(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 057 078**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **82300253.0**

(22) Date of filing: **19.01.82**

(51) Int. Cl.³: **B 41 F 27/12**
B 41 L 29/12

(30) Priority: **23.01.81 GB 8102041**

(43) Date of publication of application:
04.08.82 Bulletin 82/31

(84) Designated Contracting States:
AT DE GB IT NL

(71) Applicant: **AUTO-MASTERS LIMITED**
Manchester Road
Hyde Cheshire, SK14 2BP(GB)

(72) Inventor: **Davies, Kevin Graham**
47 Ladysmith Road
Ashton-under-Lyne Lancashire(GB)

(72) Inventor: **Marsh, John Richard**
6, The Ceal Compstall
Marple Bridge Cheshire(GB)

(74) Representative: **Mock, Hans et al,**
MARKS & CLERK Scottish Life House Bridge Street
Manchester M3 3DP(GB)

(54) **A mechanism for securing a printing plate to a printing cylinder.**

(57) In apparatus for securing a flexible printing plate to a printing cylinder a locking element engages the controlling edge of a flexible printing plate and is pivotal in use between a locking position in which the printing plate is tensioned and a release position in which the printing plate can be fitted or removed. Biasing means is provided with over-centre action spring means for urging the body into the locking position and the release position depending upon the position of the locking member.

EP 0 057 078 A2

COMPLETE DOCUMENT ./...

Croydon Printing Company Ltd

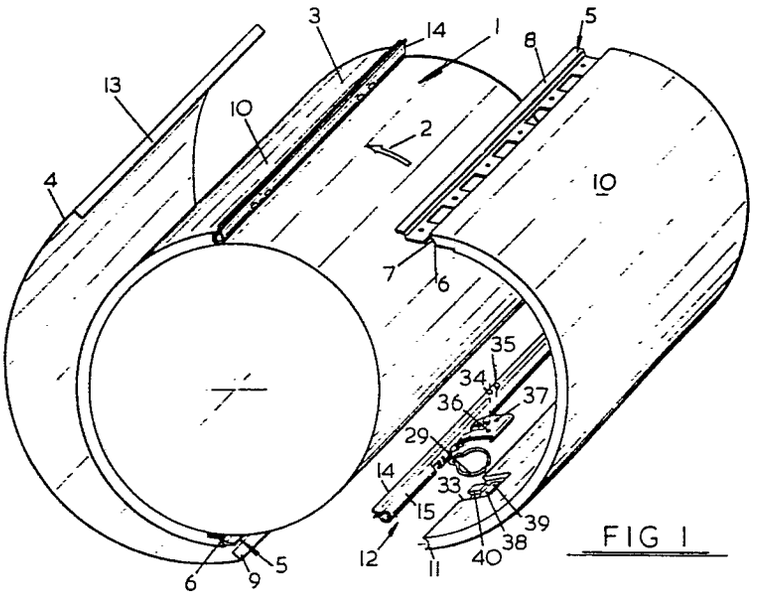

FIG 1

The present invention relates to a mechanism for securing a flexible printing plate to a printing cylinder.

Conventionally, such printing plates are made of thin aluminium or mild steel sheets and attached either directly to a shim of a printing cylinder or to a saddle which is itself attached to the cylinder. Normally two plates are attached around the circumference of a cylinder and the securement mechanism therefor comprises a simple retaining means at the leading edge of the plate, as considered in the direction of rotation of the cylinder, and a tensioning means at the trailing edge of the plate. Owing to the strength of the printing plate, the tensioning means used in the past have made use of a rotary locking bar having a plurality of projections therealong which engage in holes made in the plate. Rotation of the bar by a tool after engagement with the plate tensions the plate pulling it tight against the surface of the shim or the saddle of the printing cylinder.

When the printing cylinder is fitted with shims the printing plate tensioning assembly may be detachably attached directly to the outer cylindrical surface of the printing cylinder between facing edge portions of the shims, as described in U.K. Patent 1 575 016 by K + F Manufacturing Co. Inc. In contrast, with a saddle arrangement, the tensioning means of the securement mechanism is mounted on the trailing edge

of the saddle. In both cases, a disadvantage is that a special hand tool is required to rotate the locking bar of the tensioning means into the release position and the operator has only one hand free to fit the printing plate on the locking bar.

More recently, printing plates have been developed which are made of thick paper or plastics. However, when such plates are used with tensioning means of the kind described above they tend to tear or warp owing to the perforations therein.

An object of the present invention is to provide an improved mechanism for securing a printing plate to a printing cylinder, which mechanism is suitable for use both with paper and plastics plates, and with metallic sheet plates.

According to one aspect of the present invention there is provided apparatus for securing a flexible printing plate to a printing cylinder, comprising holding means for holding one edge of the plate on the cylinder, locking means including a pivotally mounted body adapted to engage the opposite edge of the printing plate and pivotal in use between a locking position in which the printing plate is locked under tension on the cylinder and a release position in which the printing plate can be fitted or removed, and biasing means having over-centre action spring means which to the locking side of an intermediate position of the body urge the body into the locking position and to the release side of said intermediate position urge the body into the release position.

According to a second aspect of the present invention there is provided apparatus for securing a flexible printing plate to a printing cylinder, comprising holding means for holding one edge of the plate on the cylinder, locking means including a body pivotally mounted for selective pivotal movement from a central release position to a locking position at either side of the release position depending upon the direction of rotation of the printing cylinder, the body being adapted to engage the opposite edge of the printing plate so as to lock the printing plate under tension on the cylinder in the selected locking position and permit fitting or removal of the plate in the release position, and biasing means with over-centre action spring means having a stable intermediate or neutral position at the central release position whereby deflection to either side of the intermediate position causes the spring means to urge the body into the corresponding locking position.

Preferably, the body includes a spindle with exposed journal sections engaged by complementary bearing formations of the mounting means for the body.

The spring means may comprise respective springs acting on the spindle from opposite sides thereof so as to define said stable intermediate or neutral position when the springs act to neutralise each other and to exert a turning force on the spindle on deflection out of said neutral position thereby urging the body into the corresponding locking position.

The present invention will now be described by way of example with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a printing cylinder provided with locking mechanisms according to the present invention;

Fig. 2 is an exploded view to an enlarged scale of the locking mechanism shown in Fig. 1 seen from underneath; the inset shows the parts in the assembled condition;

Figs. 3 to 5 are diagrams showing different stages in the printing plate fitting and locking operation;

Fig. 6 is a second embodiment of locking mechanism according to the invention, and

Fig. 7 is a detail of Fig. 6 to an enlarged scale showing the arrangement of the biasing springs.

The drawings show a printing cylinder 1, which is rotatable, in use, in the direction shown by arrow 2 and which is provided with a pair of saddles 3 to each of which a printing plate 4 can be attached by a locking mechanism according to the present invention.

The locking mechanism comprises holding means 5 which is located along the leading edge 6 of the saddle 3 with respect to the direction of rotation of the cylinder 1. The holding means 5 comprises a simple clamp arrangement in which the edge 6 of the saddle 3 is undercut to provide an acute angle 7. Attached to the saddle 3 along the edge 6 is a metal or plastics strip 8 which is formed so as to define

a clip with the edge 6. In this way, one edge 9 of the printing plate 4 can be retained by being pushed firmly between the strip 8 and the edge 6 so that the strip 8 clamps the plate 4 to the edge 6 and the plate 4 folds over the angle 7 against the surface 10 of the saddle 3.

At the trailing edge 11 of the saddle 3, the locking mechanism comprises a locking arrangement 12 to hold and tension the trailing edge 13 of the printing plate 4 opposing the leading edge 9 thereof against the surface 10 of the saddle. The arrangement 12 comprises a locking member 14 with a body having a heel 15 of part-circular profile. The trailing edge 11 of the saddle 3 is also formed with a part-circular profile, into which the heel 15 of the member 14 fits so that the locking member 14 has a degree of rotary motion with respect to the saddle 3 and thereby the cylinder 1. The locking member 14 is retained in position with respect to the saddle 3 by two hinges at opposite sides of the saddle only one of which is shown in Fig. 1.

The locking member body is made of sheet metal strip bent into shape with a spindle 16 inserted and secured thereto by suitable means (not shown). The curved heel 15 passes into side walls 17, 18 which defines therebetween a retaining groove 19 for the trailing edge 13 of the printing plate 4. The retaining groove 19 has a parallel-sided section 20 leading into a flared mouth 21 facilitating

entry of the printing plate edge. That side wall 18 which is nearer to the associated holding means 5 is shorter than the other side wall 17 for the same reason. The body of the locking member has cut-outs 22, 23 exposing reduced diameter sections 24, 25 of the spindle 16 which provide journals for hooked ends 26, 27 of a hinge element 28. A generally circular split spring 29 is retained by the hinge element 28 and abuts with its one end against a lip 30 of the hinge element 28. The opposite end of the spring 29 has a U-shaped projection 31 of which the cross-piece 31a seats in a groove 32 in the body. The groove 32 has circumferential extensions 32a, b at each end for receiving the side pieces 31b, c of the spring projection 31 when necessary. The hinge element 28 is secured in a recess 33 at the trailing edge of the saddle 3 by means of screws 34, 35 extending through apertures 36, 37 in the hinge element 28 into engagement with tapped holes 38, 39 in the saddle 3. The recess 33 is U-shaped leaving an island of material 40 at the edge of the saddle 3 which is thus weakened little if at all by the two recesses in its trailing edge. The hinge element 28 has a cut-out 41 which fits over the island 40. It will be appreciated that the hinge at the opposide side of the saddle is constructed in the same way.

The construction of the hinges is such that the springs 29 have an over-centre action with respect

to an unstable intermediate or neutral position which occurs when the line of action of each spring 29 is in line with the slot 32 and the axis of rotation of the body. When the locking member 14 is deflected to either side of this neutral position the springs act to urge the body in the same direction i.e. towards the locking or release position.

The spindle 16 has a flat surface 42 along one side thereof so as to provide an extension of the groove 19 (Figs. 3 to 5). The reduced diameter sections 24, 25 of the spindle 16 lie radially within the flat surface 42 so as to permit engagement by the hooked ends 26, 27 without obstructing the groove 19. Fig. 3 shows the locking member 14 in the release psition ready for receiving the trailing edge 13 of a printing plate 4. The holding means 5 is about to receive the leading edge 9 of what may be assumed for the purposes of illustration to be the same printing plate 4. It will be seen that the locking member 14 projects generally radially with respect to the cylinder 1 and well above the surface 10 of the saddle 3 thus permitting a relatively deep retaining groove 19 which is increased in depth by the flat surface 42 on the spindle 16. Because of the depth of the groove 19 the trailing edge 13 is retained therein without any nipping or clamping action by the walls 17, 18 but merely by friction with the sides of the groove as the locking member 14 is turned into the fully locked position shown in Fig. 5.

The printing plate 4 is fitted to the saddle 3 by inserting the leading edge 9 in the direction of the arrow in Fig. 3 into the nip defined by the edge 6 of the saddle 3 and the clamping strip 8. The trailing

edge 13 of the plate 4 is then inserted into the retaining groove 19 of the locking member 14 which is held in the release position by spring pressure urging the locking member 14 into abutment with the edge of the saddle. The operator can thus use both hands to fit the trailing edge 13 into the retaining groove 19.

Fig. 4 shows both leading and trailing edges 9, 13 of the printing plate 4 fully inserted and finger pressure being used to push the locking member 14 towards the locking position. The neutral or intermediate position of the over-centre springs is closely adjacent to the release position of the locking member 14 so that only a small rotational movement is required to push the locking member past the neutral position, i.e. over-centre, whereupon the springs snap the locking member 14 into the locking position (Fig. 5). The angular movement of the locking member 14 between the release and locking positions is approximately 90^{o} and in the locking position the locking member 14 is more or less tangential to the printing cylinder 1. The exact amount of movement will depend upon the length of the printing plate 4 and slight variations in this dimension will produce corresponding changes in the angular orientation of the locking member 14 inthe locking position. It is important that the printing plate 4 should always hold the locking member 14 out of

direct contact with the printing cylinder 1 in the locking position for otherwise insufficient tension is exerted on the plate.

When it is desired to remove the printing plate 4 from the cylinder 1, the locking member 14 is then rotated from the locking position (Fig. 5) back to the release position (Fig. 3) and the trailing edge 13 of the plate 4 removed from the mouth 21. The leading edge 9 of the plate 4 can then be removed by pulling from the holding means 5. It is possible to rotate the locking member 14 back into the release position by hand. However, as in practice it is awkward to grasp the locking member 14 with fingers often owing to the proximity of the leading edge of the adjacent saddle 3, a tool (not shown) may be used. Such a tool conveniently comprises an angled strip, the turned over angle portion of which can be engaged in the mouth 21 and the tool pulled to raise the member 14 back into the release position.

The advantage of having a locking member 14 which is movable at least from the first position into the second position by hand is twofold. Firstly, it permits the person fitting the plate 4 on the cylinder 1 to use both hands in the location of the trailing edge 13 of the plate 4 in the mouth 21 as the edge 13 can be held in the mouth 21 whilst pushing the member 14 over into the second position. This is in contrast to prior art arrangements wherein a tool is

required to rotate the equivalent locking bar and only one hand can be used to hold the plate in the appropriate position with respect to the locking bar. Secondly, the comparative ease with which the locking member 14 rotates and the proximity of the centre position of the biasing springs to the release position prevent damage if the locking member 14 is accidentally left in the release position when the cylinder 1 is used. If this happens, the locking member 14 is automatically rotated into the locking position by contact with a cooperating press roller or cylinder. However, in prior art arrangements, the accidental use of a cylinder having an incorrectly positioned locking bar results in damage to the paper as the locking bar remains in the wrong position during printing.

The embodiment of locking mechanism described above is saddle-mounted and cannot be used without reversing saddles when the direction of rotation of the printing cylinder 1 is reversed. In contrast the embodiment of Figs. 6 and 7 is cylinder-mounted and can be used without modification independently of the direction of rotation of the cylinder. In the following description parts which correspond to those of the first embodiment are designated by the same reference numeral increased by 100. The cylinder 101 is fitted with shims 103 which contrast with the saddles 3 by being attached directly to the cylinder and having no mechanisms attached to their leading and trailing edges. The facing

edges 106 of the shims 103 are undercut and define therebetween a recess 150 which receives a locking member 114 pivotally mounted on a base 151 which is detachably attached directly to the cylinder 101 by means of screws 152 locating in slots 153 permitting some lengthwise adjustment of the locking member 114 prior to final tightening.

The base 151 has upturned side edges 154 and 155 and centrally arranged, spaced bearing portions 156 alternating with cut-outs 157. The locking member 114 has corresponding body sections 158 and cut-away portions 159 which interengage with the bearing portions 156 and cut-outs 157 of the base 151 as shown in Fig. 6. The locking member 114 and the base 151 are interconnected by the spindle 116 which is then fixed to the body of the locking member 114. At the cut-away portions 159 of the body the spindle 116 provides journals for the bearing portions 156 of the base 151. The retaining groove 119 of the locking member 114 is defined by the body side walls 117, 118 which in this case are of equal length. The mouth 121 is flared as previously but the spindle 116 is not provided with a flat surface serving to increase the depth of the groove 119.

The over-centre spring means for the second embodiment is illustrated in Fig. 7. At each side of the locking member 114 is a pair of springs 129, one at each end of the base 151. Each spring 129 has a straight

section 160 which locates in the respective side edge 154, 155 of the base 151. Converging legs 161, 162 extend from the straight section 160 to hooked ends 163, 164 which engage in respective grooves in the spindle 116 through openings 165, 166 in the body. Each spring 129 has an exactly similar spring 129 arranged opposite it at the other side of the locking member 114 as shown in dotted line in Fig. 7. In Figs. 6 and 7 the locking member is shown in the upright or relase position ready for recciving the trailing edge of a printing plate 4 supported on the shim 103 to the right or left of the recess 150 depending upon the direction of rotation of the printing cylinder 101. This position is a stable neutral or intermediate position in which the turning force exerted by a pair of springs 129 at one side of the locking member 114 is balanced by the turning force exerted by the pair of springs at the opposite side of the locking member 114. If the locking member 114 is now deflected in either direction out of this central position the springs 129 at both sides act to urge the locking member 114 in that direction into a locking position in which the locking member 114 is approximately tangential to the cylinder 101. The hooked ends 163, 164 of one spring 129 will act in one direction above the axis of rotation of the body and the hooked ends 163, 164 of the opposing spring 129 will act in the opposite direction below the axis of rotation of the body. When the locking member 114 moves over-centre, i.e. through the neutral position, the level of action of the springs is

reversed. It will be appreciated that for any particular direction of rotation of the printing cylinder 1, only the release position and the locking position to one side of the locking member 114 will be used. For example, in Fig. 6, if the cylinder is rotated clockwise the locking position to the left-hand side of the release position will be used. If the direction of rotation of the cylinder is then reversed the locking position at the opposite side is used.

The manner of retention of the trailing edge of the printing plate in the retaining groove 119 is the same as in the first embodiment. The locking member 114 as seen in the release position again projects well above the outer surface of the shims 103 in order to permit relatively great depth of the retaining groove 119. The leading edge of the printing plate may be engaged by the undercut edge 106 of the shim 103 cooperating with a spring member, e.g. as in Figs. 4 and 5, or possibly without the use of a special clamping member as shown.

It will be appreciated that several modifications can be made to the locking mechanism described above. Firstly, although the mechanism has been designed for incorporation in new printing equipment, it is possible to use the mechanism to convert existing equipment, which is an important advantage within the industry. In this case, the locking member 14 is used to replace the locking bar arrangements of existing printing cylinders and the holding means 5 can be included in a screw-on strip which can be added to the saddle or shim of the

existing machine. In addition, it will be appreciated that the construction of the holding means may be different and instead of a clip arrangement or an undercut edge may comprise a slotted mouth cut into the leading edge of the saddle or shim at an acute angle to the surface. Although over-centre biasing means has been described, it is in fact sufficient if only the locking member 14 is biased into the locking position.

Secondly, when the locking mechanism is cylinder-mounted as shown in Figs. 6 and 7 it is possible to provide for only one locking position at the trailing side of the release position of the locking member. In this case the biasing springs will act in the same way as in the first embodiment with the unstable neutral position adjacent the upright release position. Alternatively, two such locking members may be provided in each recess 150 to permit rotation of the printing cylinder in opposite directions, one of the locking members being used when the cylinder is rotated in one direction and the other locking member being used when the cylinder is rotated in the opposite direction.

Thirdly, instead of being mounted on a saddle or directly on the cylinder it is possible for the locking member to be mounted in the recess between two shims on a support which is detachably mounted on the confronting edges of the shims.

Finally, the locking member may have means for locating the trailing edge of the printing plate other than a retaining groove. Depending upon the strength of the printing plate a locking bar may be provided with an undercut trailing edge over which the edge of the printing plate fits, possibly with pins of the locking bar engaging perforations in the plate. See, for example, Figs. 3 and 17 of U.K. Patent 1 575 016 referred to above.

CLAIMS:

1. Apparatus for securing a flexible printing plate to a printing cylinder, comprising holding means for holding one edge of the plate on the cylinder, locking means including a pivotally mounted body adapted to engage the opposite edge of the printing plate and pivotal in use between a locking position in which the printing plate is locked under tension on the cylinder and a release position in which the printing plate can be fitted or removed, and biasing means having over-centre action spring means which to the locking side of an intermediate position of the body urge the body into the locking position and to the release side of said intermediate position urge the body into the release position.

2. Apparatus for securing a flexible printing plate to a printing cylinder, comprising holding means for holding one edge of the plate on the cylinder, locking means including a body pivotally mounted for selective pivotal movement from a central release position to a locking position at either side of the release position depending upon the direction of rotation of the printing cylinder, the body being adapted to engage the opposite edge of the printing plate so as to lock the printing plate under tension on the cylinder in the selected locking position and permit fitting or removal of the plate in the release position, and biasing means with over-centre action spring means having a stable intermediate or neutral position at the central release position whereby deflection to either side of the

intermediate position causes the spring means to urge the body into the corresponding locking position.

3. Apparatus as claimed in claim 1 or 2, wherein the body includes a spindle with exposed journal sections engaged by complementary bearing formations of the mounting means for the body.

4. Apparatus as claimed in claim 3 when dependent upon claim 2, wherein the spring means comprises respective springs acting on the spindle from opposite sides thereof so as to define said stable intermediate or neutral position when the springs act to neutralise each other and to exert a turning force on the spindle on deflection out of said neutral position thereby urging the body into the corresponding locking position.

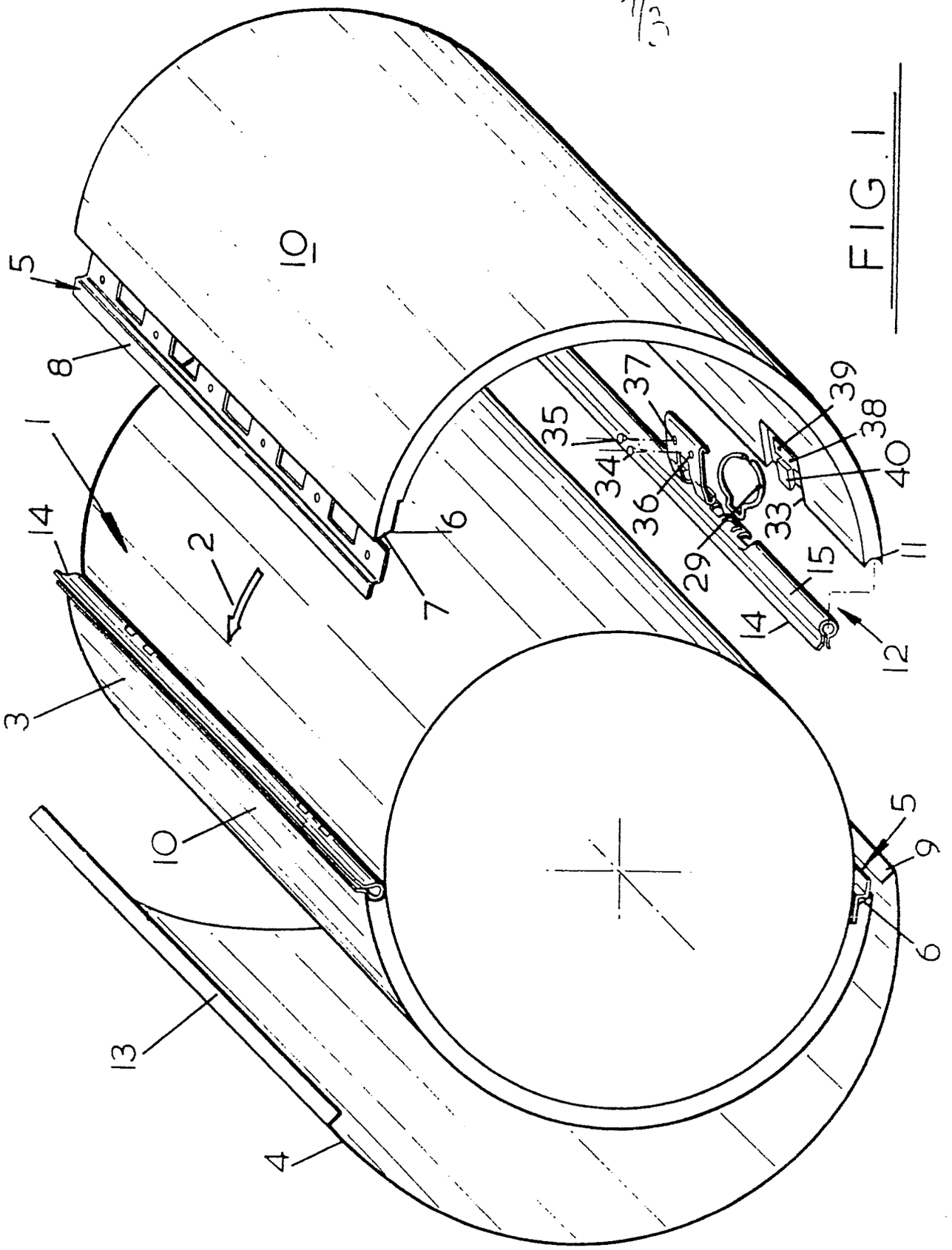

FIG. 1

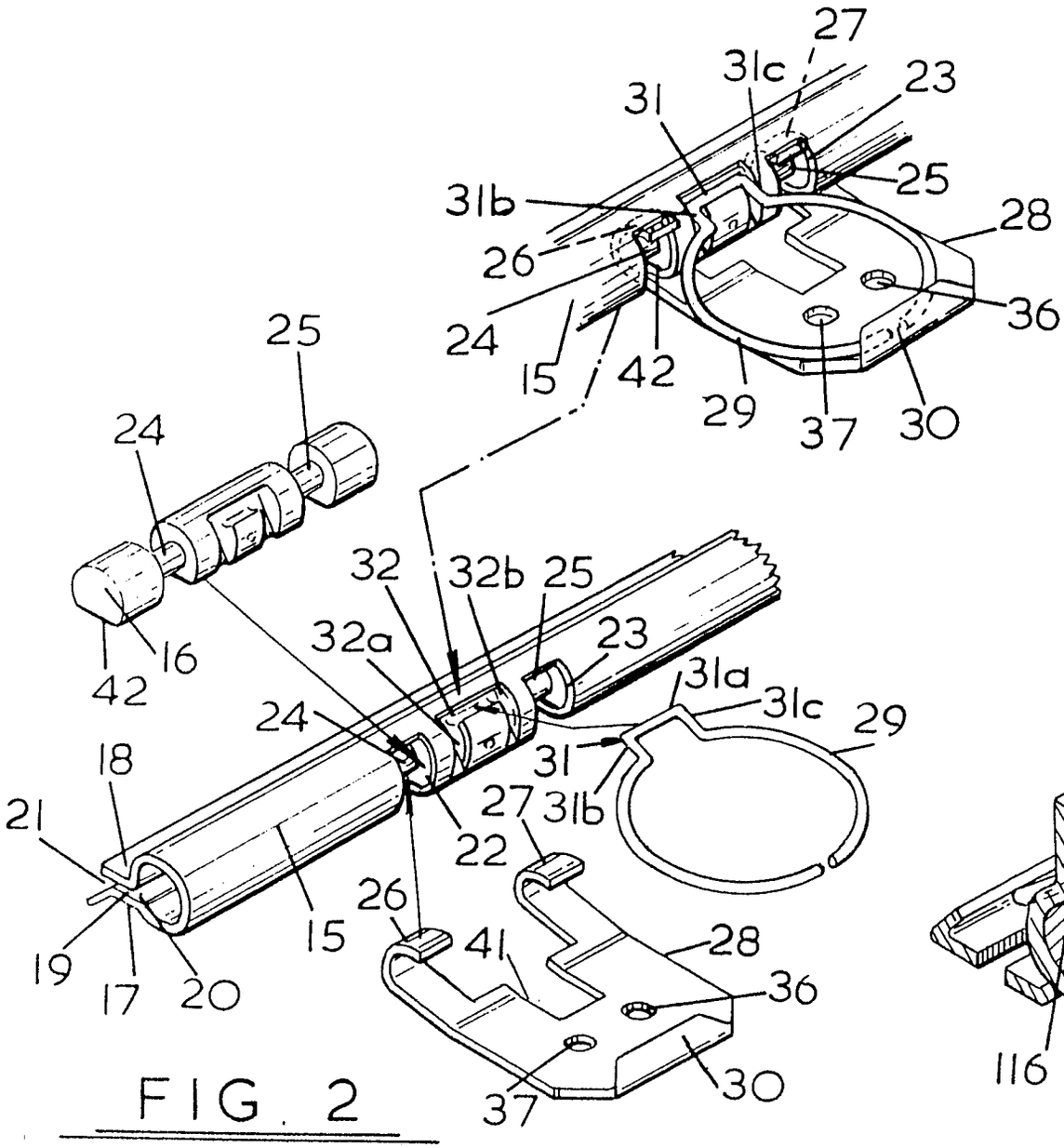

FIG. 2

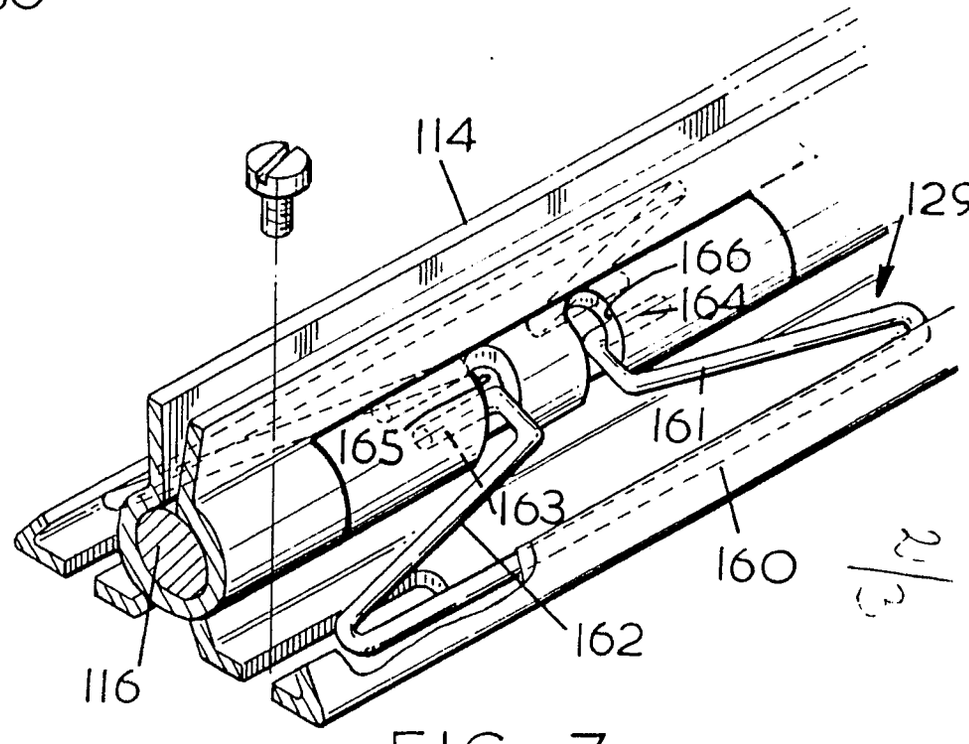

FIG. 7

2/2

0057078

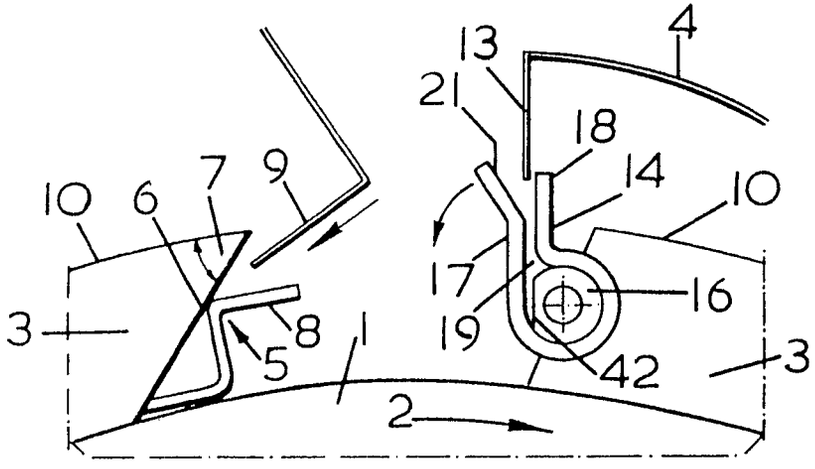

FIG. 3

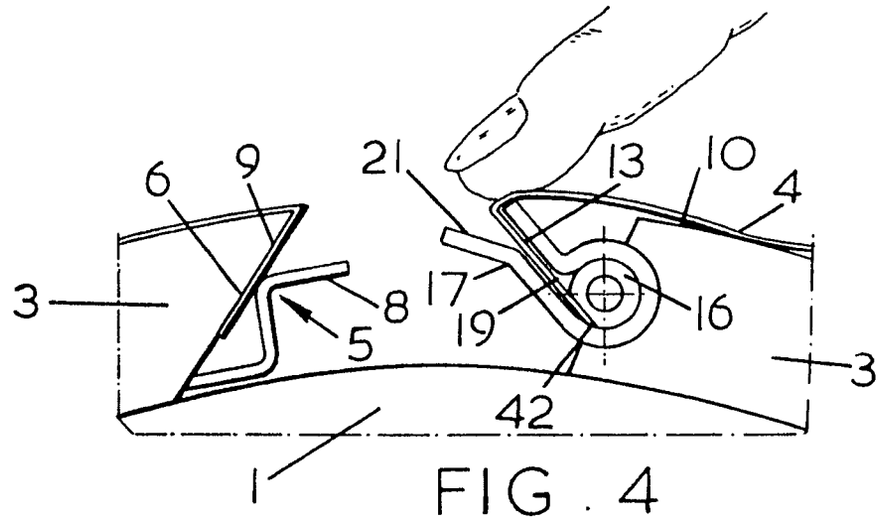

FIG. 4

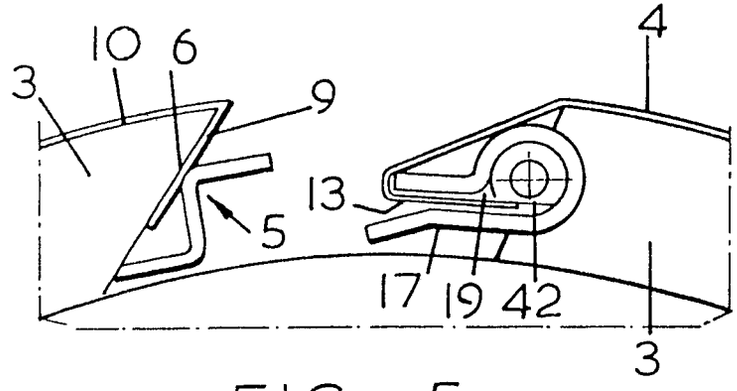

FIG. 5

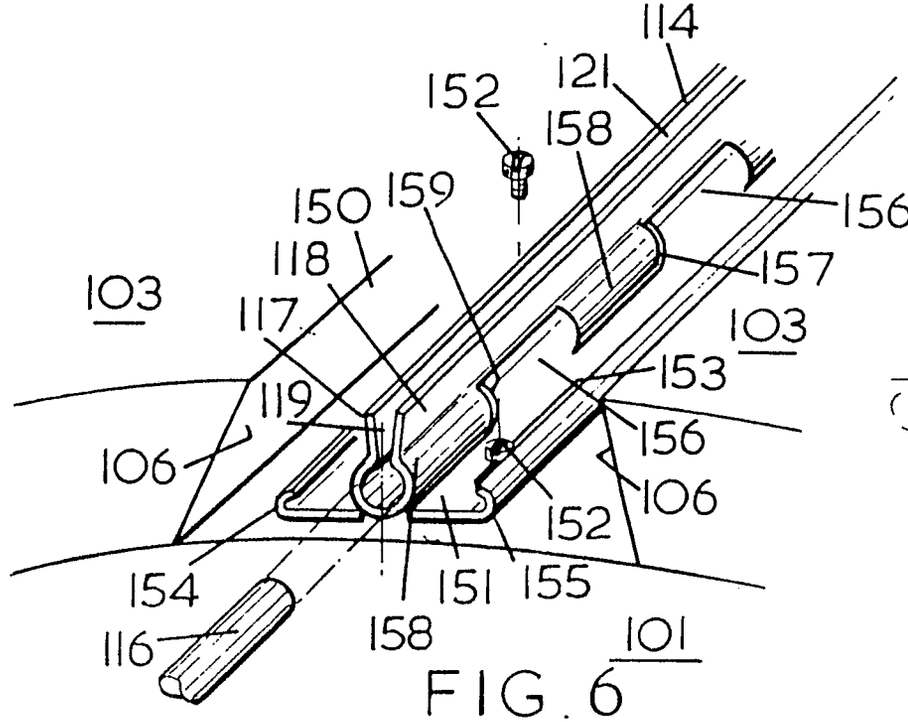

FIG. 6

0057078