (3) in a position ensuring that the needle passes through the centre of the centre aperture even at the top width of the zigzag stitch. The needle aperture must not be burred or otherwise damaged since it would unfavourably affect the quality of stitching.

7. To adjust the presser bar pressure

The presser bar pressure is actuated by the adjusting screw located under the upper cover of the machine arm and accessible through a hole provided in it. By turning the adjusting screw to the right increase the pressure, by turning it to the left, decrease it. The pressure of the presser foot must be sufficient to ensure reliable and continuous feeding even at top speed. The uniformity of damage-free feeding as well as that of the

stitch length depends on the correct adjustment of the presser bar.

8. To adjust the height of the needle bar (Fig. 8)

The hook must be so interrelated with the needle that at the moment when the hook point begins to take up the upper thread loop, the upper edge of the eye of the needle is approximately 1 mm under the hook point at the maximum stitch width and in the right position of the needle bar. If the needle bar height is not adequate to this requirement, loosen the screws of the front plate and remove it, loosen screw (6) of carrier (13) of needle bar (10) and adjust the needle bar correctly, then mount the front plate.

9. To adjust the hook course

Adjust the stitch width to zero and turn the hand wheel towards you until the needle bar reaches its bottom position and reascends by 2.1 + 0.3 mm. In this position, the hook point must lie in the needle axis, the distance between the needle and the hook being 0.1 mm or less. If this is not the case remove the throat plate, loosen the screws, adjust the angular position of the hook on the hook shaft, retighten the screws and mount the throat plate. The gauges (4, 5, and 6) of Equipment No. 202 are suitable for the hook course adjustment.

10. To adjust the hook holder (Fig. 2)

After the hook course adjustment, loosen the fixing screw and adjust hook holder (2) so as to obtain a gap of approximately 0.7 mm between the holder lug and the bottom of the inner part of the hook . Gauge No. 5 of Equipment No. 202 is suitable for this adjustment.

11. To adjust the elliptical path of the feed-dog movement (Fig.7)

If the machine is adjusted correctly, the feed-dog describes an elliptical path both with forward and with reverse stitching. The adjustable eccentric is positioned by means of a pin in the aperture of the lower shaft and commands the length of feeding. Another stationary eccentric situated in front of the adjustable one commands the correct interrelation

between the major and the minor axes of the ellipse. The stationary eccentric is secured by two screws located in its collar. The eccentricity of the stationary eccentric is constant so that the height of the ellipse remains the same regardless of the height adjustment of the feed-dog teeth.

The adjustment is acrried out as follows:

When the eccentricity of the adjustable eccentric equals zero (so that no feeding takes place) adjust the feed-dog holder with the feed-dog to the centre of the slot provided in the throat plate, having first loosened screws (9) of lever (9) on feed shaft (7).
Ensure that the feed-dog reaches its top height at about the middle of the feed-dog movement.

12. To adjust the length of feeding (Table 16)

Loosen screw (22) of lever (20) on the pin of the reverse stitching hand lever, set the stitch length regulation knob to its zero position, adjust the traversable sleeve of the adjustable eccentric to a position corresponding to zero, retighten screw (22) of lever (20) and check whether the feeding is the same length for both forward and reverse stitching.

13. To adjust the hook opening (Fig.9)

During the stitching the gap between the sides of the groove provided in the inner part of the hook and hook holder (7) is positively periodically opened by means of opening lever (8) and eccentric (6) for easier lower thread movement out of the hook . The eccentric is situated on the hook box at the end of the lower shaft.
Adjust first the gap between the lug of the hook holder and the recess provided in the inner part of the hook and simultaneously opening lever (8) with respect to the face of the inner part of the hook . Loosen screw (1) fixing the position of bobbin case (5) contacted by pin (4) with the opening lever and adjust a gap of 0.8 mm between the lug of the opening lever and the lower surface of the inner part

of the hook by lightly tapping on the opening lever. At the same time, set the opening lever so as to produce a gap of 0.5 mm required to let the thread pass between the recess of the inner part and the hook holder. Having adjusted the opening lever, retighten screw (1). Before proceeding to carry out the adjustment, remove the throat plate. The timing of the opening lever with respect to the hook is best carried out only during the sewing off of the machine.

First screw out four screws (3) on cover (9) of the hook box, remove the cover, take out the lubrication inlay, loosen two screws (2) of eccentric (6) and set its angular position on the lower shaft so as to time the opening of the inner part of the hook to begin prior to the moment the upper thread begins to pass across the recess of the inner part of the hook and the lug of the hook holder. Check also the correct passage of the upper thread around the looper bottom when the opening lever approaches the opening lug to open the passage around the inner part of the hook for the upper thread. The correct adjustment is best checked on the adjusting spring that must only slightly move while the thread passes freely.

After the adjustment of the eccentric, retighten its screws, insert the lubrication inlay and mount the cover of the hook box.

14. <u>To exchange the presser foot</u> (fig. 8)

To exchange presser foot (1), first lift presser bar (11) to its top position and lock it by hand lever (12). Lift also the needle to its top position, then loosen attachment screw (5) of the presser foot together with the washer, and remove first finger guard (9) and then the presser foot from the presser bar. To insert the presser foot, proceed inversely.

Having fixed a new presser foot and with the needle bar in its top position check whether it does not collide with the presser foot during its movement. Gauge No. 6 from Equipment No. 202 (see Table No. 20) can be used for adjusting the presser foot stroke.

15. To take off and mount the drive belt (Fig. 10)

Remove first the synchronizer (A). Mark the position of the hub with respect to the handwheel if it has not been marked already. Screw out the screws /4/, remove the upper belt guard /1/, then the V-belt from the handwheel, and afterwards, after loosening the two screws /2/, take the handwheel with the bearing /8/ out of the machine arm and from the upper shaft /5/. Pass the drive belt /7/ through the aperture thus created in the machine arm around the upper shaft, set it on the two belt wheels, and mount the handwheel with the bearing back on the upper shaft in such a position that the first screw, considered in the sense of rotation of the handwheel, comes to sit on the small flat surface of the upper shaft, when tightened. Secure the handwheel by tightening the screws /2/ put the V-belt on the handwheel, mount the belt guard, and then the synchronizer in the marked angular position.

To observe:
After each mounting or exchange of the drive belt, adjust the hook course and the feeding, as described in the preceding paragraphs of this Manual. If this adjustment is not carried out by an experienced mechanician it is advisable to take the needle out of the needle bar before proceeding to the adjustment.

16. To adjust the needle punches into the centre of the slot of the throat plate in longitudinal direction (Fig. 8)

Adjust the zigzag stitch to the median position and to the zero width and turn the handwheel until the needle bar with the needle reaches its bottom position. The needle should be in the centre of the throat plate slot both longitudinally and transversely. In case of longitidinal deviation (i.e., in the feed direction of the sewn work) screw out the two screws of the front plate, remove the plate, loosen securing

screws (2 and 3) and finely adjust the angular position of screws (4) both on the front and on the rear side of the machine so as to set the needle lonfitudinally into the centre of the throat plate slot. Retighten screws (2 and 3) and mount the front plate.

NOTE:

When tightening adjustment screws (4) for adjusting the needle position, do not tighten them completely but leave a minimum play between them and the needle bar holder in order to let the transverse movement of the needle bar holder required for the zigzag stitch proceed unimpeded. Check also the gap between the looper point and the needle.

17. <u>To adjust the needle punches into the centre of the slot of the throat plate in transverse direction</u> (Fig. 4)

Adjust the zigzag stitch to the median position and to the zero width and turn the hand wheel until the needle bar with the needle reaches its bottom position. In case of transverse deviation from the central needle position screw out the four attachment screws, remove upper cover (1), take plug (7) out of the machine arm, loosen screw (29, Table 13) situated under the upper cover, insert a screwdriver into the hole created by the plug removal, adjust the angular position of the eccentric pin (32, Table 13) so as to set the needle transversely to the slot centre, retighten screw (29, Table 13), insert the plug into its hole and mount the upper cover.

Check the needle punch position at the maximum stitch width and be sure that there is play between the needle and the slot side in each lateral position of the needle. With zigzag stitch width adjusted at zero, the needle bar with the needle should react with no lateral movement to the hand wheel rotation. If it does react, the basic zero position of the zigzag stitch drive mechanism should be adjusted by an experienced sewing machine mechanic since such an adjustment is demanding.

18. To adjust the zigzag stitch mechanism to positions right side - left side (Fig. 6)

After the adjustment of the median position and maximum width of the zigzag stitch, the left and the right zigzag stitch position can be adjusted. Screw out two attachment screws, remove the cover of the zigzag stitch mechanism, loosen locking lever (7) and set the zero stitch width by means of lever (2). Rotating the hand wheel, set the needle bar with the needle to its bottom position. Displace lever (1) upwards, i.e., for the right side stitch position, and observe the simultaneously proceeding movement of the needle in the throat plate slot to its extreme right position. Loosen screw (A) and adjust stop (9) so as to let its notch enter into the recess provided in lever (1), then retighten screw (A). Proceed analogically for adjusting the left side needle position. Displace lever (1) downwards towards the bed plate, loosen screw (B), set stop (8) correctly and re-tighten screw (B). Having adjusted the right side and the left side position mount the cover of the zigzag stitch mechanism.

19. To adjust the needle bar lateral movement

If the machine is adjusted properly the needle bar begins to carry out its lateral movement, even at the maximum width of the zigzag stitch, only after the needle comes to lie about 4 mm above the throat plate during its upward movement. For correct adjustment, loosen screws (34, Table 4) of gear wheel (13, Table 4) on upper shaft (1, Table 4) and adjust the angular position of the hand wheel accordingly, then firmly retighten screws (34, Table 4).

20. To adjust the control force required for stepless adjustment of zigzag stitch width

For stepless tilting of the zigzag stitch bracket, inlay (1, Table 12) contains braking roller (3, Table 12) with spring (4, Table 12) and adjustment screw (5, Table 12). Turning the screw to the right increases the pressure exerted on the roller and, consequently, the force required to adjust the width of the stitch. Lever (7) actuated mechanism (Fig.

6) serves to fix the adjusted stitch width and must be turned to the left prior to proceeding to the stitch width adjustment which is carried out by lever (2, Fig. 6) whose extreme left position (up to stop) produces the zero zigzag stitch width that can be increased up to 4 mm by shifting the lever to the right. The number marking on cover (6, Fig. 5) shows the approximate stitch width values at the respective lever positions. To adjust the control force, first take the complete zigzag stitch mechanism out of the vertical part of the machine arm. Screw out three attachment screws (3, Fig. 6) from the body of the zigzag stitch mechanism, then screw out securing screw (37, Table 13) on pin (40, Table 13), remove the pin from guiding (43, Table 13), loosen fixing lever (51, Table 13) and take screw (42, Table 13) out of engagement thus releasing the body of the zigzag stitch mechanism that can then be taken out of the machine arm. During the assembly, proceed inversely.

21. <u>To adjust the control force required for stepless adjustment of the zigzag stitch position</u>

For adjusting the zigzag stitch position steplessly (and, to some extent, the zigzag stitch as well), nut (5, Fig. 5) and locking nut (4, Fig. 6) are screwed on guiding (43, Table 13). The adequate position of nut (5, Fig.6), fixed by locking nut (4, Fig. 6), will provide for the required displacement (control) force and define the force holding the adjusted zigzag stitch position. Any adjustment of the zigzag stitch position can be carried out only with locking lever (5, Fig. 5) released.

22. <u>To adjust the tooth play of the zigzag transmission mechanism</u>

The tooth play of the zigzag stitch transmission mechanism is actuated by eccentric pin (6, Fig. 6).
To adjust the tooth play, first screw out four attachment screws (2, Table 1), remove upper cover (8, Table 1) and loosen screw (4, Table 13) situated in the lug of the machine arm. By turning then eccentric pin (6, Fig.6), adjust the tooth play of the zigzag transmission mechanism, i.e., between complete cam (9, Table 13) and gear wheel (13, Table 4) mount-

ed on upper shaft (1, Table 4), then lock the adjusted position by thoroughly tightening screw (4, Table 13).

23. To adjust the position of the needle bar with respect to that of the hook shaft

After any larger adjustment of the machine mechanisms, the median (vertical) needle bar position with respect to that of the hook shaft should be checked. The hook shaft axis is displaced to the left of the needle bar axis. For adjustment, loosen two screws (24, Table 5) ensuring the locking joint between the bed plate and the hook gear box. In correct position, the hook gear box is in direct contact with the lug of the bed plate. The stop pin on the front side of the gear box is inserted into the split section of the bed plate lug and is in contact with the upper part of the split lug. Lock the gear box position by tightening two screws (24, Fig. 5).

24. To adjust the operation of the adjusting spring

Loosen screw (28, Table 8) and take the complete upper thread tensioner (21, Table 8) out of the machine arm. To adjust the tension of adjusting spring (20, Table 8), loosen screw (8, Table 8) on bushing (19, Table 8) and adjust the angular position of pin (22, Table 8) with a screwdriver. By turning the pin to the left decrease the spring tension, and inversely. The value of the spring arm stroke is adjusted in the same manner. Sew a few stitches and check the adjustment of the adjusting spring. With correct adjustment, the thread passing around the looper bottom produces a slight movement of the adjusting spring without being tensioned.

25. To time the trimmer actuating cam

The correct and trouble-free function of the thread trimmer device requires the correct setting of the trimmer actuating cam mounted on the lower shaft and commanding the movement of the moving cutter which serves also to draw out the threads prior to trimming them as well as the mechanism for loosening the thread tensioner. With the machine at rest, rotate the hand wheel until the thread take-up lever reaches its top position. Mark this position on the hand wheel and on the

machine arm (on the belt guard) by provisional signs, then tilt the machine and rotate the hand wheel until the two provisional signs are aligned. Loosen two screws (53, Table 4) of cam (47, Table 4) and set the loosened cam so that its index line (marked in red) coincides with the axis of pin (25, Table 9) and then lock the cam by tightening screws (53, Table 4). This is the basic position of the cam which, however, can require some adjustment depending on the kind of threads, sewn work, etc. The timing of the drawing hook movement is governed by the angular position of the cam on the lower shaft. Tilt the machine head and insert pin (25, Table 9) into the straight section of the cam groove by depressing the levr transmitting motion from the electro-magnet. By subsequent turning of the hand wheel, the beginning of the drawing hook movement from the initial to the rear position can be timed.

If adjusted correctly, the point of the drawing hook comes to lie in the immediate vicinity of the throw-away section of the hook at the moment when the lower thread leaves it, forming the typical triangle. During the subsequent rotation of the hand wheel, the drawing hook point passes through the triangle, one arm of the upper thread together with the lower one lying on one side, the other arm of the upper thread on the other side of the drawing hook. The threads lying on the notched side of the drawing hook enter the notch.

For adjustment, loosen two screws (53, Table 4) on cam (47, Table 4) and turn the cam either in the sense of the lower shaft rotation to speed up the beginning of the drawing hook movement, or inversely. After the adjustment check whether pin (25, Table 9) enters the straight section of cam (47, Table 4) freely upon depression of lever (26, Table 9), press carrier ring (45, Table 4) onto the adjusted cam and retighten it by screws (46, Table 4).

26. <u>To adjust the starting position of the drawing hook</u>

In the starting position of the drawing hook there must be a distance of 0.5 to 1 mm between its outer edge and the outer edge of the removable slide plate (aligned with the

outer edge of the bed plate). The slide plate must be attached to the bed plate in a position leaving no gap between the slide plate and throat plate (1, Table 10). To adjust the drawing hook position, loosen locking nuts (2, and 34, Table 10) and turn connecting tie-rod (31, Table 10), so as to obtain the length required for fixing the correct position of the drawing hook, then retighten the locking nuts.

27. To adjust the stroke of the drawing hook

Insert pin (25, Table 9) into cam (47, Table 4) and rotate the hand wheel towards you until the lower thread end one arm of the upper thread enter the notch provided on the side of the drawing hook. If they do not enter, loosen nut (6, Table 9) on swinging lever (17, Table 9) and displace lever (15, Table 9) in the groove of lever (17, Table 9). To increase the drawing hook movement, increase the length of the lever arm, and inversely. Fix the adjusted position by retightening nut (6, Table 9).

28. To adjust the stationary knife for correct thread trimming

The correct trimming operation depends among other things on the pressure force of stationary knife (14, Table 10). The pressure force can be increased by screwing in screw (3, Table 10), and decreased by screwing it out. The pressure force chosen should be just sufficient for proper trimming to avoid excessive wear of both the stationary and moving knife (the drawing hook). If in spite of this adjustment the trimming operation remains unsatisfactory, check the cutting blade of the stationary knife and sharpen it or exchange the knife.

29. To adjust the loosening of the upper thread tension

For correct operation the main upper thread tensioner must be loosened during the thread trimming cycle. This loosening is actuated automatically in the due phase of the thread trimming operation via a bowden and a lever system, by the switching on of the trimmer device. If the loosening does not take place use displaceable bushing (9, Table 8) to adjust the mutual position of the two bowden ends and, consequently, the stroke value, having first loosened screw (18,

Table 8) in the machine arm. The gap between the disks of the tensioner in loosened state must ensure free passage of the upper thread. This gap can also be adjusted by displacing the whole thread tensioner in or out after loosening screw (28, Table 8).

30. To adjust the machine stop with the needle up

The principle of this is described in detail in the instructions for the stop motor. Before leaving the producer's works the machine is tested and sewn-off at predetermined values, i.e., in the "needle up" position lying between 0° and 5° after the upper dead position of the thread take-up lever.

31. Available length of upper thread

The available upper thread length depends on the following factors:

a) Tension of the ancillary thread tensioner
b) Timing of the main tensioner
c) Timing of the upper dead position of the thread take-up lever

ad a) The available upper thread increases with decreasing tension of the ancillary thread tensioner, and inversely

ad b) The timing depends on the values of the time constant and is carried out by adjusting time constant C_7, resistor R_{36} and potentiometer P_2 which serves to adjust the delay of the control electromagnet release with respect to the trimmer pulse. These values have been set at the producer's.

ad c) The later the machine stops (i.e., after the upper dead position of the thread take-up lever) the longer the available upper thread length, and inversely

32. To remove and insert the slide plate

It is necessary to remove slide plate (1, Table 10), care must be taken to disconnect the trimmer mechanism fixed to it. To do this, loosen screw (12, Table 10) and take pin (22, Table 10) out of lever (11, Table 10). Then loosen screws (2, Table 10) fixing the slide plate to the machine bed plate and remove the slide plate. When inserting the slide plate, proceed inversely.

33. To remove and to mount the moving trimmer knife (the drawing hook)

Tilt the machine head onto the support pin located on the stand plate, loosen screw (12, Table 10), take pin (22, Table 10) out of lever (11, Table 10) to disconnect the trimmer device drive, swing lever (11, Table 10) together with the trimmer knife to the left (away from the hook), shift the cylindrical end of lever (11, Table 10) out of the aperture of trimmer knife (5, Table 10), and remove the latter from the slide plate. During assembly, proceed inversely.

34. Electrical equipment of machine

The machine is equipped with a Minerva stop motor situated in the machine stand. The electrical equipment of the machine should be kept in good state according to the electrotechnical and security regulations. To change the sense of rotation of the electromotor change over the lead-in cable either at the plug or at the terminal board of the stop motor. In the latter case, do not omit first to take the plug of the lead-

in cable cut of the socket.

CAUTION:

Any failure of the electrical equipment of the machine should be repaired by a qualified electrician.

35. To adjust the work cutting device

The movement of the work cutting knife is derived from the lifting eccentric of the feed mechanism. The basic adjustment elements of the cutting mechanism, i.e., the cutter stroke (2.3 mm), its timing with the feed mechanism and the position of the cutting knife axis with respect to that of the needle bar, are constant. The other elements are adjustable in the following way:

The cutting knife adjustment in height (with respect to the cutting plane of the throat plate) should be carried out, with loosened screw (20, Table 15) of the joint of lever (25, Table 15), so as to ensure that the cutting edges overlap by approximately 0.3 mm in the bottom dead point of the knife.

The moving knife can be adjusted for slight crossing with the stationary knife for improved quality of cutting.

To adjust the incline of the moving knife and its pressure on the stationary one, screw out screw (13, Table 1) located in the bed plate, use the aperture thus created to loosen screw (20, Table 15) and adjust the knife incline so that the front part of its edge is slightly raised. To increase the knife pressure, displace lever (25, Table 15) to the right. Retighten screw (20, Table 15) and check the pressure which should lie between 18 and 22 N.

III. MAINTENANCE

1. Machine cleaning

The plain machine lines help to keep the [illegible] parts clean. From time to time it is necessary to remove the waste between the feed-dog and the throat plate. Otherwise, the machine should be cleaned daily.

2. General overhaul and repair of machine

should be carried out once a year. The machine should be set out of operation, cleaned, dismantled, faulty parts exchanged and necessary repairs carried out. The machine should be then assembled and tested. The electric motor and the electrical equipment should be inspected and tested. The general overhaul of the machine should be carried out so thoroughly as to enable the machine to run without major defects for another year.

3. To store the machine

After the machine has been set out of operation it should be cleaned, inspected and faulty pieces if any, exchanged. The machine should then be tested, coated with protective grease and stored with all the tools and accessories.

IV. FAULTS AND HOW TO REMOVE THEM

Fault	Cause	Remedy
1) General faults		
a) Heavy machine run	The machine has been out of use for a considerable time; dried oil and impurities deposited in the bearings	Inject some drops of kerosene into all lubrication holes and on sliding surfaces and let the machine run rapidly so as to clean the lubrication holes in the bearings. Then oil the machine carefully with sewing machine oil (see par. 5, page 10.
b) Slow machine start	Insufficient belt tension.	Increase the belt tension by displacing the electric motor
c) Upper thread breakage	1. Slashed thread guides.	1. Ascertain and exchange them
	2. Too sharp hook point.	2. Repair it.
	3. Faulty feeding	3. Adjust it (see par. 5, page 19)
	4. Faulty thread guiding or faulty needle threading	4. Thread the upper thread correctly (see par.8, page 13)
	5. Incorrect upper thread tension	5. Adjust it (see par.3, page 18)
	6. Bad needle quality or bent needle	6. Exchange the needle (see par.7, page 12)
	7. The thread size is inadequate to the thickness of sewn material.	7. Use the right thread size.
	8. Machine considerably soiled	8. Unscrew the throat plate, clean the mechanism, and set the throat plate (see par.6, page 19)
	9. Thread wound on the hook	9. Remove the thread
	10. The thread is too thin or not strong enough.	10. Use better thread.
d) Lower thread breakage.	1. The thread is incorrectly threaded into the bobbin case.	1. Thread is correctly (see par.11, page 14)

Fault	Cause	Remedy
	2.The thread is too thin or not strong enough.	2.Use the right thread size.
	3.The thread is wound incorrectly on the bobbin.	3.Wind it on the bobbin correctly.
	4.Damaged bobbin.	4.Exchange it.
	5.Too sharp pressure spring on the bobbin case.	5.Exchange the spring.
e) Missed stitches	1.Needle inserted incorrectly.	1.Insert it correctly (see par.7,page 12)
	2.Blunt or bent needle.	2.Exchange it (see par. 7, page 12)
	3.Blushed or broken **hook** point.	3.Exchange the **hook**
	4.Excessive needle aperture in the throat plate	4.Exchange the throat plate and set it correctly (see par. 6, page 19).
	5.Broken adjusting spring for upper thread tension	5.Exchange the spring and adjust the upper thread tension (see par., page 18)
	6.Needle bar positioned too high or too low	6.Adjust it (see par.8 page 20)
	7:Overturned **hook** , incorrect **hook** course.	7.Adjust the **hook** course (see par.9, page 20).
	8.Boiled **hook** mechanical.	8.Clean it with kerosene and if it
f) Needle breakage	1.Feed-dog positioned too high.	[illegible] (see par.4, page 19).
	2.Faulty attention [illegible]	[illegible]
	3.Incorrect [illegible]	[illegible] (see par.7, page 12).
	4.Needle inserted incorrectly.	4.Insert it correctly (see par.7, page 12).
	5.Incorrect throat plate.	5.Set [illegible] (see par.6, page 19) [illegible]
	6.Excessive upper thread tension.	6.Adjust it (see par.3, page 13).

ult	Cause	Remedy
Heavy and irregular feeding.	1.Feed-dog positioned too low.	1.Adjust it for height (see par.4, page 19).
	2.Worn-out feed-dog.	2.Exchange it.
	3.Clogged or blunt teeth of feed-dog.	3.Clean or exchange the feed-dog.
	4.Insufficient pressure of the presser foot.	4.Increase the pressure (see par.7, page 19).
h)Stitch forming below sewn material.	1.Tensioner discs slashed by upper thread.	1.Exchange them and adjust the upper thread tension (see par.3,page 18).
	2.The thread does not pass smoothly around the hook or catches the bobbin case.	2.Clean the hook and adjust the bobbin case
	3.The upper thread is not threaded between the tensioner discs.	3.Thread it correctly (see par.8,page 13).
	4.Thread broken and caught between the tensioner discs.	4.Clean the thread tensioner and adjust it (see par,3,page 18).
	5.Incorrect proportion between the upper and lower thread tensions.	5.Correct the proportion (see par.3, page 18) and check it from time to time.
i)Stitch forming above sewn material.	1.Damaged spring on the bobbin case, the lower thread is braked insufficiently.	1.Exchange the spring.
	2.The lower thread is not threaded under the spring of the bobbin case.	2.Thread it correctly (see par.11, page 14).
	3.Lower thread broken and caught under the spring of the bobbin case.	3.Remove the thread.
	4.Incorrect proportion between the upper and lower thread tensions.	4.Correct the proportion (see par .3,page 18).

Fault	Cause	Remedy
	5.Premature feeding.	5.Adjust it (see par. 5, page 19).
j)Locked hook	Thread residues caught in the hook	Rotate the hand wheel in each direction regardless of the considerable resistance until the caught thread residues are cut to pieces. Remove them and start the unthreaded machine. Let it run for a period, then drip two or three drops of Jl oil onto the hook .

2. Basic faults referring to thread trimmer device

a) Insufficient length of upper thread available resulting in unthreading of upper thread out of the needle eye at the machine start: the machine fails to start stitching.	1.Excessive tension of the ancillary thread tensioner.	1.Reduce the tension.
	2.Premature timing of the cam.	2.Adjust the timing.
	3.The machine stops before reaching the top dead position.	3.Adjust it correctly.
	4.The electromagnet serving to release the main thread tensioner fails to operate.	4.Ascertain the cause and repair the trouble.
	5.Incorrect upper thread unwinding.	5.Repair it.
	6.The edge of the active section of the drawing hook is too sharp and tends to cut the thread.	6.Polish the edge.
	7.Too sharp hook edge.	7.Polish it.
b)Insufficient amount of lower thread, the machine fails to start stitching.	1.The lower thread end is drawn into the bobbin case.	1.Increase the lower thread tension when being wound on the bobbin.
	2.Excessive r.p.m. prior to machine stop.	2.Keep it within the limits of 140 r.p.m.
	3.Excessice lower thread tension.	3.Reduce it.

Fault	Cause	Remedy
	4.Burrs on the cover sheet of hook .	4.Polish it.
c)Thread ends are poorly cut or are not cut at all.	1.Maladjusted (insufficient) pressure of stationary knife.	1.Repair (adjust) it.
	2.The stationary or the moving knife (the drawing hook) is blunt.	2.Sharpen it.
d)Poor seam beginning on the underside of sewn work.	Too long upper thread end.	1.Increase the tension of the ancillary tensioner. 2.Adjust the cam timing.
e)The upper or the lower thread fails to be cut.	1.Incorrect cam timing.	1.Time it correctly.
	2.Missed stitches at reduced r.p.m.	2.Adjust the mechanism.
	3.Poor thread separation by the drawing hook.	3.Adjust or exchange the drawing hook.
	4.Insufficient stroke of drawing hook.	4.Adjust it (see par.27,page 29).
f)Both the upper and the lower thread cutting fails but the needle movement from the lower to the upper position takes place.	1.Incorrect cam timing.	1.Time it correctly.
	2.The electromagnet controlling the thread cutting fails to operate correctly (gets stuck).	2.Check the wiring of the electromagnet or exchange it.
	3.Insufficient stroke of drawing hook.	3.Adjust it (see par. 27, page 29).
g)Stitching begins only after a few missed stitches.	1.Insufficient amount of upper thread.	1.Increase it (see par.31, page 30).
	2.Insufficient amount of lower thread.	2.Re-polish the drawing hook and the hook .
h)At the seam beginning,the upper thread and protrudes above sewn work.	Excessive amount of upper thread.	1.Increase the tension of the ancillary thread tensioner. 2.Reduce the cam timing. 3.Adjust the machine stop in the needle up position.

V. HOW TO USE THE CATALOGUE AND ORDER SPARE PARTS

Please study carefully the following information.

The catalogue is divided into three sections, as follows:

1. The basic section, comprising the technical specifications and the instructions for servicing with due illustrations.
2. The List of Parts with a heading comprising the Type No. of the machine, the letter A and the serial No. of each sheet. Column 1 gives the respective position No., arranged from the lowest one upwards, column 2 gives a twelve-digit number of the part (purchsed or produced at our factory), and the mark + before the twelve-digit number refers to spare parts comprised in the standard set of spare parts.

   An example of designation: ZZ 564 TD A 1
3. Section with drawings of the machine parts, each part accompanied with its one- or two-digit position number including the tables of accessories and equipment, with a heading comprising the Type No. of the machine, the letter B, and the serial No. of each Table.

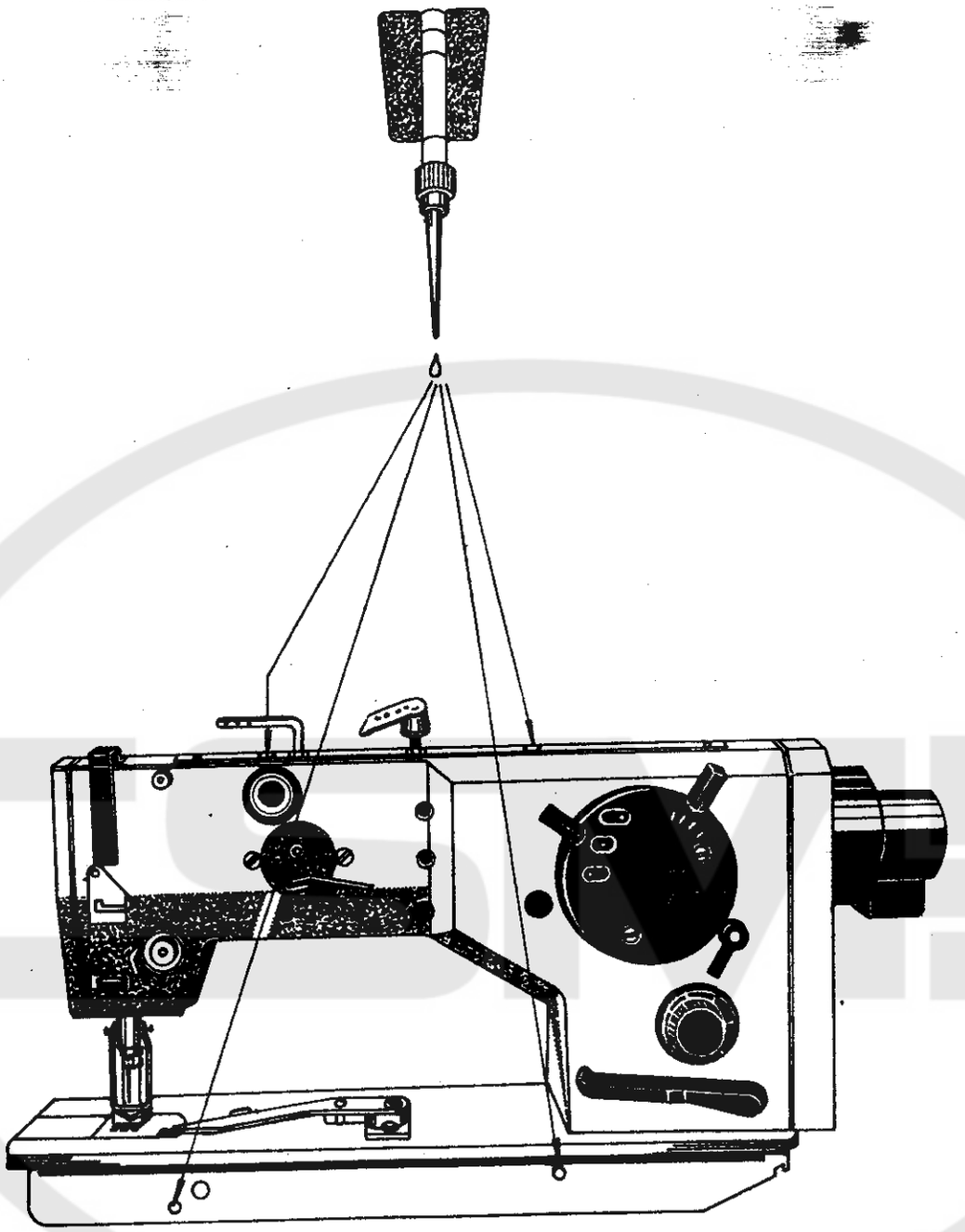
   An example of designation: ZZ 564 TD B 1

A twelve-digit number of a machine part (purchased or produced) in the List of Parts corresponds to each one- or two-digit position number of each Table.

When ordering spare parts, please, specify:

1. The twelve-digit number of the part in question (purchased or produced).
2. Number of parts required.

   Example of an order: 2 parts No. 272 213 017 015
   1 part No. 522 980 021 248
   1 part No. 522 080 828.079



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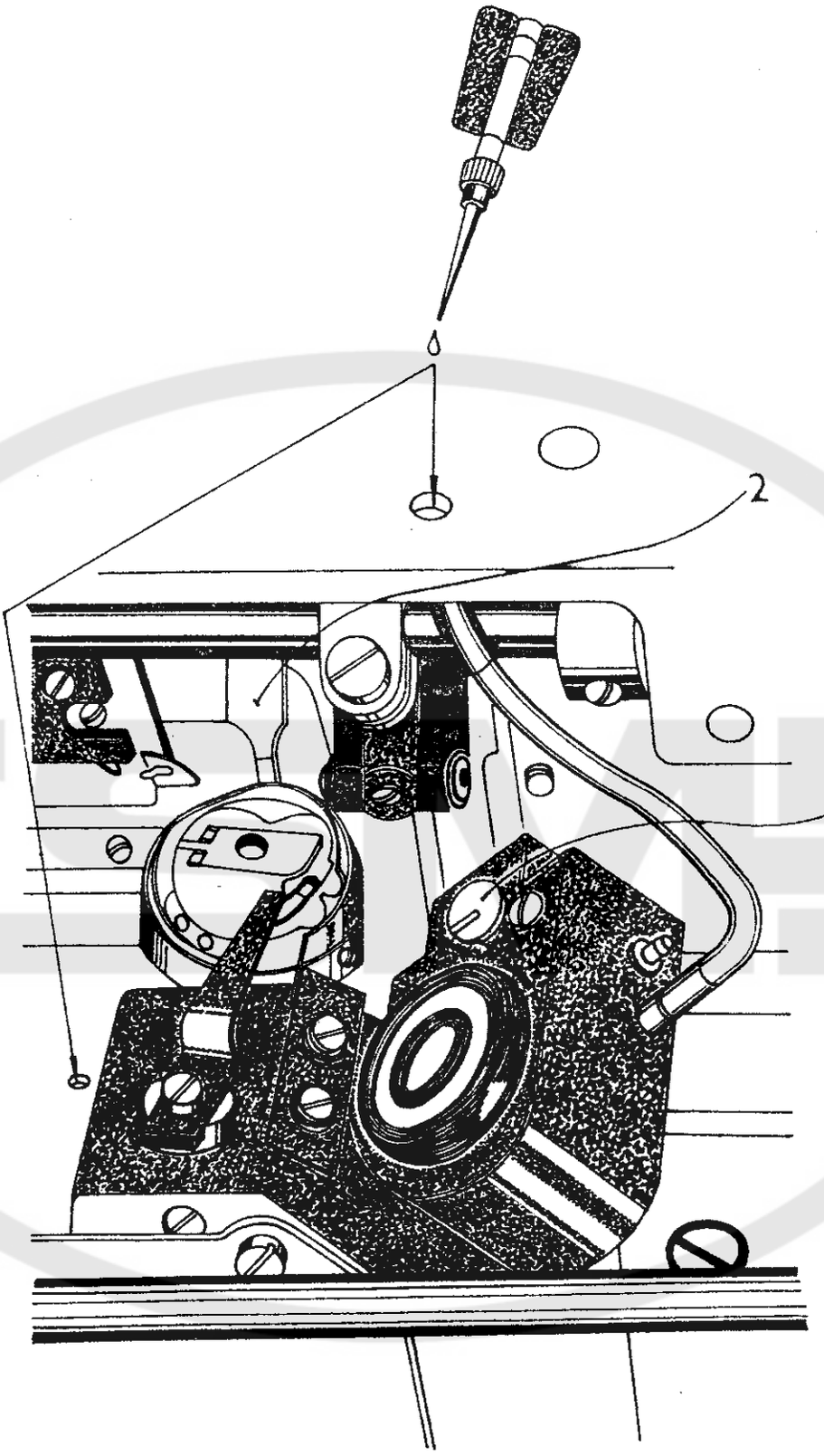

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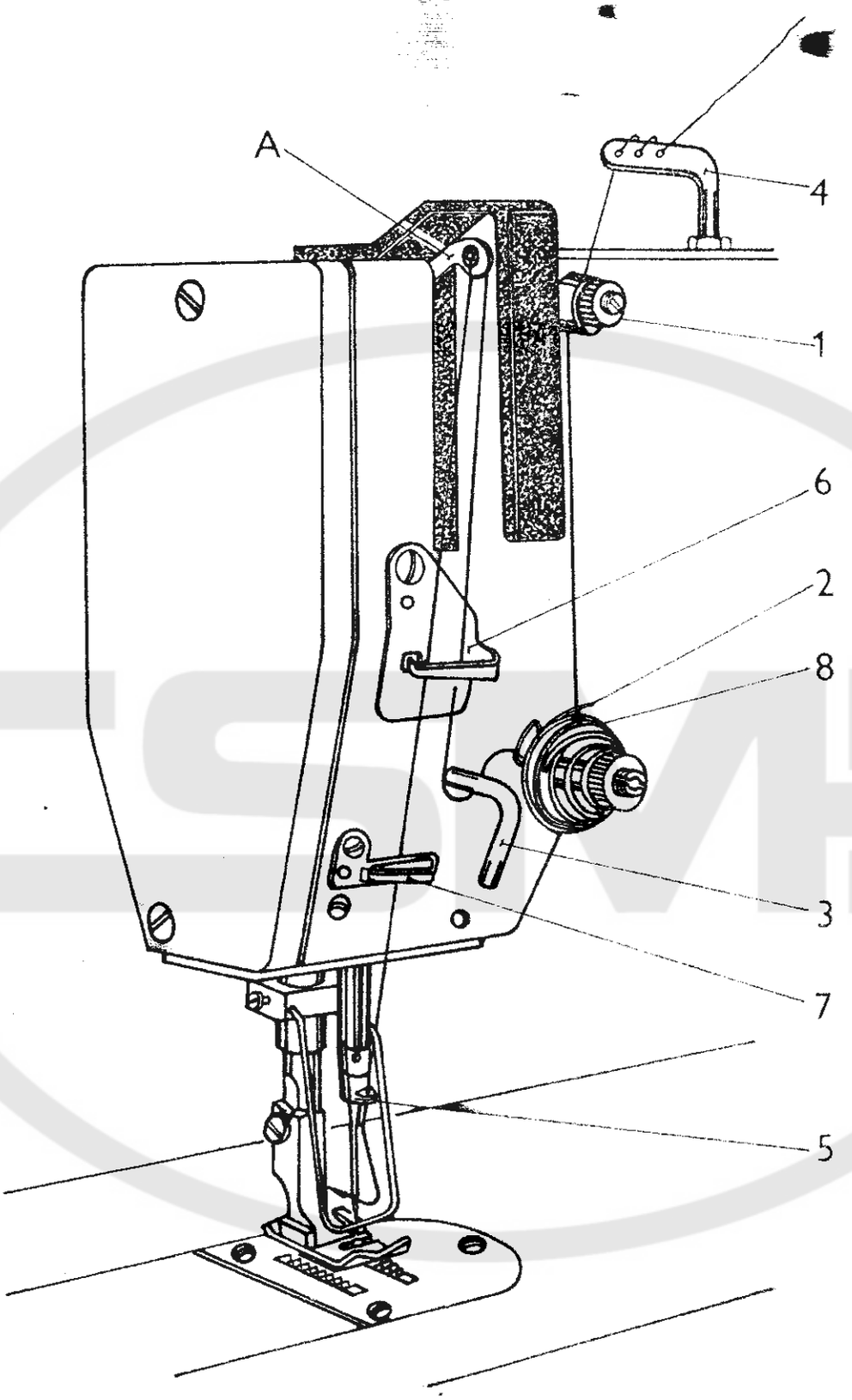

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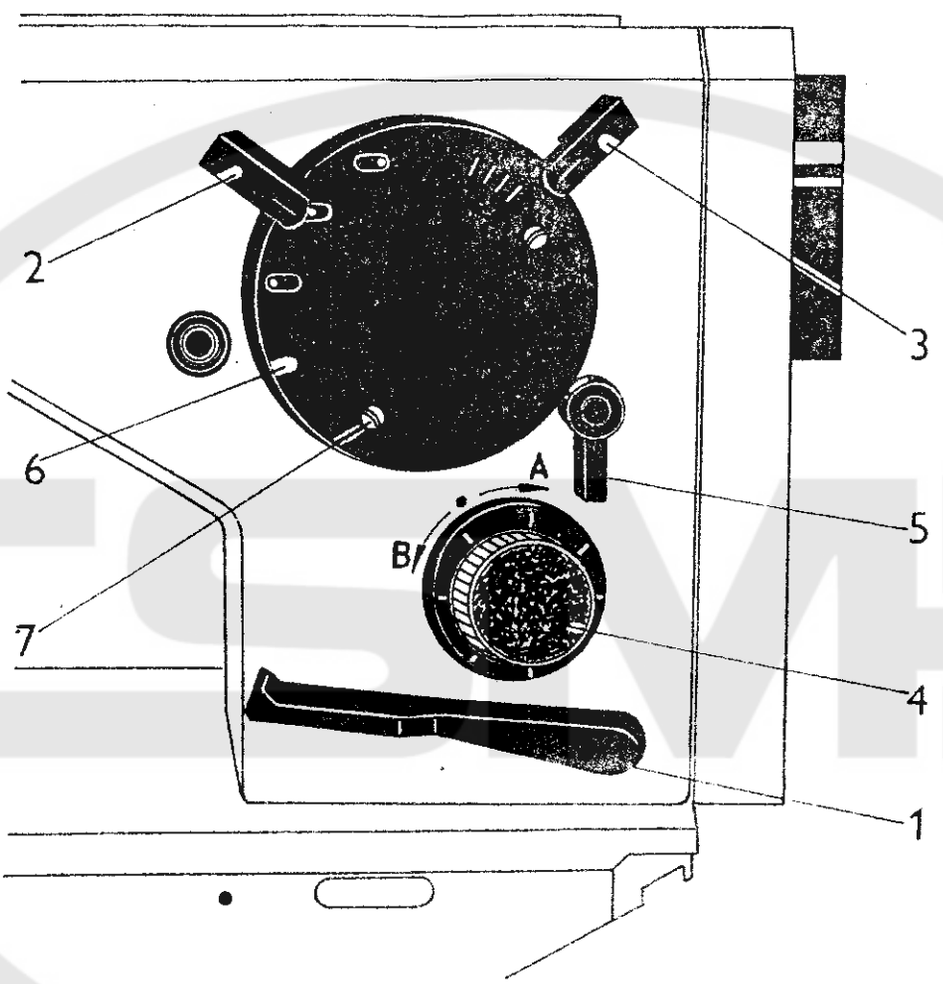

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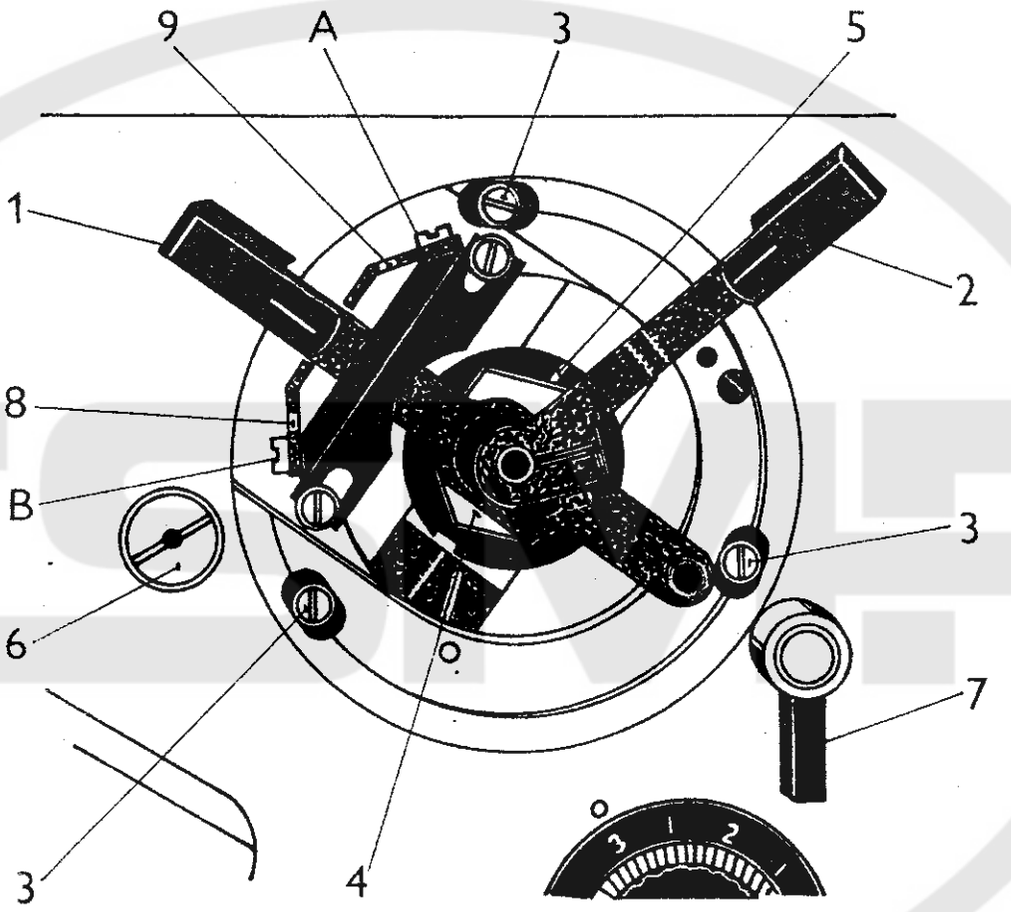
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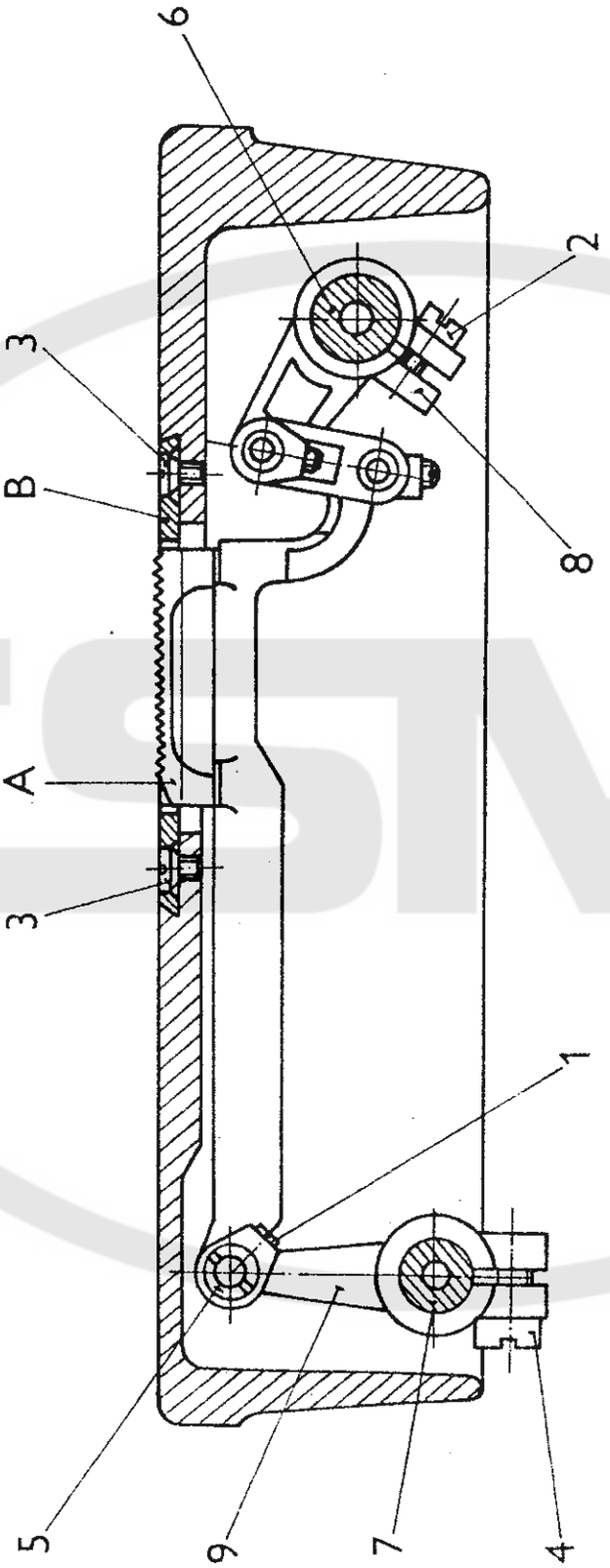

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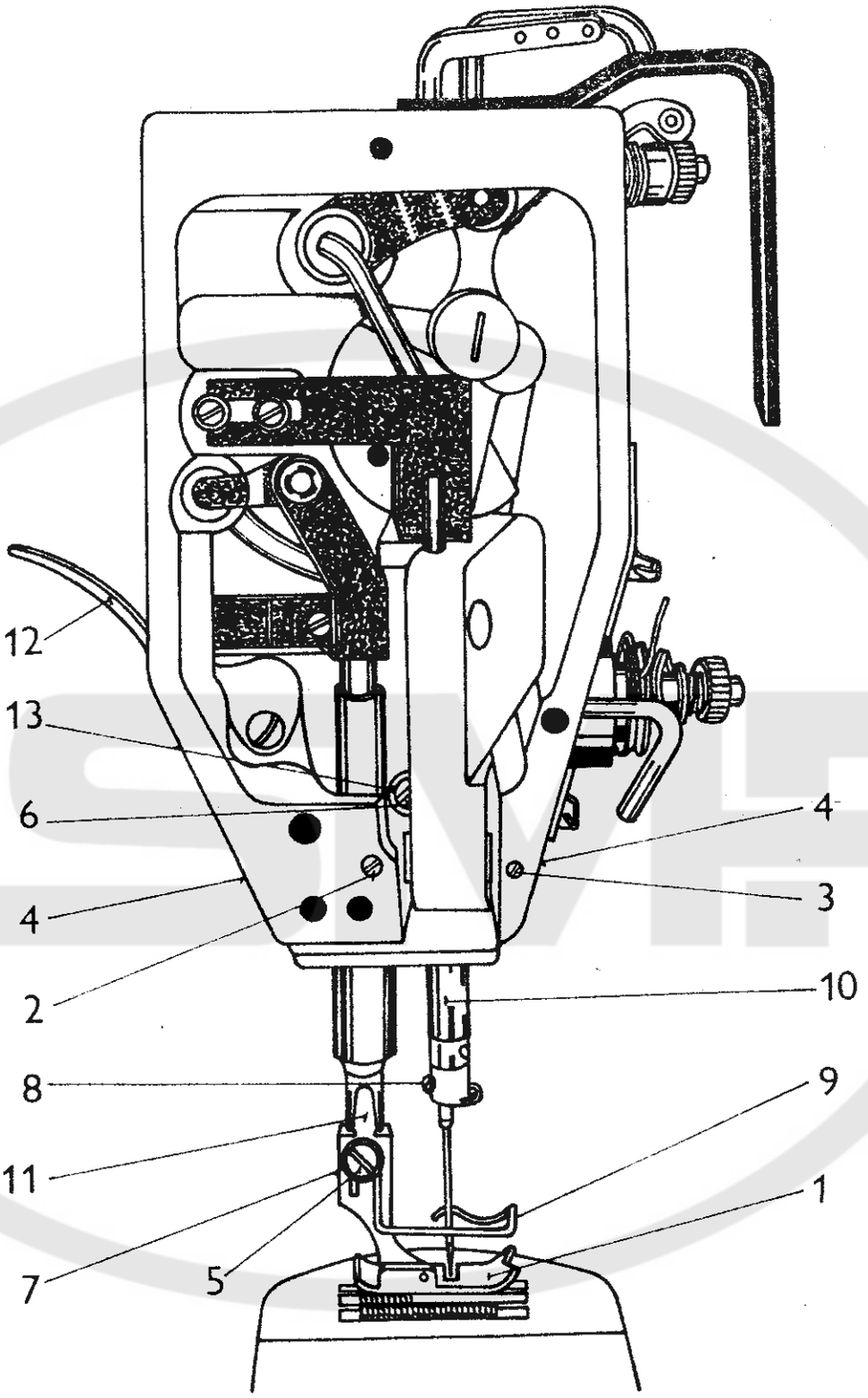
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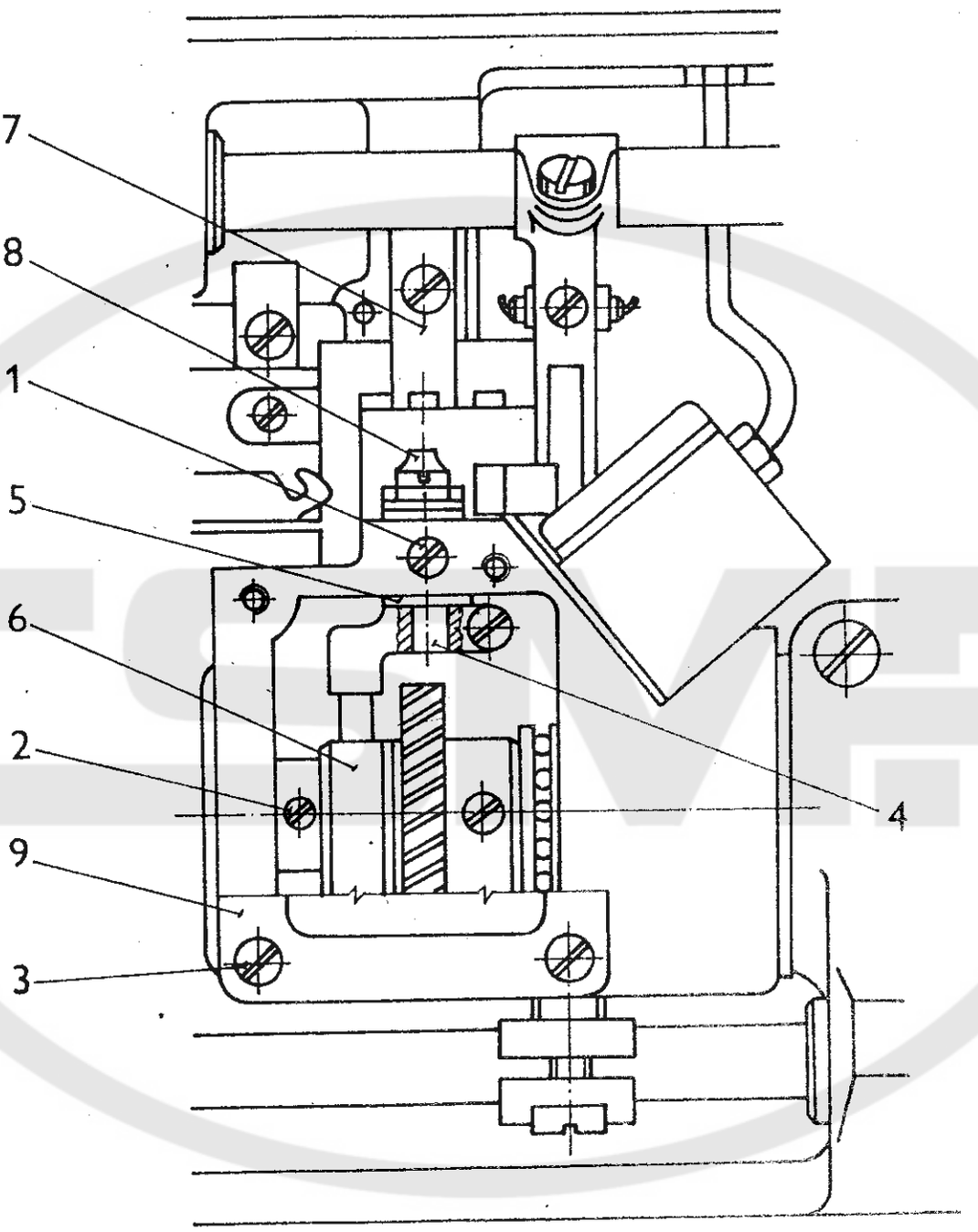
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1	2
	TAB. 1
1	522 080 831.342
2	+ 123.117
3	321 161 001 000
4	522 080 840.073
5	313.204
6	161.138
7	161.146
8	813.904
9	120.248
10	721.173
11	827.180
12	123.122
13	124.160
14	123.159
15	111.227
16	271.184
17	821.115
18	821.077
19	821.113
20	190.368
21	120.361
22	124.062
23	722 923 110 000
24	522 080 132 112
25	220.011
26	522 980 020.318.10
27	311 515 306 025
	TAB. 2
1	522 980 020.318.10
2	311 733 100 620
3	273 199 005 000

1	2
4	522 980 041.162
5	522 080 190.346
6	522 080 120.346
7	191.110
8	161.151
9	316.096
10	283 362 003 000
	TAB. 3
1	522 080 646.104
2	522 980 021.318
3	522 080 413.311
4	421.341
5	810.419
6	111.253
7	708 420 030 003
	1 = 20 mm
8	522 080 120.276
9	708 420 030 002
	1 = 80 mm
10	522 080 190 353
11	111.229
12	113.115
13	111.248
14	708 420 030 003
	1 = 300 mm
15	283 366 002 000
	ø 3,5/4,8 x 147
16	522 080 328.005
17	111.222
18	+ 112.014
19	+ 122.008
20	318.192
21	111.238
22	120.261
23	112.015
24	318.191

1	2
25	611.101
26	613.469
27	945.281
28	324 165 038 396
29	522 080 120.006
30	953.139
31	+ 124.050
32	522 980 035.499
33	522 080 391.153
34	+ 135.029
35	+ 627.037
36	548 300 000 110
37	311 515 002 006
38	522 080 260.458
39	951.281
40	138.009
41	421.321
42	349.147
43	953.159
44	120.221
45	522 980 049.782
46	522 080 111.214
47	111.295
48	313.322
49	+ 522 980 044.711
50	+ 522 080 120.062
51	120.216
52	111.126
53	111.273
	TAB. 4
1	522 080 349.147
2	+ 522 980 039.047

1	2
3	522 080 260.467
4	436.338
5	113.115
6	324 165 038 306
7	522 080 424
8	111.225
9	708 420 030 002
	1 = 130 mm
10	522 980 041.176
11	283 366 002 000
	ø 3,5/4,8 x 90
12	522 080 120 259
13	522 980 045.330
14	522 080 190.359
15	+ 122.029
16	120.006
17	311 733 000 300
18	522 080 511.082
19	522 080 442 548
20	522 080 120.252
21	342.243
22	724.148
23	324 165 028 396
24	311 733 000 180
25	522 080 814 338
26	324 592 510 900
27	522 080 630.248
28	671.152
29	+ 112.013
30	522 980 044.045
31	708 420 030 002
	1 = 350 mm
32	522 080 141.088
33	318.103
34	+ 111.343
35	445.048
36	324 162 068 396

1	2
37	522 980 045.314
38	+272 213 011 015
39	324 165 038 396
40	522 080 141 102
41	627.023
42	324 165 028 396
43	522 080 337 033
44	424 055
45	522 080 436 346
46	+ 112.013
47	672.166
48	445.045
49	421.122
50	271.062
51	324 165 038 396
52	522 080 120.222
53	120.468
54	554.077
55	122.031
56	272 711 222 000

TAB. 5

1	2
1	311 733 100 260
2	324 152 927 796
3	522 080 724.148
4	441.278
5	324 155 920 020
6	522 080 111.219
7	120.269
8	725.023
9	283 366 002 000
	ø 3,5/4,8 x 100
10	522 080 424.060
11	424.051
12	522 980 020.318.10

1	2
13	+ 522 080 112.013
15	945.283
16	122.007
17	120.601
18	708 420 030 003
	1 = 40 mm
19	522 080 120.226
20	311 515 003 008
21	+ 522 080 552.165
22	311 515 601 612
23	311 733 100 240
24	522 080 120.235
25	708 420 030 005
	1 = 300 mm
26	283 366 002 000
	ø 3,5/4,8 x 170
27	522 080 111.094
28	410.530
29	323.155
30	671.153
31	522 980 035.330
32	+ 522 080 552.166
33	324 311 010 000
34	522 080 120.246
35	827.179
36	613.466
37	990.134
38	945.285
39	+ 825.743
40	+ 522 980 008 235
41	+ 522 080 686.020
42	+ 685.017

1	2
	TAB.6
1	522 980 035.526
2	522 080 945.185
3	111.252
4	111.233
5	424.051
6	945.170
7	346.053
8	273 111 001 000
9	321 891 001 000
10	120.269
11	725.023
12	283 366 002 000
	ø 3,5/4,8 x 100
13	522 080 945.077
	TAB.7
1	522 080 111.245
2	283 366 002 000
	ø 3,5/4,8 x 200
3	522 080 945.316
4	708 420 030 002
	1=250 mm
5	283 366 002 000
	ø 3,5/4,8 x 210
6	283 366 002 000
	ø 3,5/4,8 x 90
7	283 366 002 000
	ø 3,5/4,8 x 100
8	522 980 020.318.10

1	2
9	283 366 002 000
	ø 3,5 / 4,8x150
10	522 080 945.180
11	824.095
12	120.245
13	283 366 002 000
	ø 3,5/4,8 x 65
14	283 366 002 000
	ø3,5/4,8 x 75
15	708 420 030 003
	1=110 mm
16	522 080 945.286
17	321 891 001 000
18	522 080 441.313
19	708 420 030 004
	1= 300 mm
20	708 420 030 005
	1=640 mm
21	708 420 030 002
	1=320 mm
22	283 366 002 000
	ø 3,5/4,8 x 250
23	708 420 030 002
	1=270 mm
24	708 420 030 002
	1=130 mm
25	708 420 030 002
	1=140 mm
26	522 080 120.216
	TAB.8
1	522 980 049.806

1	2
2	522 080 274.104
3	522 980 049.786
4	522 080 120.221
5	410.511
6	278.009
7	522 980 020.318.10
8	522 080 111.227
9	945.100
10	945.188
11	264.274
12	522 980 049.782
13	522 080 120.216
14	313.322
15	953.159
16	131.027
17	822.424
18	111.245
19	416.131
20	+ 264.294
21	522 980 025.245
22	+ 522 080 118.039
23	+ 828.079
24	828.080
25	+ 262.073
26	195.041
27	171.037
28	111.229
29	310.270
30	118.027
31	828.051
32	827.174
33	+ 262.065
34	171.030
35	522 980 025.160

1	2
	TAB.9
1	522 080 274.083
2	120.322
3	141.204
4	141.142
5	744.380
6	161.144
7	822.446
8	120.218
9	822.409
10	825.587
11	825.586
12	120.319
13	310.364
14	274.090
15	522 080 632.147
16	522 080 353.121
17	646.145
18	320.257
19	522 080 260.434
20	190.359
21	190.353
22	630.272
23	263.103
24	341.202
25	+ 322.231
26	625.132
28	613.421
29	120.221
30	320.258
31	131.378
32	263.207
33	120.218
34	274.104
35	314.167
36	278.009
37	522 980 049.786
38	522 080 334.090
39	120.246
41	613.420
	TAB. 10
1	522 080 647.222
2	+ 123.117
3	111.328
4	+ 811.618
5	+ 870.167
6	826.039
7	522 080 274.090
8	120.293
9	111.244
10	765.090
11	635.171
12	120.218
13	274.093
14	+ 870.140
15	132.216
16	825.868
17	120.332
18	945.315
19	191.118
20	120.215
21	132.153
22	314.165
23	323 232 000 066
24	522 980 049.811
25	522 080 161.227
26	338.190
27	190.483
28	708 420 030 003
	1 = 80 mm
29	522 080 839 058
30	+ 870.168
31	334.093
32	831.329
33	+ 120.552
34	161.144
35	522 080 132.183
36	522 980 636.243
37	120.229
38	410.481
39	318.171
40	314.166
41	632.147
42	120.217
43	522 980 049.810

1	2
	TAB.11
1	374 523 059 099
2	522 080 126 078
3	825.591
4	422.155
5	522 980 091.220
6	522 980 120.245
7	422.154
8	825.590
9	120.322
10	744.380
11	161.143
12	274.104
13	154.033
14	952.235
15	323 251 914 064
16	522 080 120 220
17	522 980 091.219
18	522 080 314.167
19	341 412 895 012
20	341 860 001 003
21	522 080 120.279
22	161.165
23	630.272
	TAB. 12
1	522 080 646.027
2	322 247
3	314.058
4	260.139
5	111.099
6	120.276
7	174.066

1	2
8	161.229
9	413.328
10	126.101
11	633.194
12	952.251
13	120.217
14	522 080 825.858
15	825.857
16	522 980 035.505
17	522 080 613.472
18	311 515 002 000
19	839.010
20	120.218
21	192.061
22	120.543
23	123.130
24	954.045
25	310.190
26	647.223
27	190.353
28	120.219
29	522 080 274 050
	TAB. 13
1	522 080 424.051
2	283 366 002 000 ø 3,5/4,8 x 100
3	708 420 030 002 1 = 140 mm
4	522 080 120.233
5	522 980 020.318.10
6	522 080 951.327
7	708 420 030 003 1 = 50 mm

1	2
8	522 080 120.235
9	522 980 035.437
10	[illegible]
11	522 080 413.[illegible]
12	413.314
13	161.233
14	120.291
15	425 111 009 000
16	522 080 320 255
17	324 311 010 000
18	522 080 436 000
19	[illegible].027
20	410.559
21	+ 112.013
22	111.253
23	708 420 030 003 1 = 20 mm
24	522 980 021.318
25	522 080 318.192
26	810.419
27	120.261
28	318.191
29	120.289
30	141.223
31	273 111 007 000
32	522 080 338 187
33	636.251
34	708 420 030 002 1 = 40 mm
35	522 080 190.[illegible]
36	335.165
37	120.221
38	283 366 002 000 ø 3,5/4,8 x 210
39	708 420 030 002 1 = 270 mm

1	2
40	522 080 335.101
41	131.391
42	152.099
43	646.027
44	334.097
45	322.247
46	161.237
47	190.359
48	273 111 001 000
49	522 080 422 184
50	522 080 163.093
51	612.342
52	112.101

TAB. 14

1	2
1	522 080 623.249
2	326.191
3	283.152
4	113.122
5	113.123
6	945.317
7	120.543
8	274.084
9	522 080 829.963
10	136.023
11	615.024
12	421.330
13	+ 112.014
14	392.114
15	190.554
16	+ 120.239
17	+ 522 980 031.585
18	522 080 314.150
19	311 732 910 060
20	522 080 120.225
21	120.037
22	635.152
23	190.369
24	120.410
25	264.288
26	328.175
27	192.060
28	522 980 049.857
29	522 080 383.178
30	174.069
31	522 080 141.114
32	190.347
33	522 980 048.899
34	522 080 126.096
35	814.014
36	120.217
37	436.331
38	120.050
39	271.201
40	646.136
41	120.221
42	633.196
43	271.337
44	190.346

TAB. 15

1	2
1	522 080 141.133
2	613.495
3	124.050
4	410.532
5	345.067
6	120.229
7	613.216
8	436.000
9	112.013
10	413.252
11	425 111 041 000
12	708 420 030 002
	1 = 160 mm
13	522 080 338 069
14	274.083
15	120.216
16	+ 121.157
17	+ 870.143
18	331.154
19	522 980 049.856
20	522 080 120.225
21	190.358
22	814.374
23	111.227
24	123.159
25	624.014
26	260.124
27	436.306
28	120.296
29	708 420 030 002
	1 = 220 mm
30	522 080 630.248
31	708 420 030 002
	1 = 350 mm
32	522 080 344.035
33	522 980 044.045
34	522 080 412.193
35	425 111 061 000
36	708 420 030 002
	1 = 60 mm
37	522 080 318.144
38	+ 651.436

	2	1	2	1	2
39	622.091	16	337.[illegible]	16	[illegible]
40	612.109	17	340.[illegible]	17	311 [illegible]
41	522 980 044.813	18	260.[illegible]	18	[illegible]
42	522 080 613.485	19	314.[illegible]	19	[illegible]
43	345.065	20	613.[illegible]	20	[illegible]
44	708 420 030 002	21	522 980 044.[illegible]	21	[illegible]
	1 = 120 mm	22	522 080 120.221	22	[illegible]
45	522 080 413.251			23	[illegible]
46	613.195			24	[illegible]
47	413.252			25	522 080 [illegible]
48	120.231			26	[illegible]
49	613.152			27	[illegible]
50	708 420 030 003				
	1 = 60 mm				TAB. 16
51	522 080 344.035		TAB. 17		202
			201		522 791 [illegible]
			522 792 112 [illegible]		
	TAB. 16				
				1	522 [illegible]
1	522 080 161.142	1	522 080 112.[illegible]	2	[illegible]
2	192.061	2	522 980 [illegible]	3	[illegible]
3	441.187	3	522 080 [illegible]	4	[illegible]
4	522 980 049.785	4	522 980 [illegible]	5	[illegible]
5	522 080 613.328	5	522 080 [illegible]	6	[illegible]
6	120.246	6	[illegible]	7	[illegible]
7	342.258	7	[illegible]		[illegible]
8	311 728 502 537	8	[illegible]		
9	522 080 233.029	9	[illegible]		
10	+ 112.013	10	[illegible]		
11	311 515 003 012	11	522 [illegible]		
12	627.023	12	522 [illegible]		
13	141.102	13	[illegible]		
14	522 980 020.318.10	14	[illegible]		
15	522 080 120.227	15	[illegible]		

1	2	1	2	1	2
	TAB. 19				
	207				
	522 792 995 032				
1	522 080 831.443				
	TAB. 19				
	295				
	522 792 995 014				
1	522 080 814.355				
	TAB. 19				
	250				
	522 791 995 068				
1	522 080 316.038				
2	632.019				
3	161.143				
4	613.508				
5	613.328				
6	120.246				
7	342.258				
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9	522 080 161.140				
10	112.013				
11	120.230				

B

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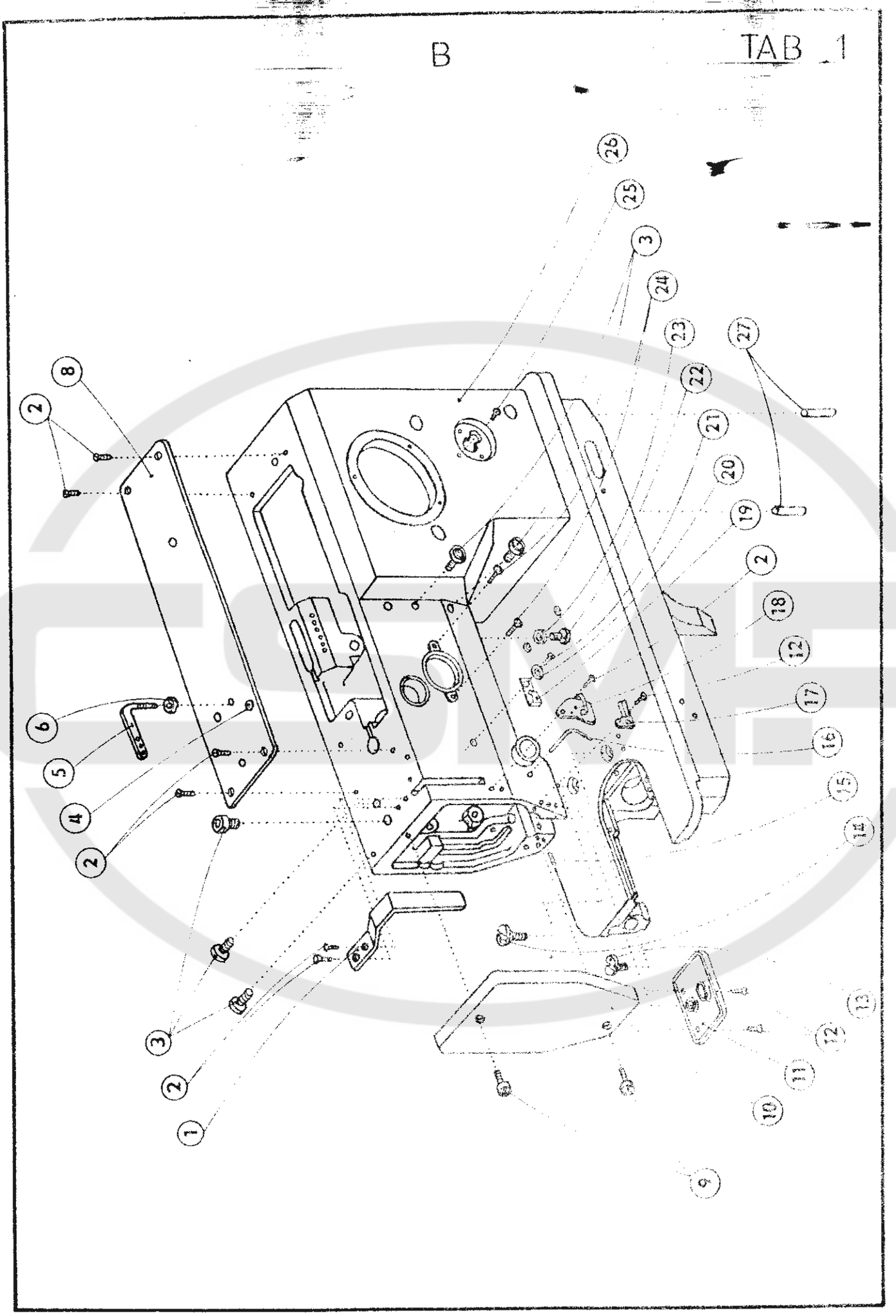
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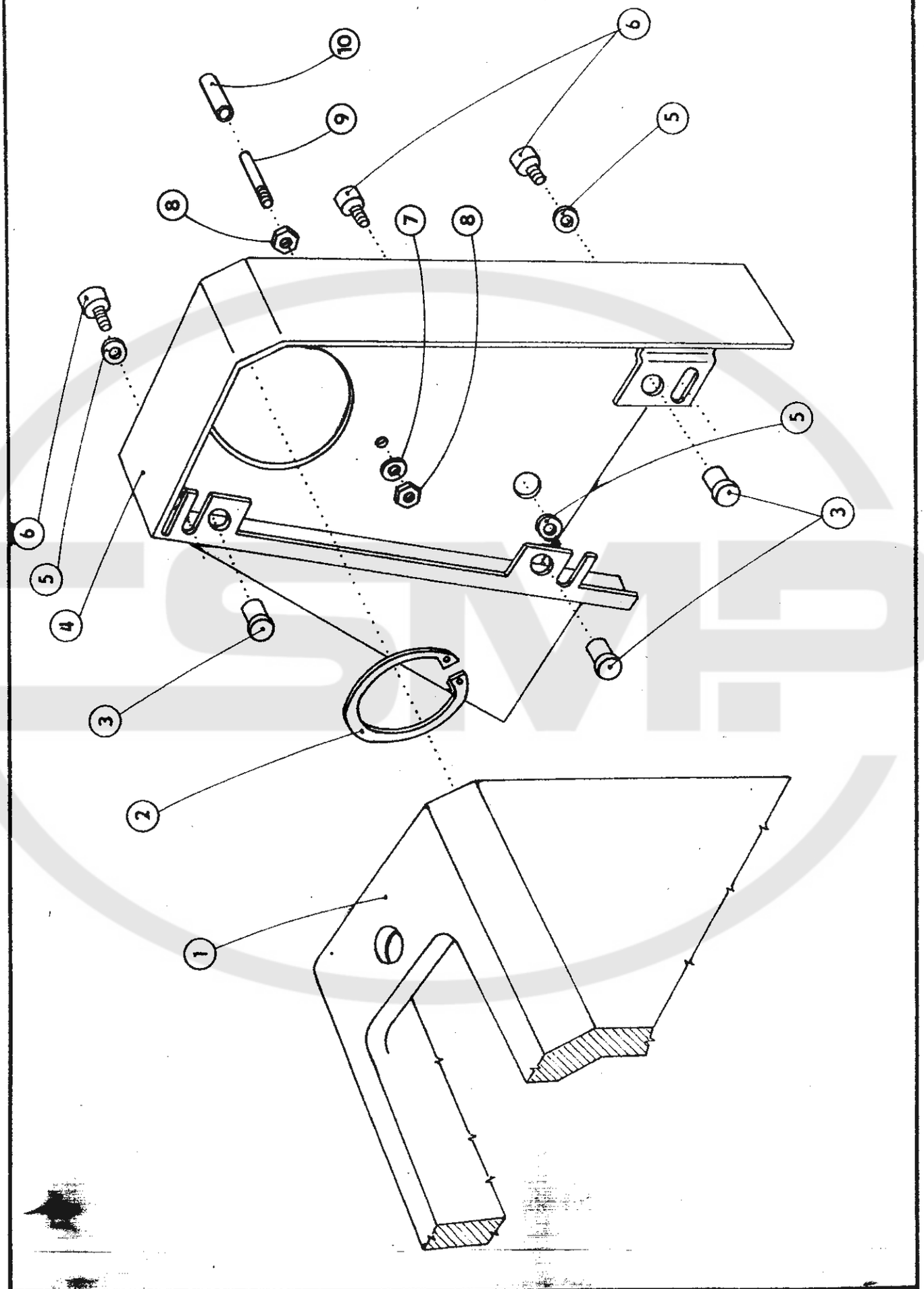
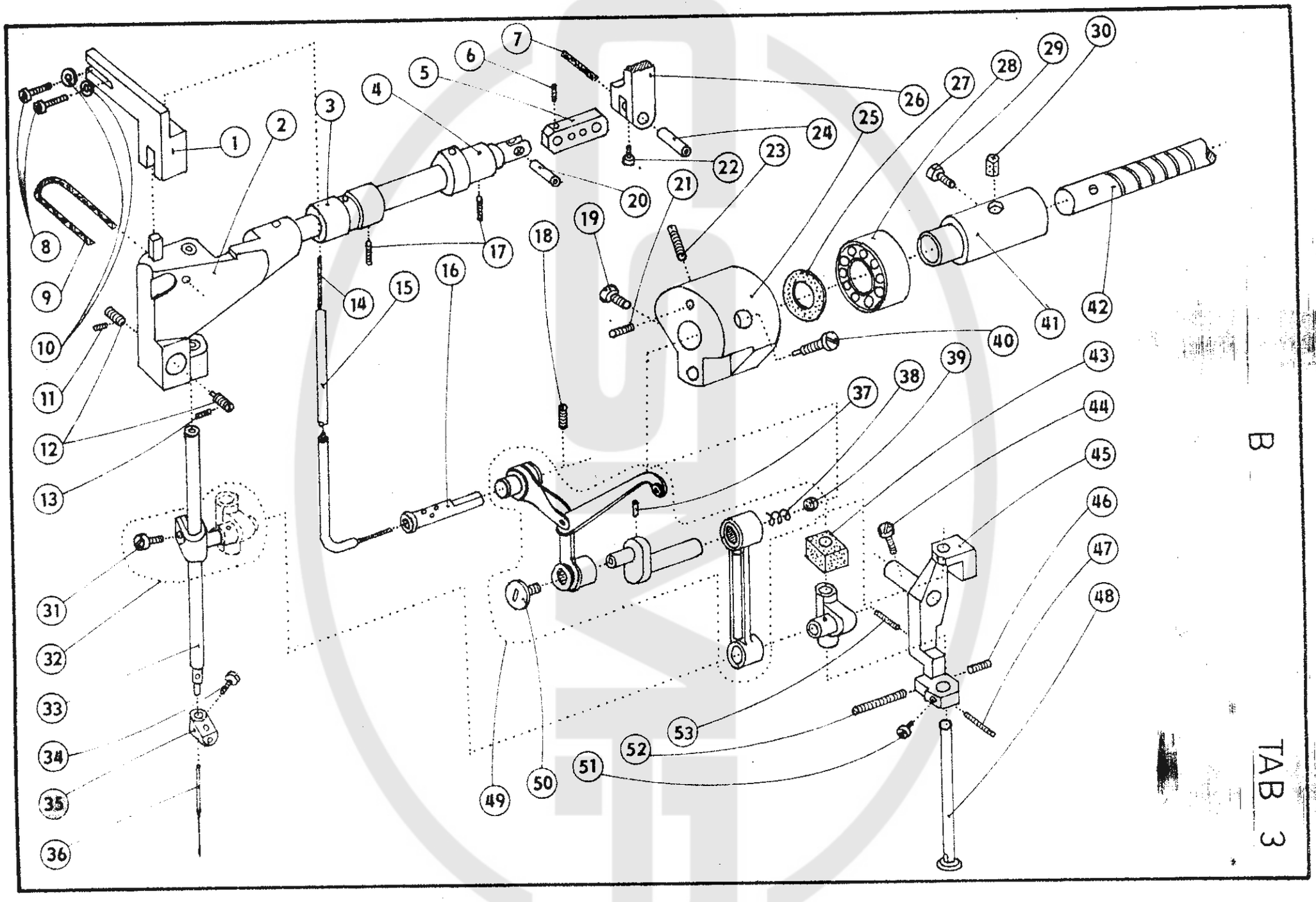
TAB 2

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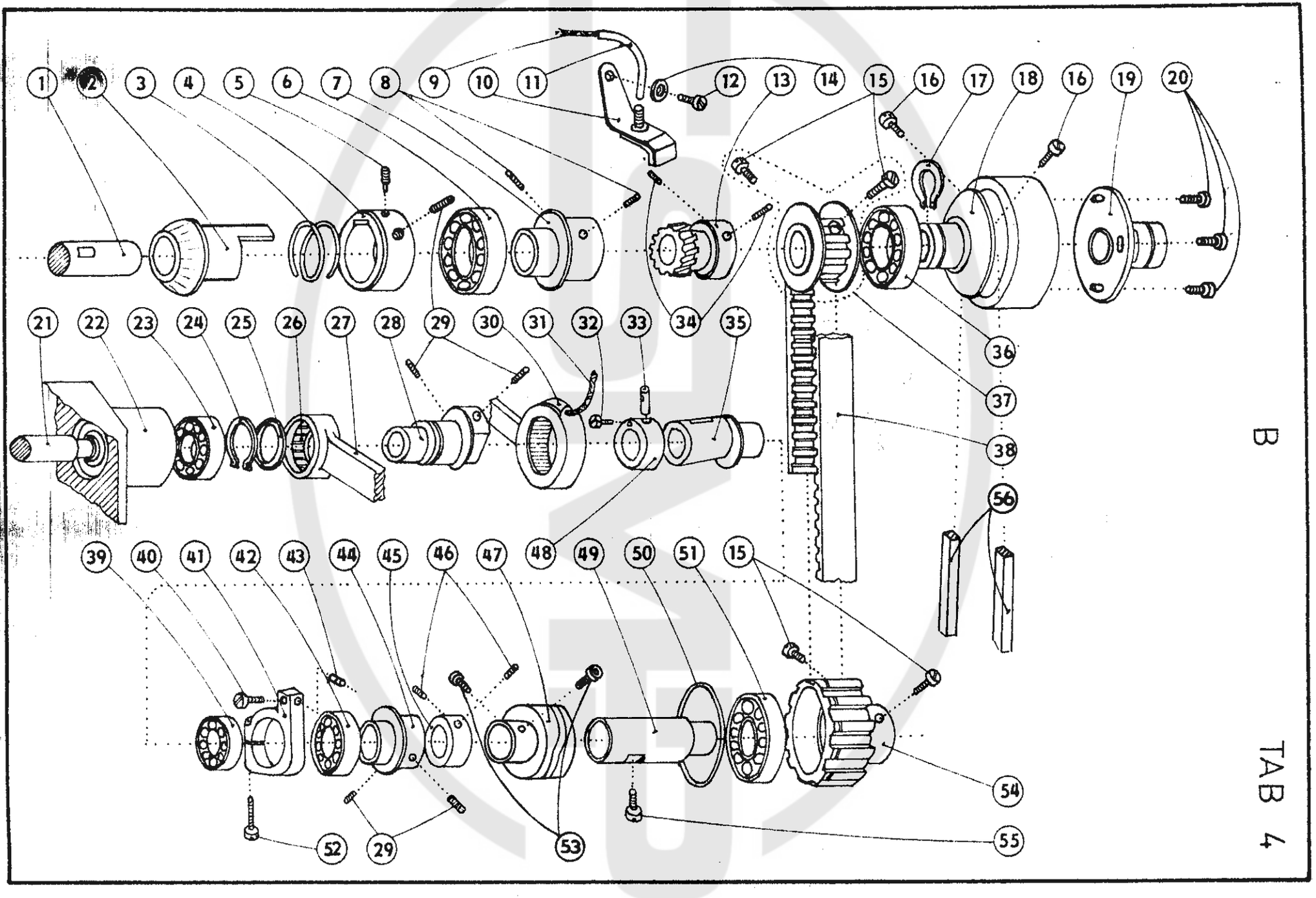
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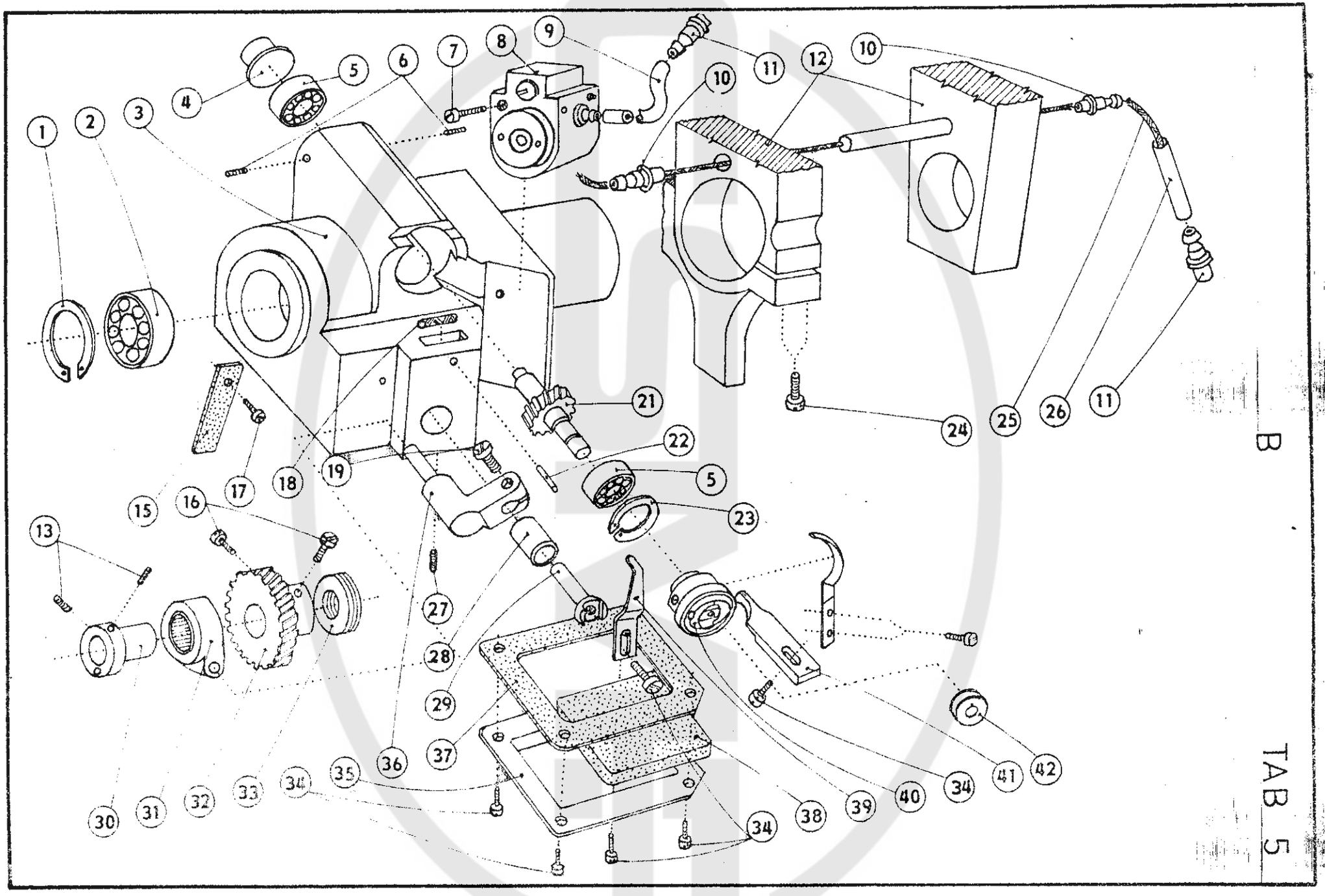
TAB 4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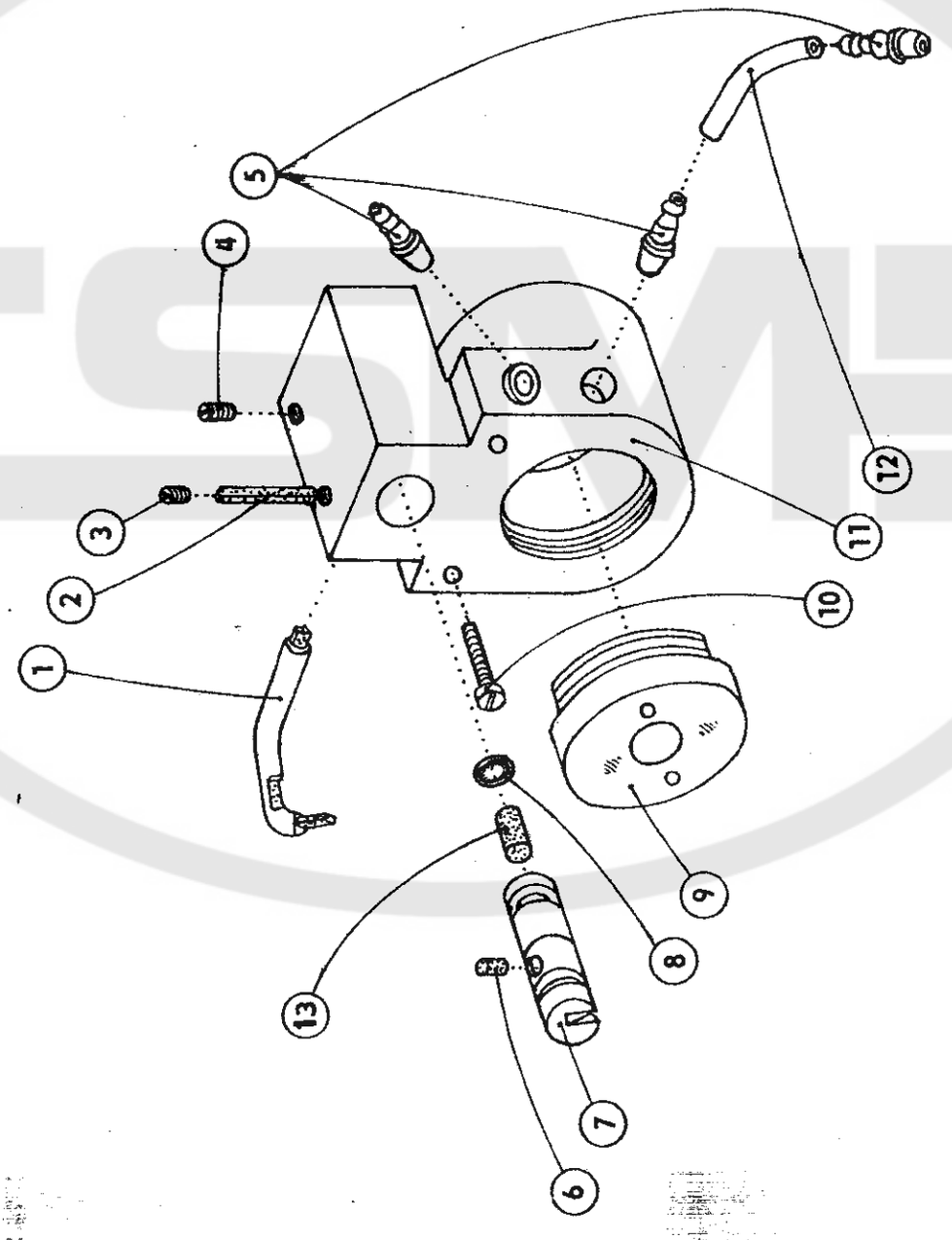
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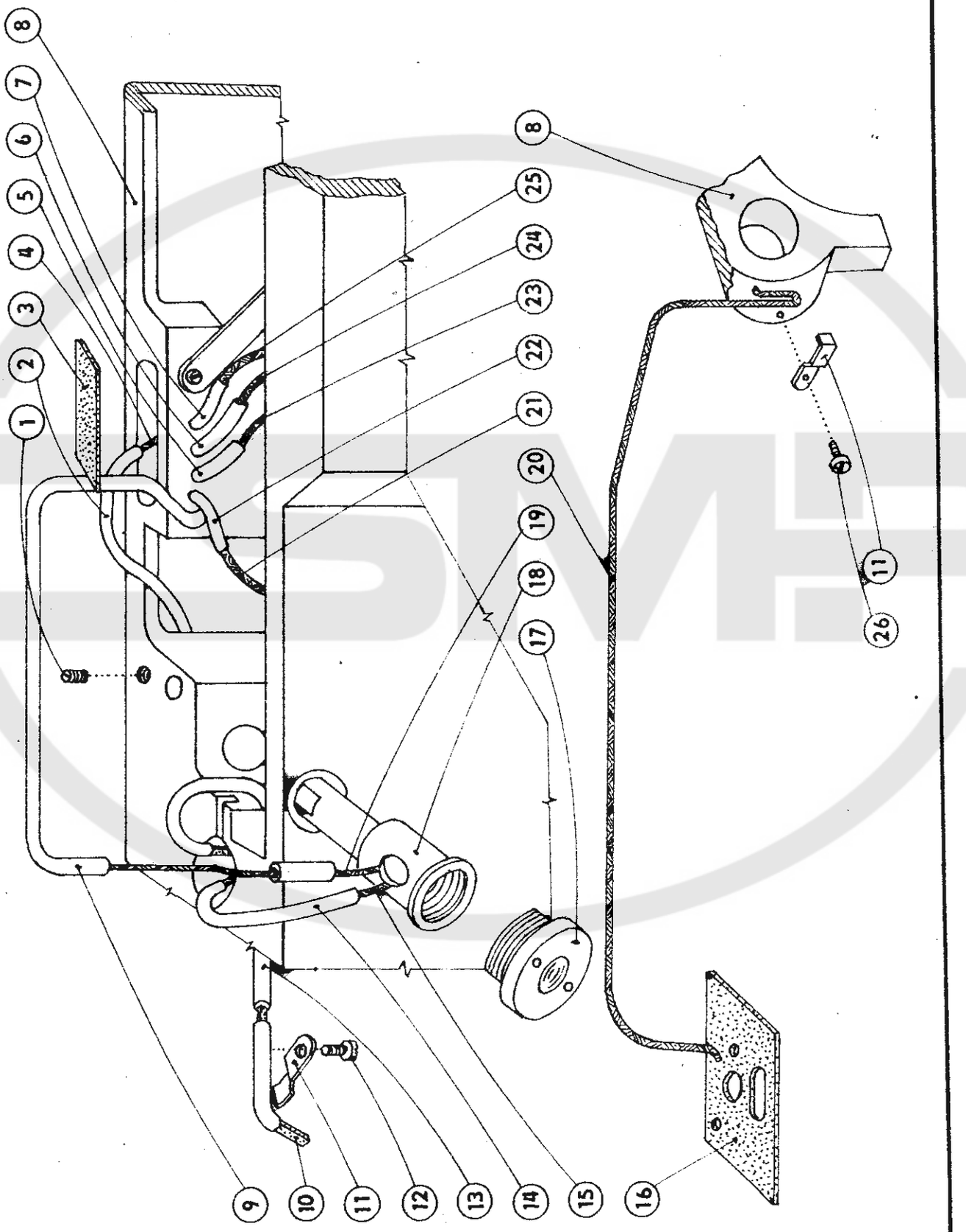
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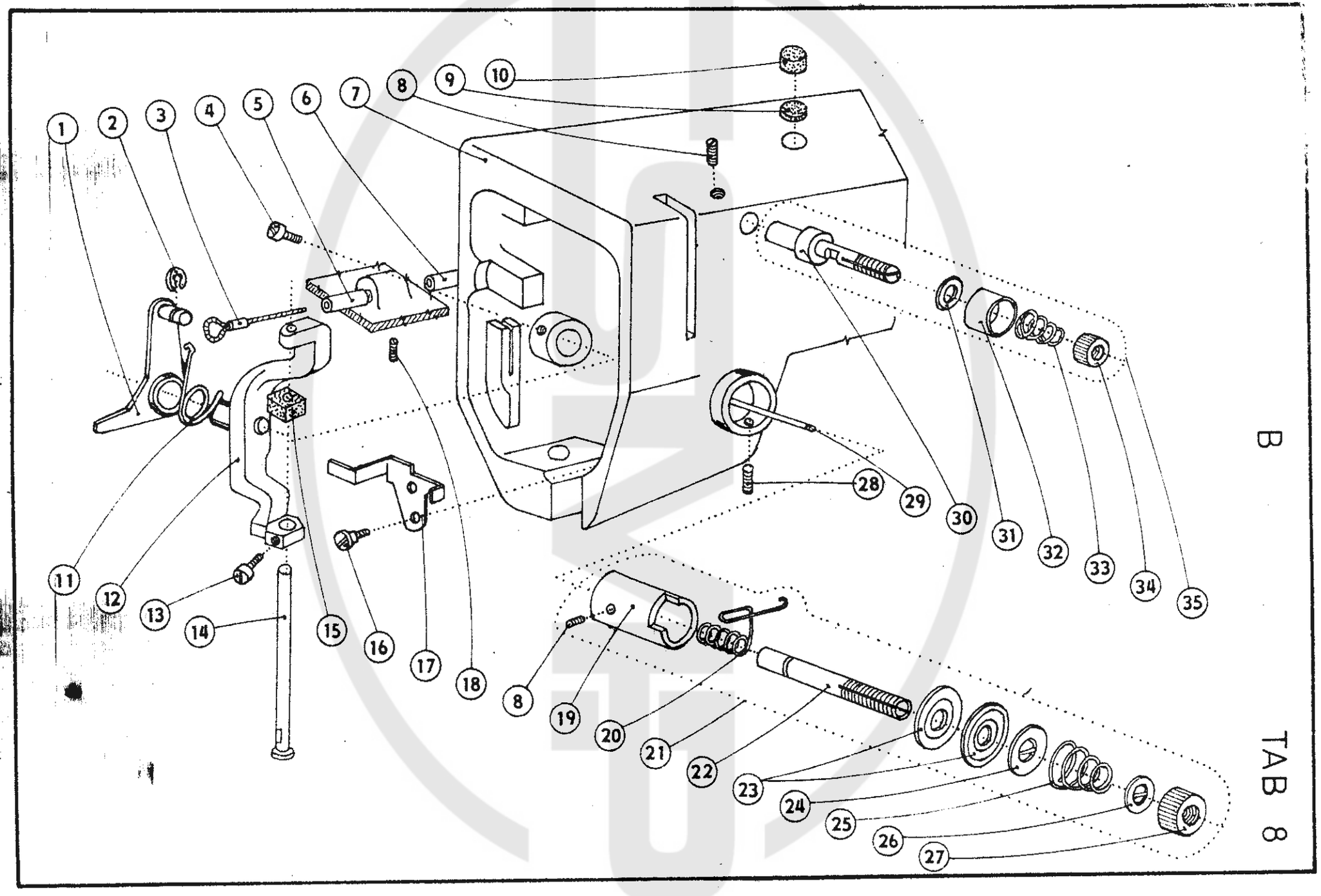
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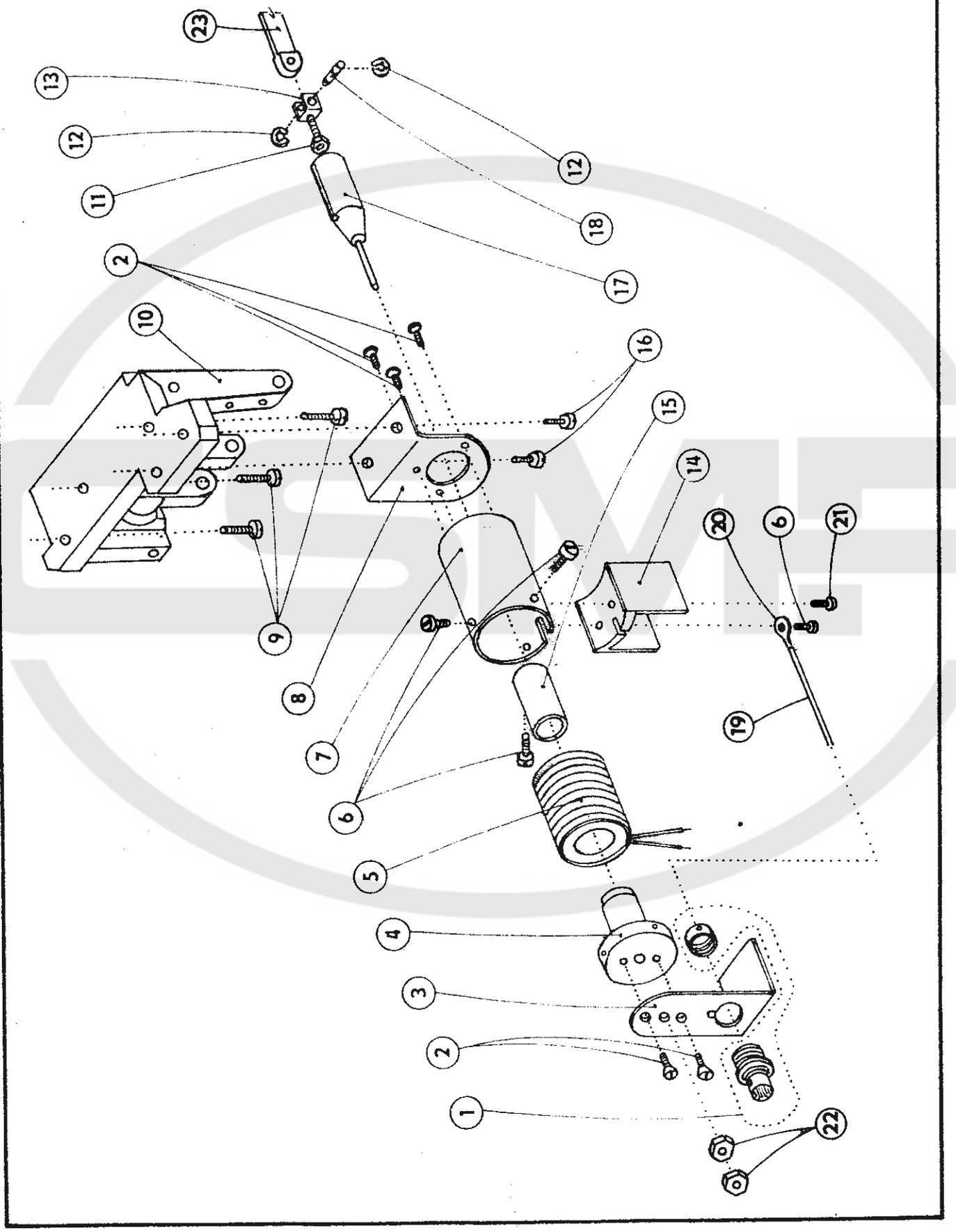
TAB 8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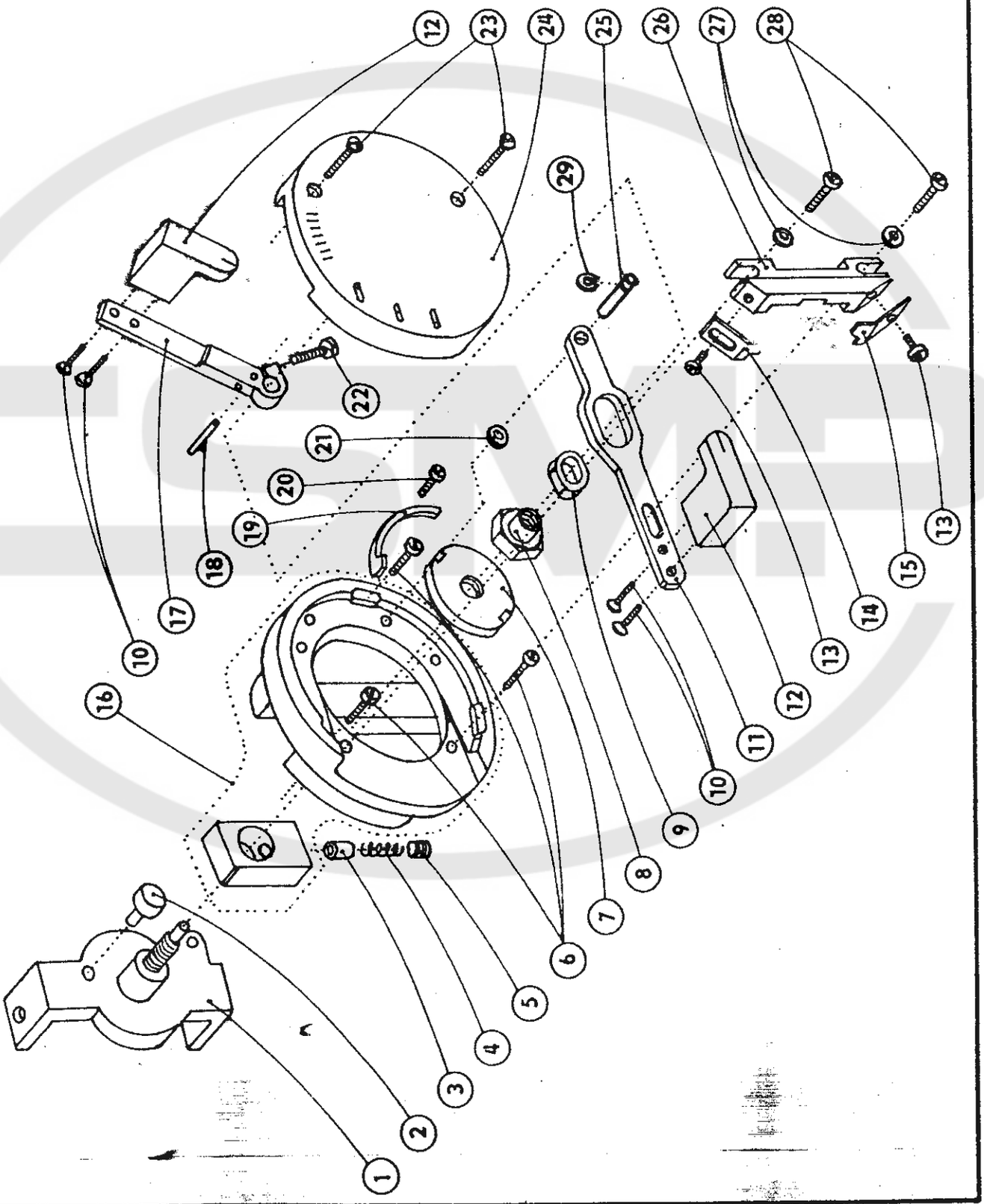
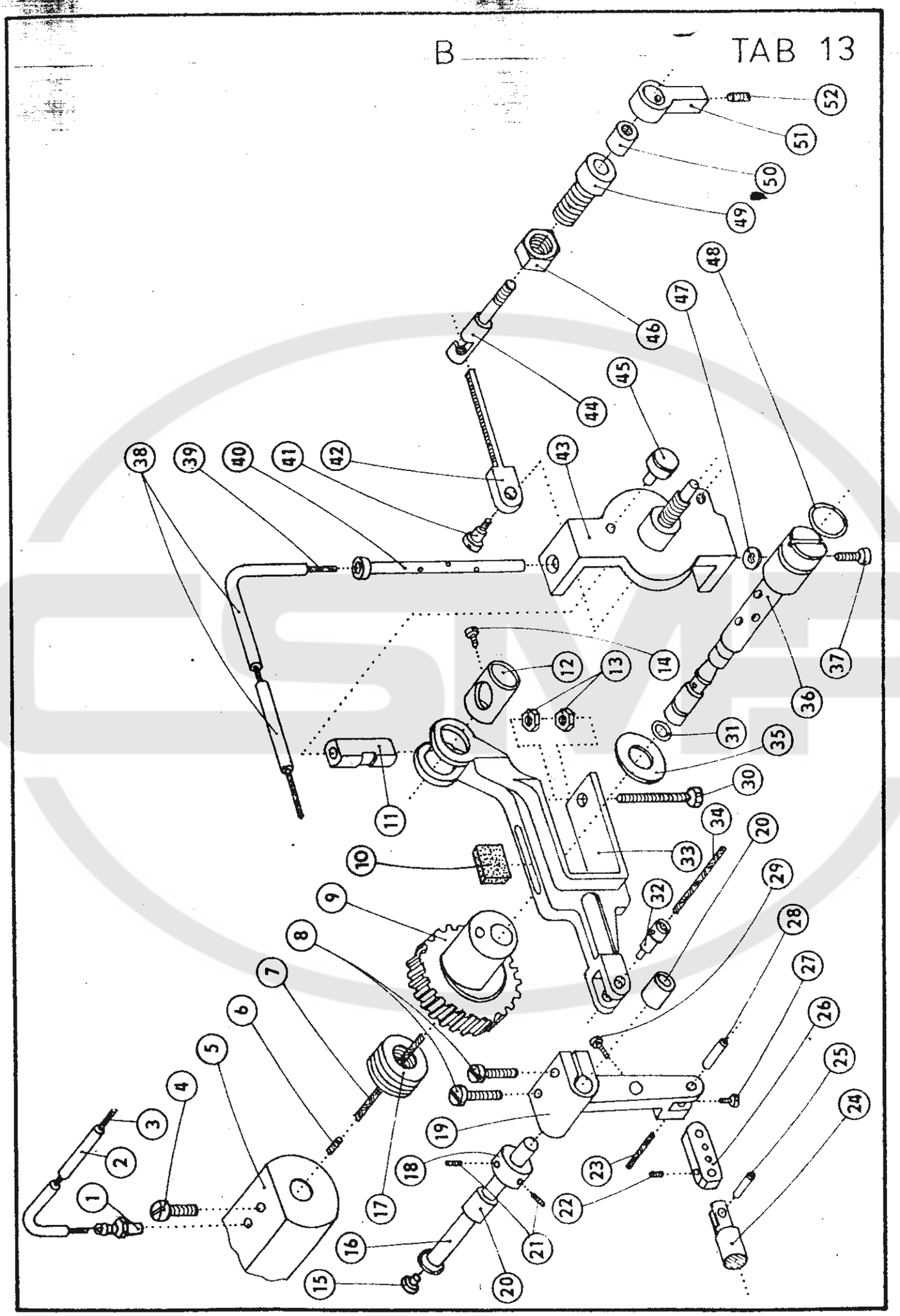
TAB 12

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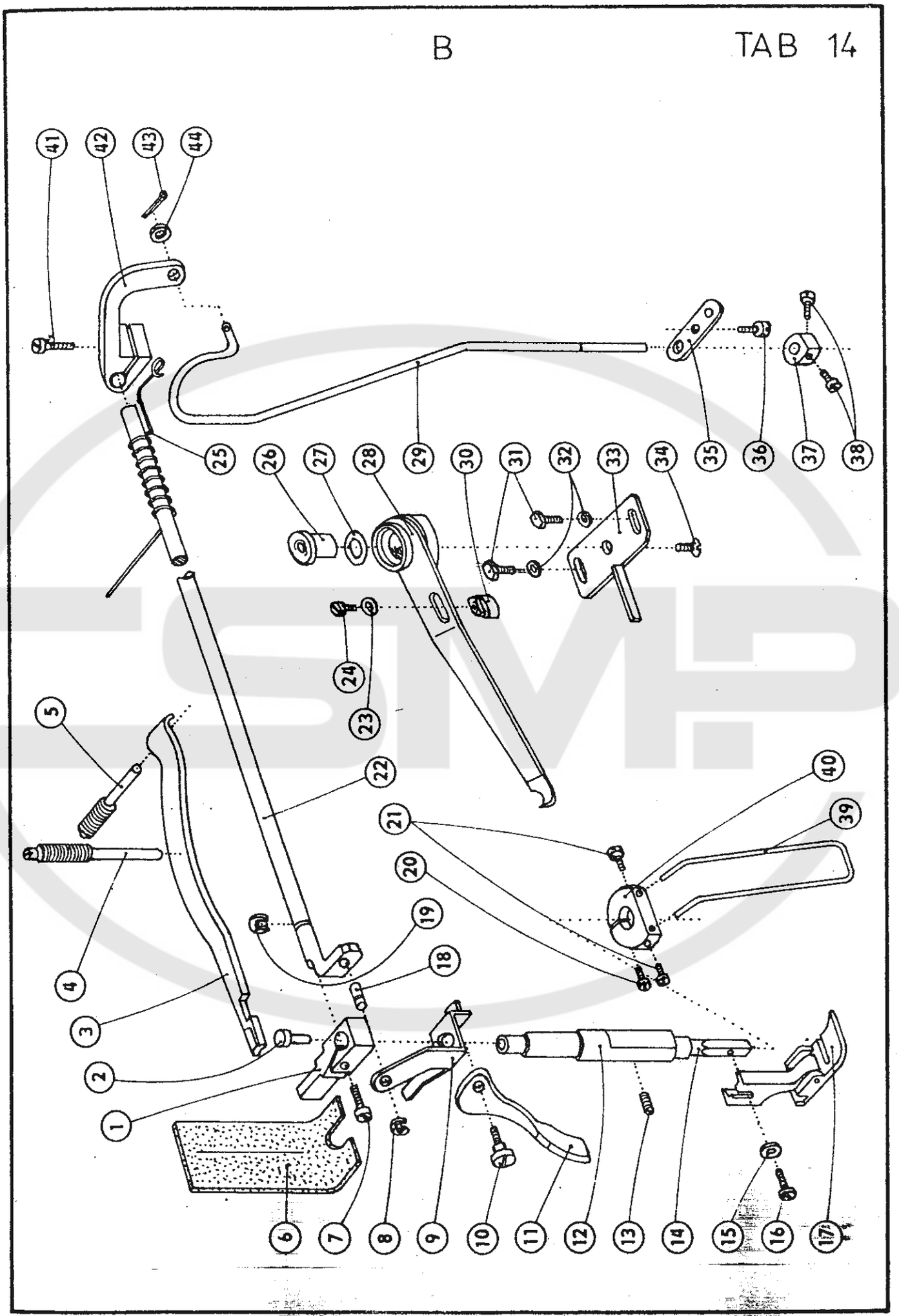
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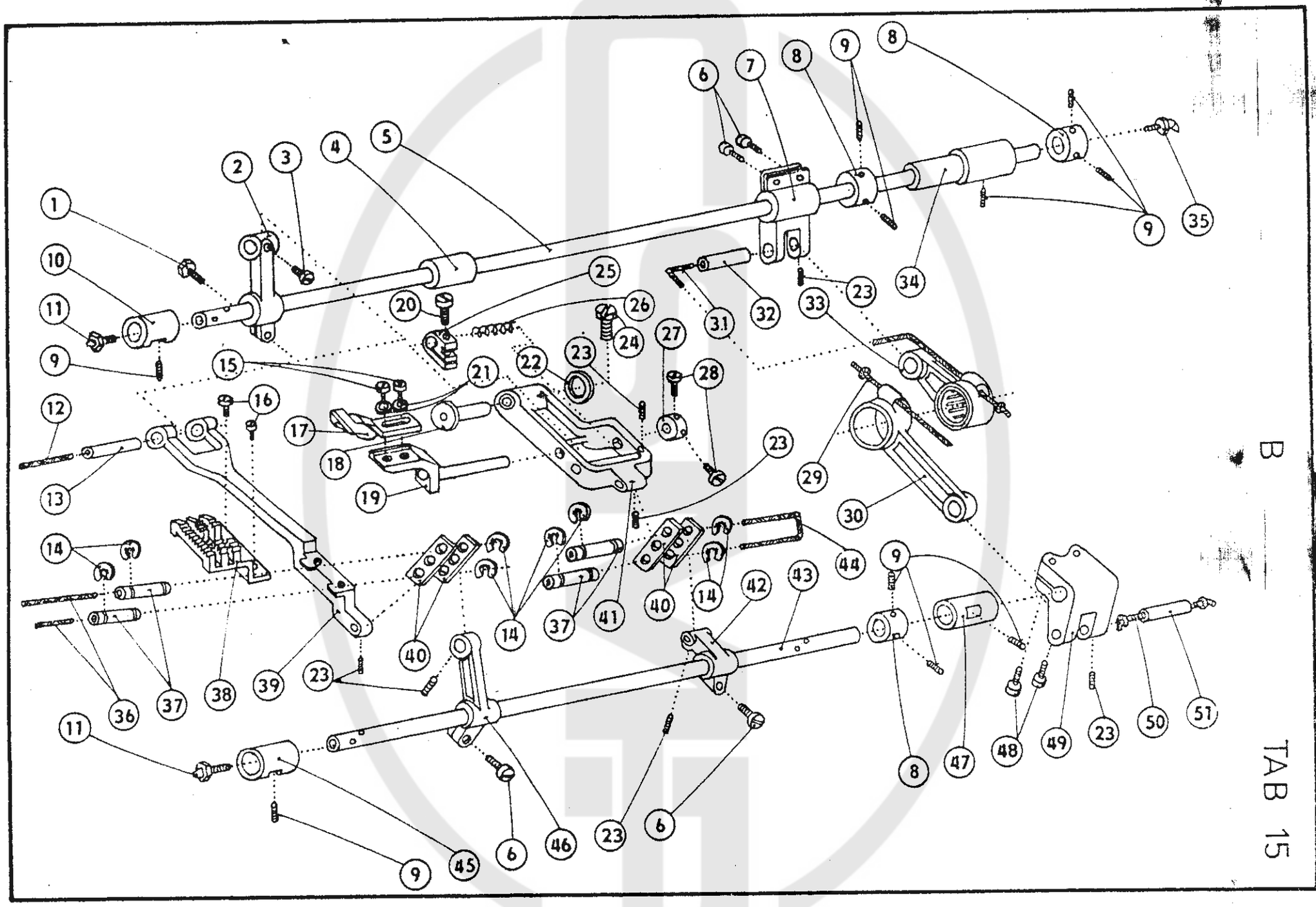
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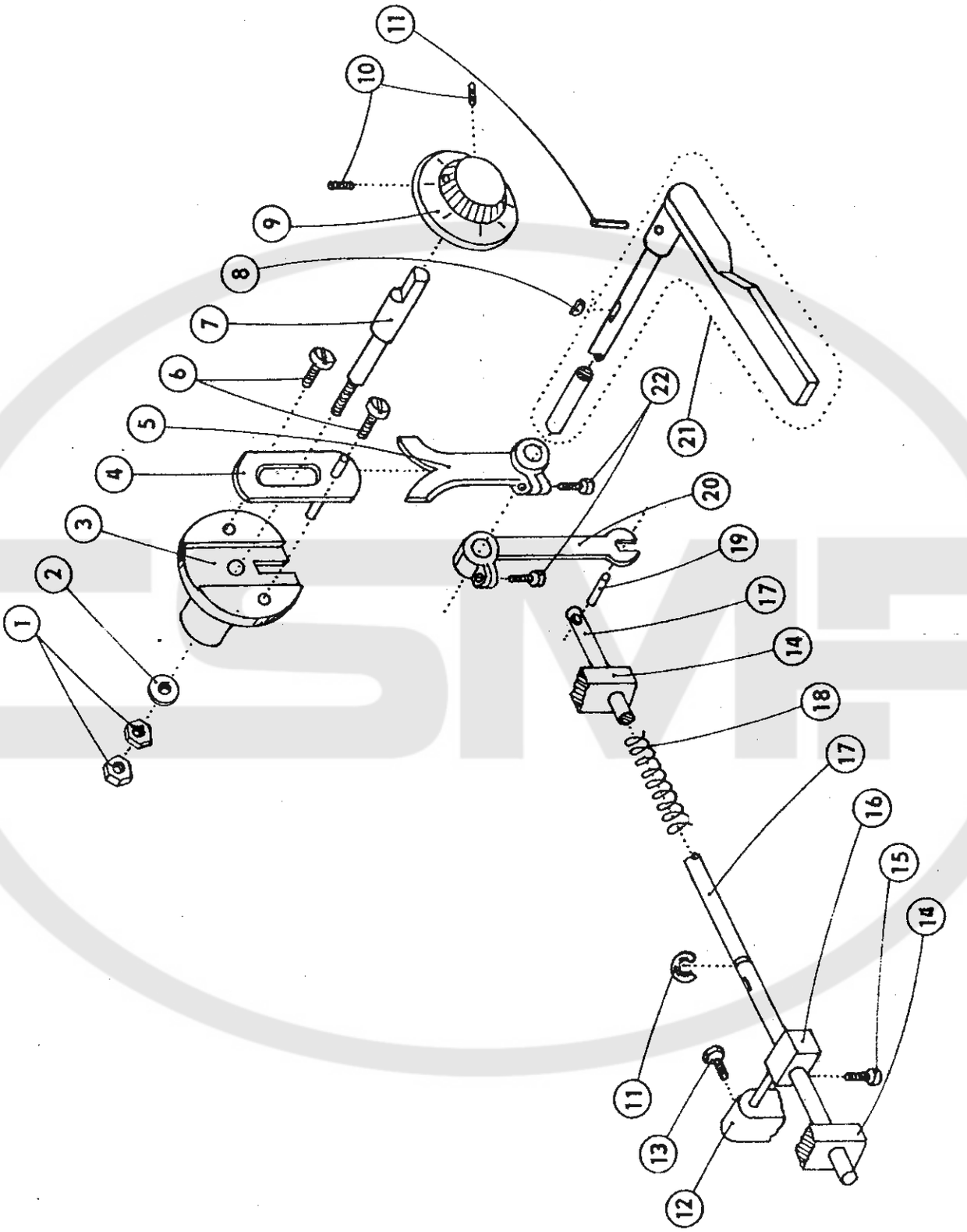
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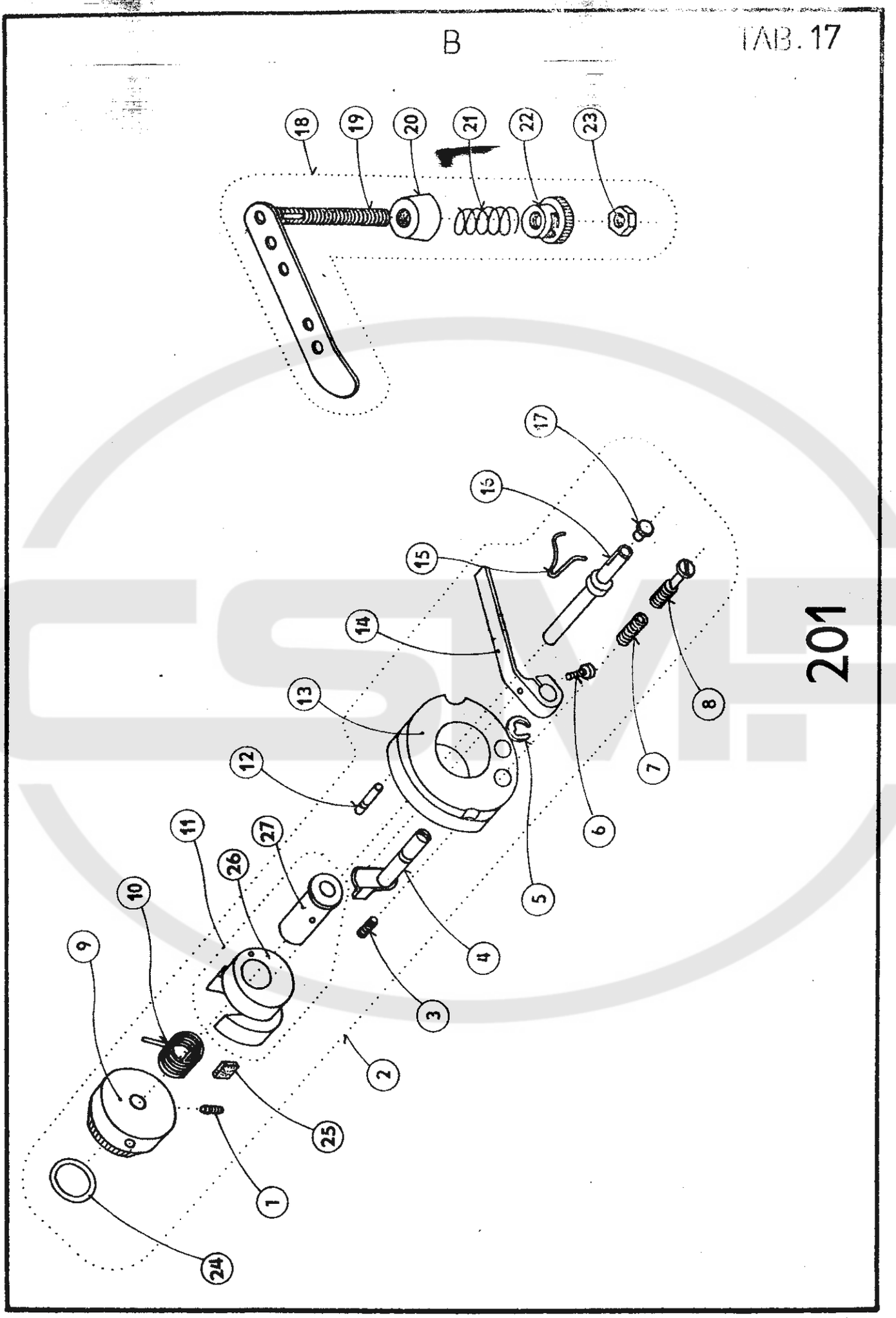
TAB. 17



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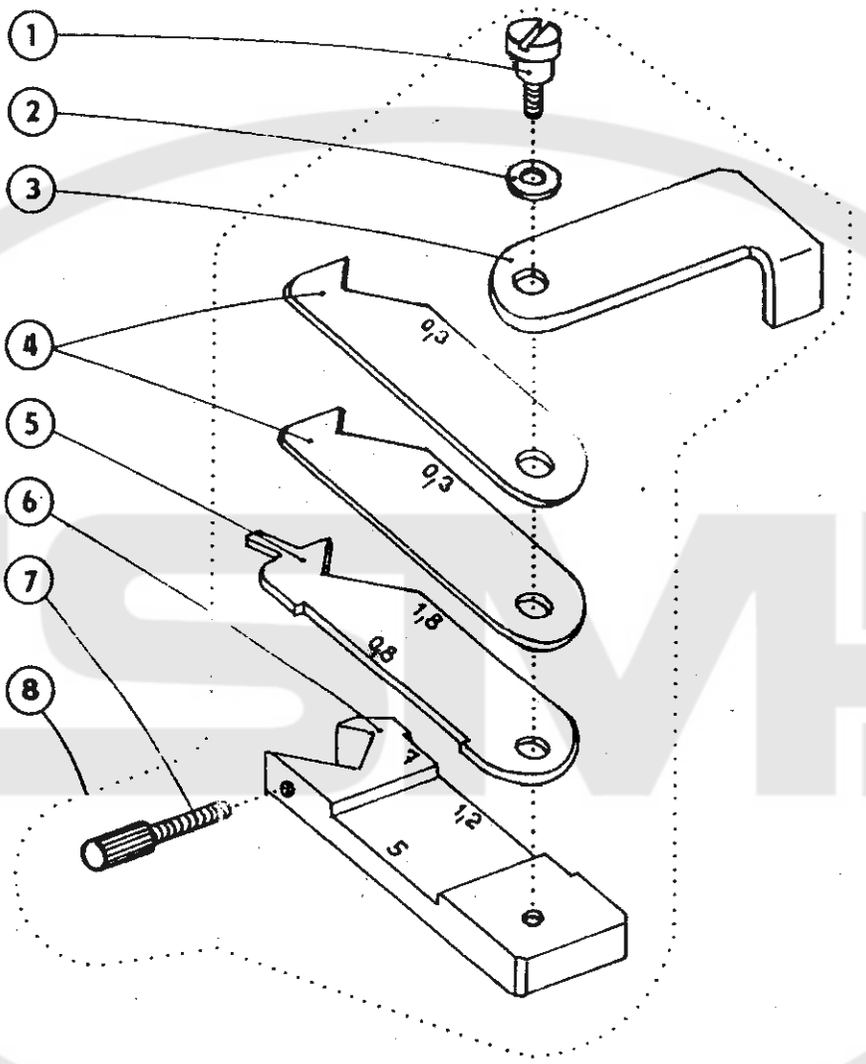

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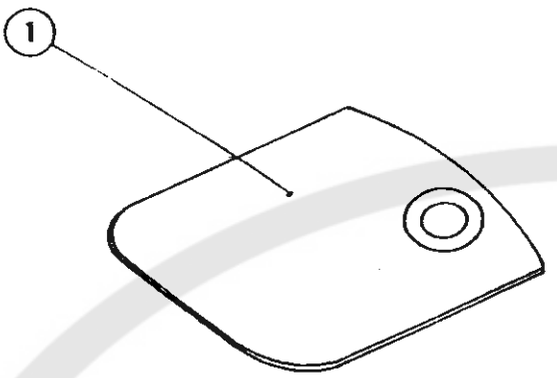

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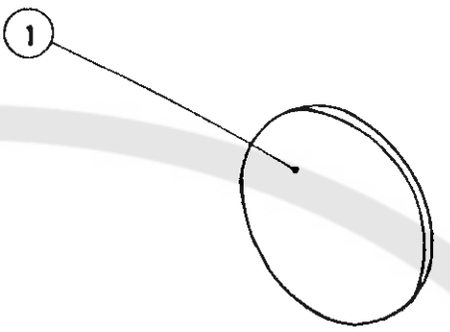

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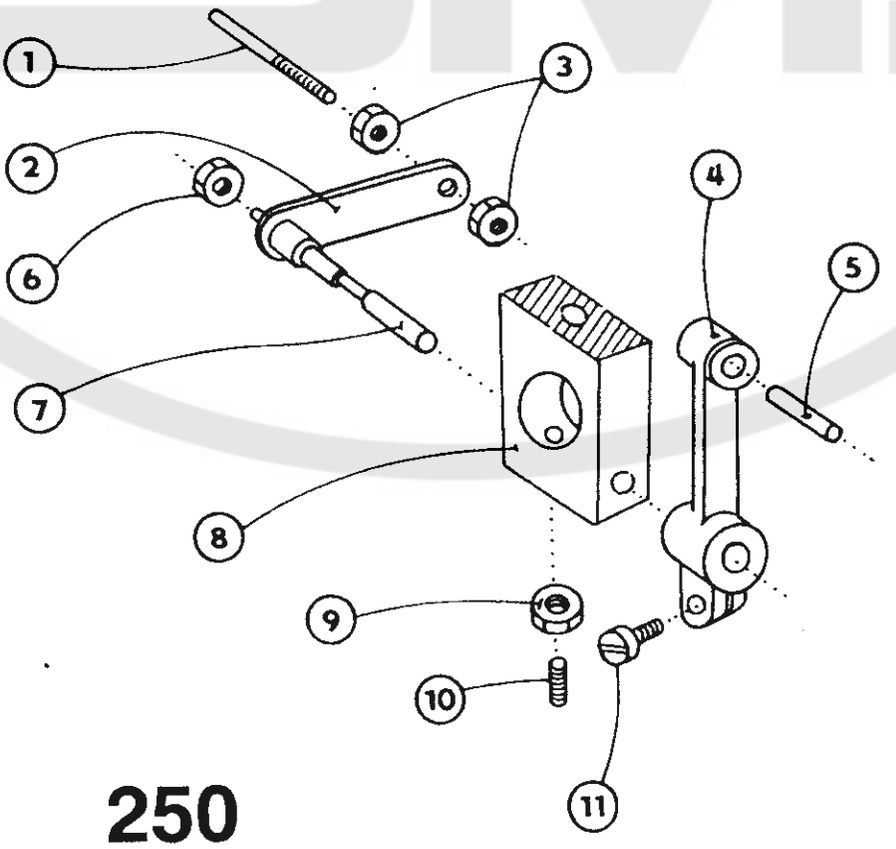

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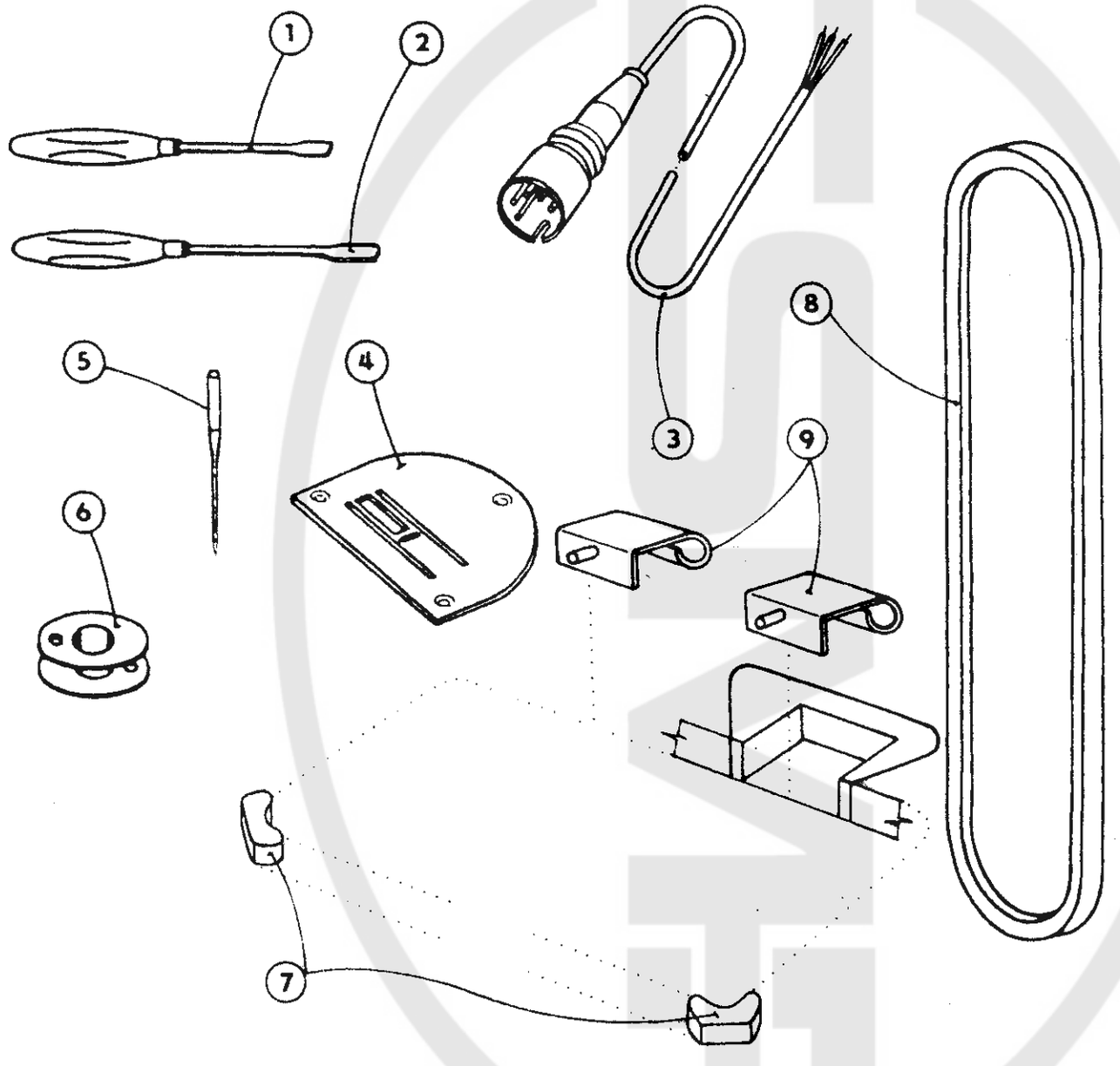
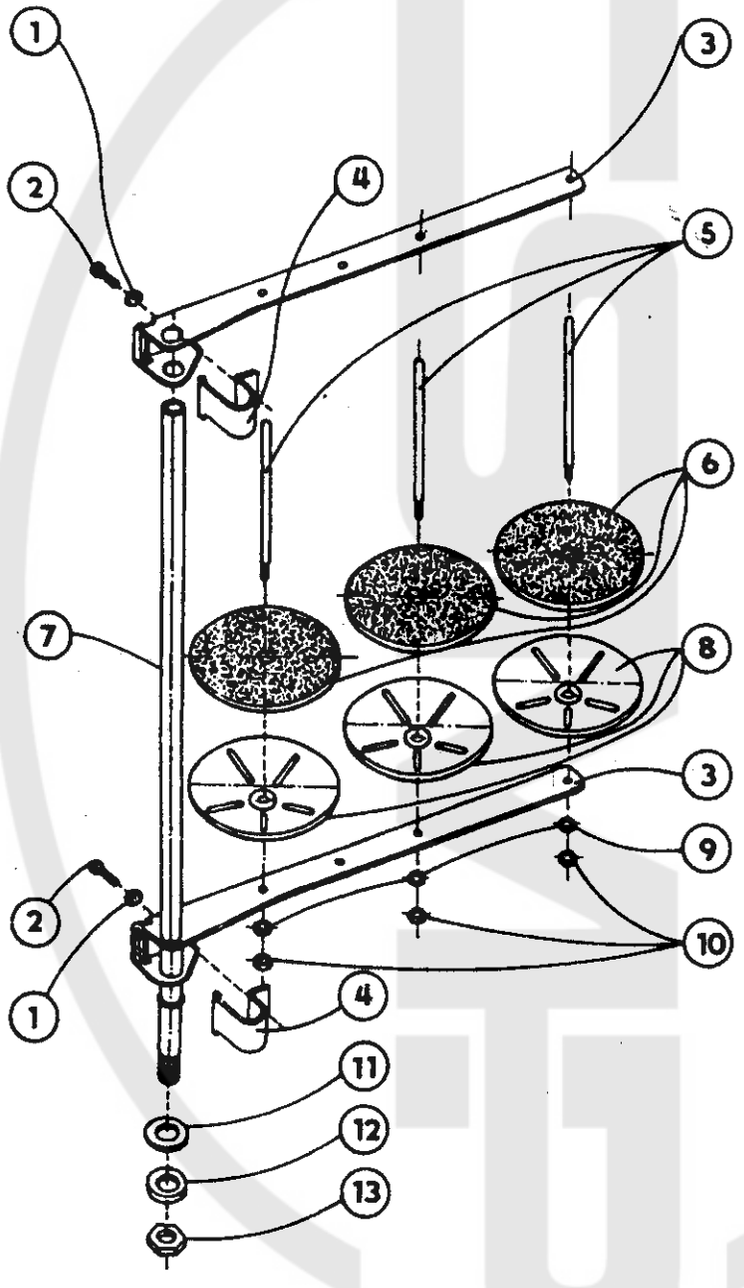
522 980 099 053

ACCESSORIES



522 980 099 053 **1**

1	413 621 731 023	
2	413 624 310 002	
3	522 980 091 880	
4	522 080 811 618	
5	548 300 000 110	10 x
6	522 080 685 01[illegible]	5 x
7	273 141 940 141	2 x
8	272 711 222 000 10 x 1120 mm	
9	549 458 100 000	2 x



522 980 099 053 **2**

1	523 081	200 025
2	522 080	120 283
3	522 080	826 162
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5	522 080	313 277
6	522 080	953 042
7	522 980	044 970
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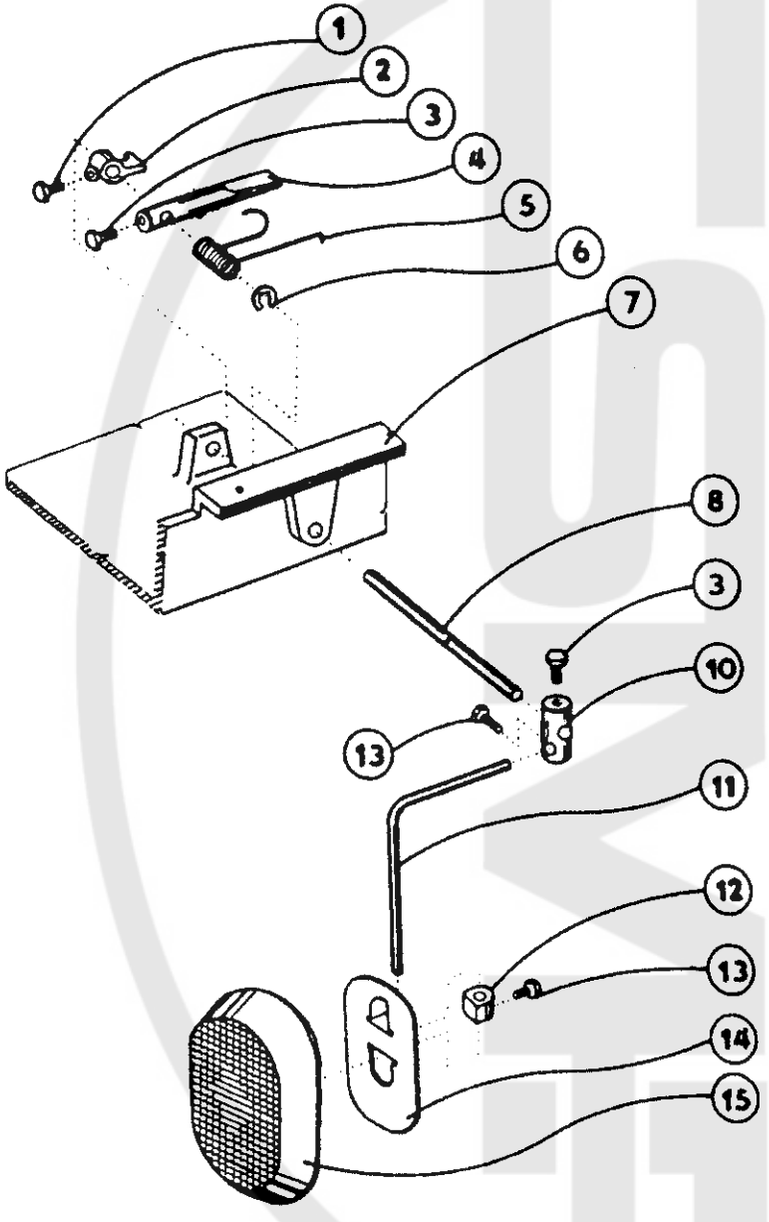
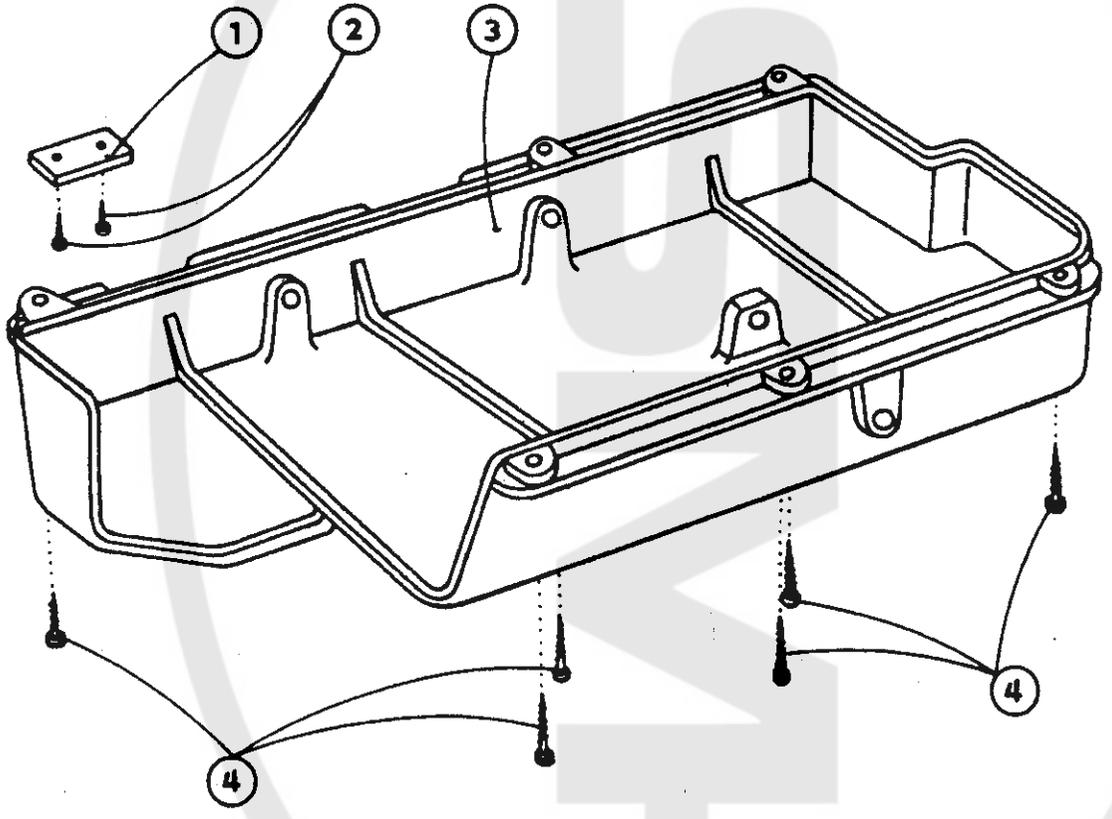


1	522 080 141 141
2	522 080 625 022
3	522 080 141 121
4	522 080 384 052
5	522 080 264 168
6	311 732 910 070
7	522 080 725 050
8	522 080 314 065
10	522 080 318 069
11	522 080 383 022
12	522 080 436 271
13	522 080 141 112
14	522 080 827 173
15	522 080 941 076

522 980 099 053 4



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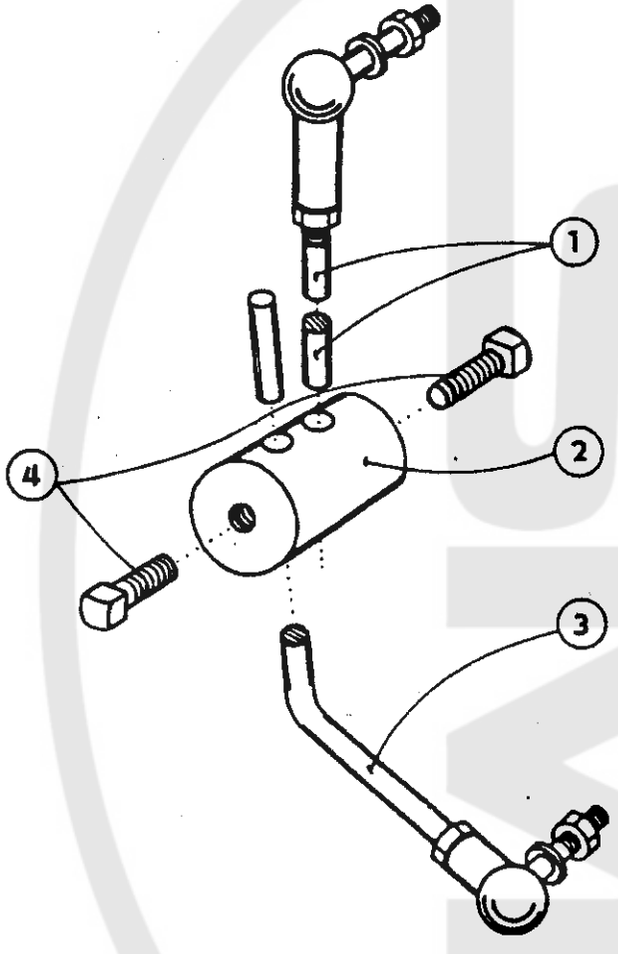
3	522 080 725 050
4	522 080 225 031



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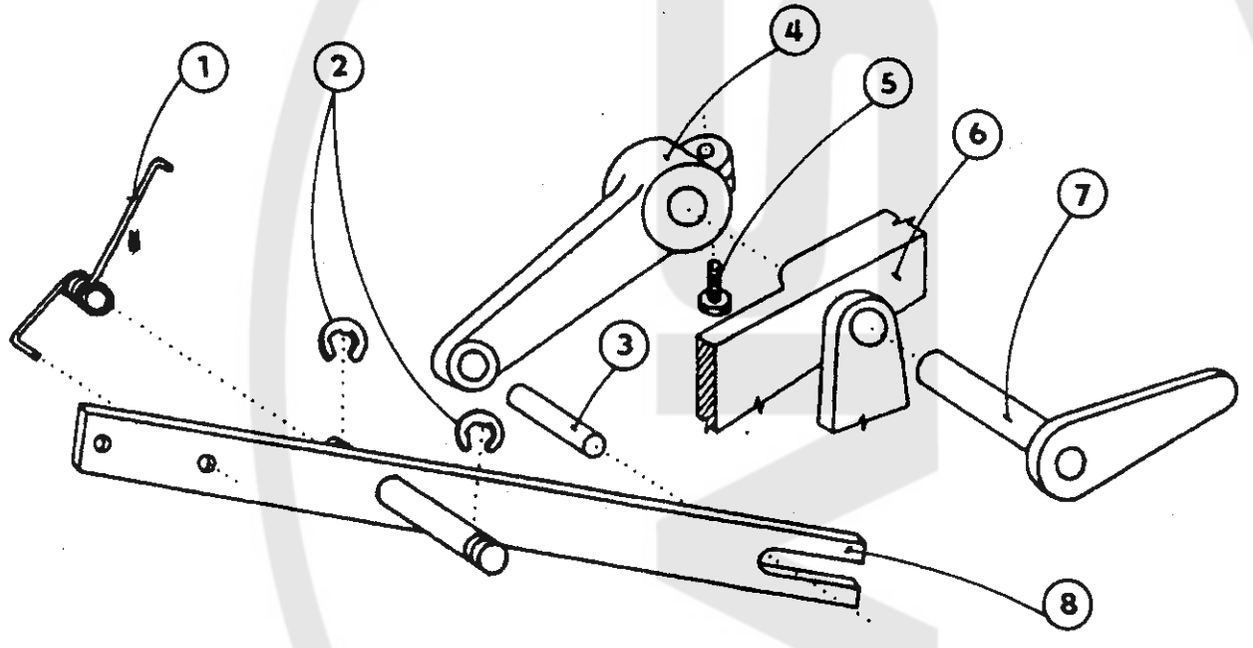
3	522 980 044 761
4	522 080 144 035

522 980 099 053 **6**



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2	311 732 910 070
3	311 515 006 016
4	522 080 613 480
5	522 080 141 109
6	522 080 725 050
7	522 980 044 142
8	522 980 049 109