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54 **Clamping or pressing devices.**

57 The screw (104) of a clamping or pressing device, such as a vice or press, passes through a sleeve (111) carrying a thread of different pitch, and engages one (102) of the parts of the device directly and the other (103) via the sleeve, so that the relative movement of the parts of the device is the sum of those due to the sleeve and the screw when they are rotated separately. Using a coarse pitch for the screw and a fine pitch for the sleeve thread, or vice versa, allows rapid initial movement together with high clamping force.

The invention is applicable to presses and to various types of vice. A vice according to the invention may be provided with an additional clamp for holding a pipe or rod vertically.

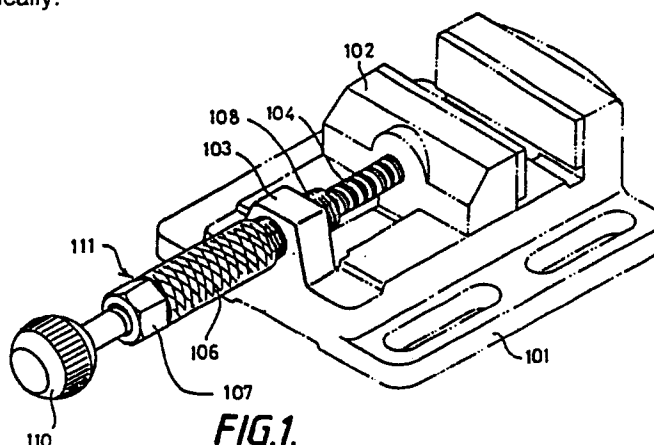


FIG. 1.

CLAMPING OR PRESSING DEVICES

The invention relates to screw-operated clamping or pressing devices, such as, for example, engineers' or carpenters' vices, engineers, clamps, and presses for various purposes.

In such devices, the jaw of the vice or clamp or the platen of the press has a relatively long travel against a low resistance while it is being advanced into position, followed by a much shorter travel against a high opposing force as it is tightened to exert its clamping or pressing action. If the operating screw is of high pitch the long initial travel is slow and tedious, while if the pitch is low a considerable effort is needed to exert sufficient pressure for clamping or pressing. The present invention is directed to providing a better compromise between initial travel speed and final pressure.

In the present invention, which is defined in the claims appended hereto, the screw of a clamping or pressing device engages first and second parts of the device to cause relative motion between them. The screw passes through a sleeve carrying a thread of a second pitch, different from that of the screw, and engages one of the parts of the device directly and the other via the sleeve, in such a way that the relative movement of the part of the device is the sum of those due to the sleeve and the screw when they are rotated separately.

Such a summation of the two movements may be achieved in any of three ways:

1. The sleeve may be threaded internally with a thread of the first, ie screw, pitch to receive the screw and externally with thread of the second pitch to engage the device part,
2. The shank of the screw may carry a thread of the second pitch engaging an internal thread of the sleeve, and the sleeve may bear against the device part,
3. The screw may screw into one device part and the sleeve into the other, the screw being freely rotatable within the sleeve, and the sleeve exerting a thrust against a surface, such as a shoulder, on the screw. Usually it will be preferable for the screw to have the coarser, and for the thread on the sleeve to be much finer in pitch.

The invention will be further described with reference to the drawings, in which

Figure 1 is an isometric view of an engineer's vice according to the invention,

Figure 2 is a part section through the vice of Figure 1 taken through the axis of the screw,

Figure 3 is a diagrammatic part-exploded view of a bench vice according to the invention,

Figure 4 is an isometric view of a modified form of the engineers' vice of Figure 1,

Figure 5 is a part section through the vice of Figure 4 taken through the axis of the screw,

Figure 6 shows the application of the invention to a pair of engineers' clamps,

Figure 7 shows the application of the invention to a hand vice, and

Figure 8 shows the application of the invention to a press.

Figure 1 shows an engineers vice according to the invention. The vice comprises a body 101 carrying a fixed jaw and slotted in the usual manner for bolting to the work table of a machine, such as a milling machine or grinder. A movable jaw 102 runs on slides provided one body and is moved backwards and forwards by a screw 104, which may be turned by a knob 110.

The screw 104 is screwed through a sleeve 111 which itself is screwed into the body of the vice by a second screw thread 108 of much finer pitch than the screw 104. The sleeve 111 is provided with a knurled outer surface 106 for ease of turning by hand and with a hexagonal nut 107 to allow it to be tightened with a spanner. The arrangement is shown in section in Figure 2. Operation of the clamp depends on the fact that the threads of the main screw 104 and of the sleeve 111 are of different pitches, that of the screw 104 being very much coarser. When an object is to be clamped in the vice the movable jaw 102 is advanced by turning the knob 110 and this advances the jaw rapidly, since the thread 104 is of coarse pitch. When the object has been loosely gripped between the jaws the sleeve 111 is rotated with the fingers by gripping the knurled surface 106, and because the screw thread 108 of the sleeve is of much finer pitch, the object can be clamped tightly with little effort. If even tighter clamping is required it may be achieved by the use of a spanner on the hexagonal nut head 107.

Figure 3 shows the application of the invention to a bench vice. The features specific to the present invention are shown in a partly exploded view to clarify their construction.

As before the vice has a body 101, part of which forms the fixed jaw, and a movable jaw 102, and a screw 104 provides for movement of the movable jaw towards or away from the fixed jaw.

The screw 104 has an enlarged shank 112 at the handle end, and this carries the second screw thread 108, which is of much finer pitch than that of the main screw 104. A short sleeve 114 carries a matching internal thread, and is formed with an enlarged hexagonal head 116. This head bears against the movable jaw 102 of the vice through a thrust ball-bearing 117 (in Figure 3 the parts are

shown separated for clarity).

In operation the vice is closed on the object to be gripped in the usual manner by tightening screw 104, which engages a mating screw-thread within the body of the vice and not visible in the drawing and, thrusts the movable jaw towards the fixed jaw through the sleeve 114 and thrust bearing 117. This movement is fairly rapid because of the coarse pitch of the screw 104. The vice is finally tightened by turning the enlarged hexagonal head 116 of the sleeve 114, either with a spanner or by means of a further handle 118, as indicated in Figure 3. Because of the much finer pitch of the second screw thread 108 a very tight grip may be obtained.

Figure 3 also shows a further feature which may be employed in a vice, either in conjunction with the present invention or independently of it. This comprises an additional means for clamping a long object of small cross-section, such as a pipe or rod. The far end of the vice body beyond the end of the screw 104 is provided with an aperture 141 having a toothed concave surface 142 at its further rim. An exactly similar corresponding aperture is formed at the underside of the body immediately opposite the aperture 141, this, of course, not being visible in the Figure. An opposed toothed concave surface 143 is formed on the end of the part carrying the movable jaw, part of it being visible in the figure through the aperture 141.

If a rod or tube is inserted through the aperture 141 and the corresponding lower aperture it may be gripped by tightening the screw 104 and, if necessary, when a particularly tight grip is required, for example, for cutting a screw thread, the sleeve 114 may be tightened to give an even more secure grip. The construction may, of course, be reversed, so that the toothed edges 142,143 face in the opposite directions.

Preferably such a vice is provided with a swivel base as shown at 144, with clamping means 145, enabling the vice to be turned round so that its tail end projects over the edge of the bench and, allowing long pipes or rods to be gripped vertically.

Figures 4 and 5 show respectively, in a partly broken away view and in longitudinal part-section, a further form of engineers' vice according to another aspect of the invention. In this embodiment the screw 104 passes freely through the middle of the sleeve 111 and its threaded portion 121 engages the movable jaw 122, this screw threaded into the fixed part of the vice body and carries a thrust bearing 117, which bears against a shoulder 129 on the screw 104.

When the vice is tightened to clamp an object the screw 104 is first rotated, the threaded portion engaging the movable jaw and driving it forwards quite rapidly since the thread is of coarse pitch. To

tighten the object securely in the vice the sleeve 111 is turned, screwing it forward and urging the screw 104, and with it the movable jaw, more tightly towards the fixed jaw through the thrust bearing 117 bearing on the shoulder 129.

Figure 6 shows a pair of engineers' clamps according to the invention, and these operate as described with reference to Figure 3. In these clamps the jaws 148,149 are operated by a pair of screws 104, each provided with a knurled knob 110 and having an enlarged shank threaded with a thread of much finer pitch, on which is threaded a sleeve in the form of a butterfly nut 150. The clamps are operated in the usual manner by turning the knobs 110 to tighten the screws 104, and final tightening can be carried out by turning the butterfly-nut sleeves 150.

Figure 7 shows a hand vice working on same principle. The arrangement of the screw 104 and the butterfly-nut sleeve 150 is identical to that of Figure 7, and the vice is tightened in the same way.

Figure 8 shows a press having a base 152 and a slide 154. The main screw carries a operating handle 156 and is formed with an enlarged shank engaged by a sleeve forming the boss of a hand-wheel 158. In operation the slide will carry a die or other tool which is brought down into position on the work by turning the handle 156. The slide can then be advanced powerfully by rotating the hand wheel, whose boss engages the fine thread on the shank of the screw.

Claims

1. A clamping or pressing device in which a screw (104) of a first pitch engages first (101) and second (102) parts of the device to cause relative motion between them, characterised in that the screw passes concentrically through a sleeve (111) carrying a thread (108) of a second pitch different from the first pitch, and the screw engages one of the parts of the device directly and the other via the sleeve, whereby the relative movement of the parts of the device is the sum of the movements due to the sleeve and the screw when they are rotated separately.

2. A clamping or pressing device according to claim 1 in which the sleeve has an internal thread of the first pitch to receive the screw and screws into a part of the device by a thread of the second pitch.

3. A clamping or pressing device according to claim 1 in which the sleeve and the shank (112) of the screw have mating threads of the second pitch, and the sleeve bears against one of the parts of the device.

4. A clamping or pressing device according to claim 1 in which the sleeve and the screw are each threaded into a separate part of the device and the sleeve exerts a thrust against a bearing surface (129) of the screw.

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5. A clamping device according to any preceding claim being a bench vice in which the part comprising the vice body and fixed jaw is formed with upper and lower corresponding concave toothed surfaces (142) in a region beyond the free end of the screw, and the part carrying the movable jaw has (143) a toothed edge facing the screw and arranged to co-operate with the toothed ends of the body in such a way that a pipe or rod inserted in the aperture can be clamped between the fixed and movable parts by tightening the screw and sleeve.

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6. A clamp according to any of claims 1 to 4 comprising a pair of jaws (148,149) movable towards or away from one another by means of two screws, one or both of which are provided with sleeves (150) having threads of a pitch different from those of the screws.

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7. A screw press according to any of claims 1 to 4 in which the screw controlling the movement of the slide is provided with a sleeve having a thread of a pitch different from that of the screw.

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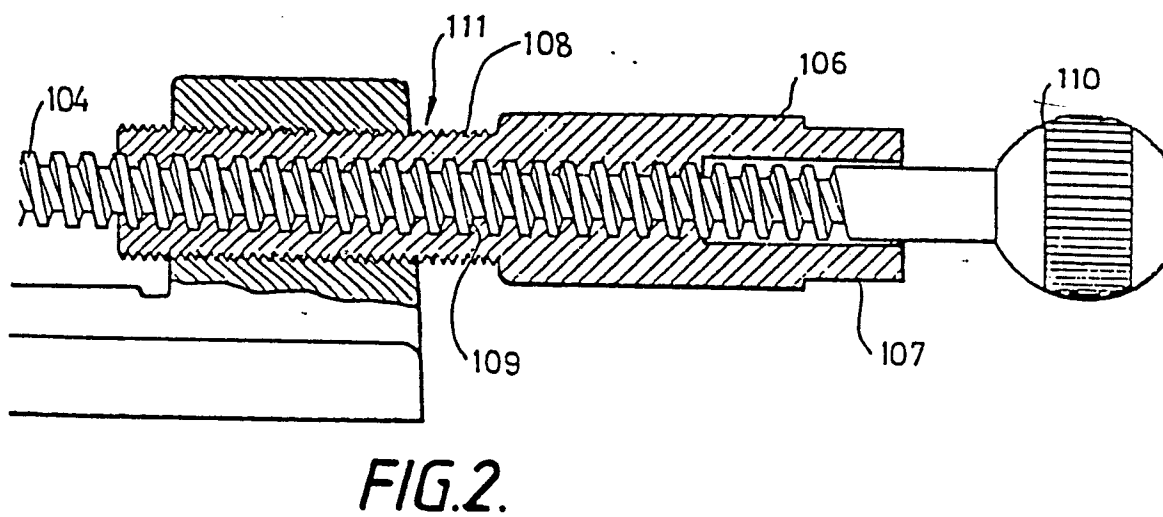
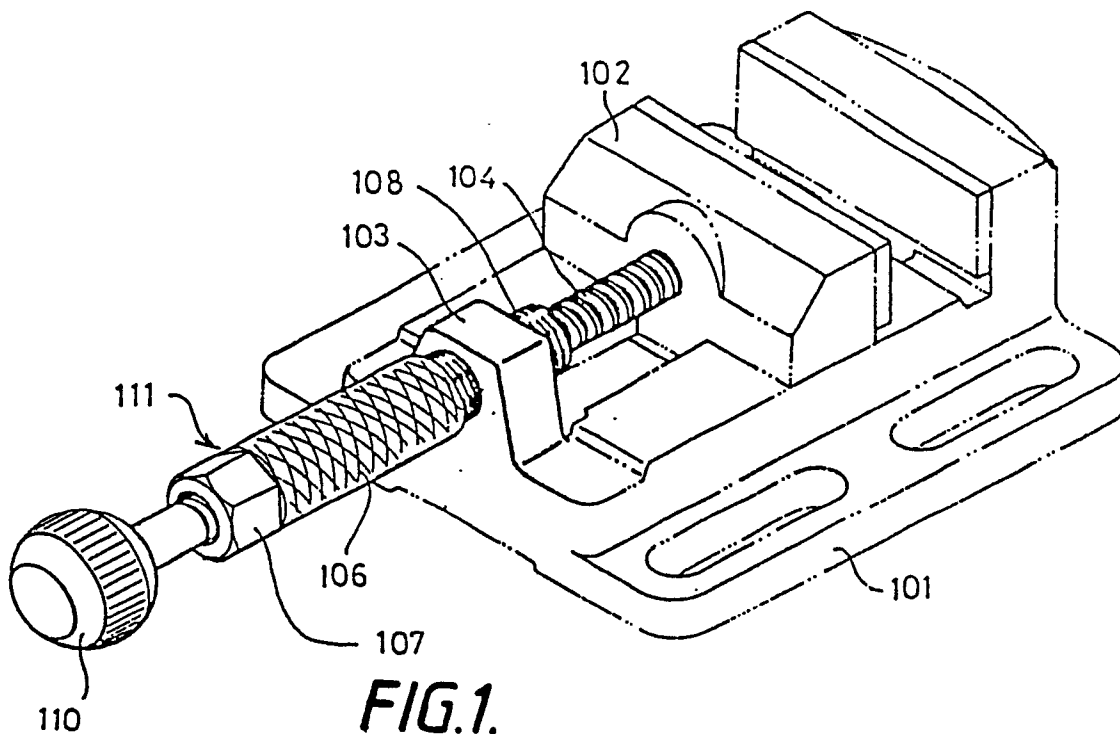
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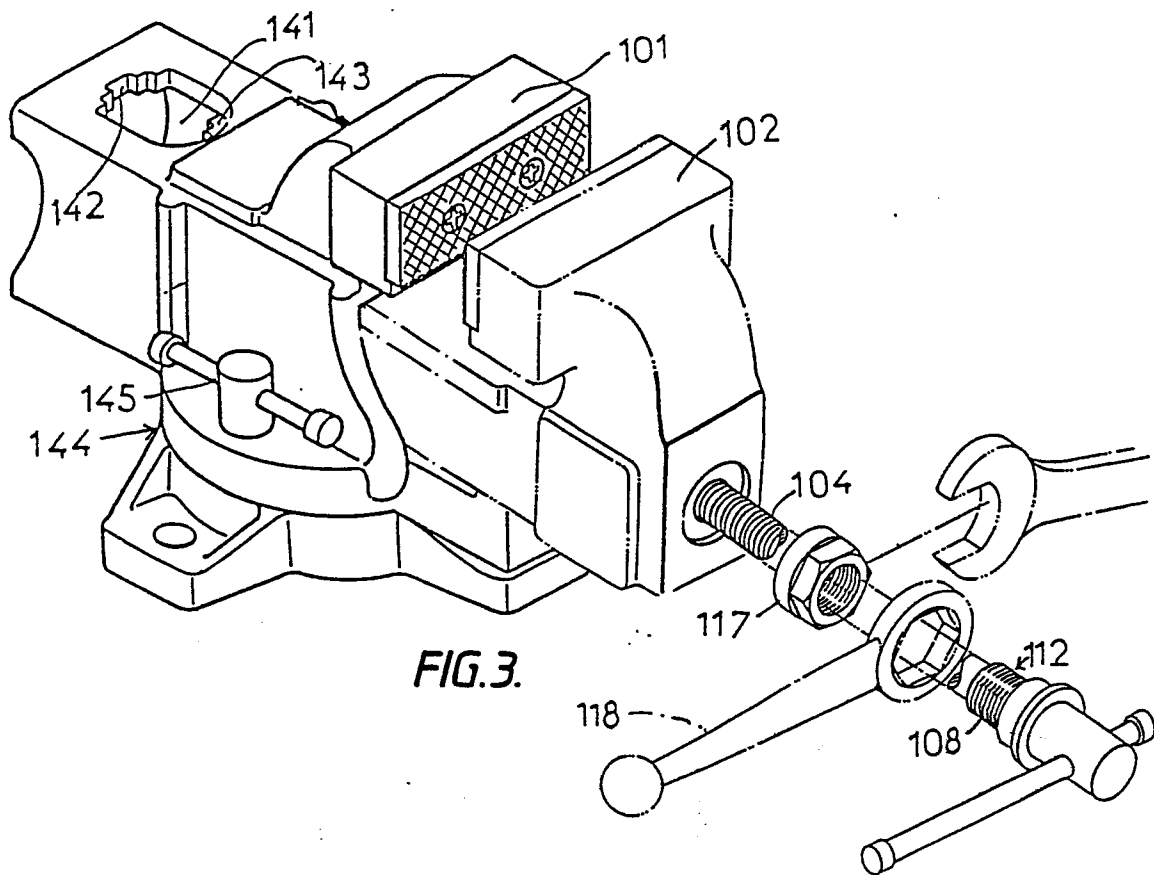
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New design / Newly filed
Nouvellement déposé



Modèle déposé / Newly filed
Brevet / Patent deposited



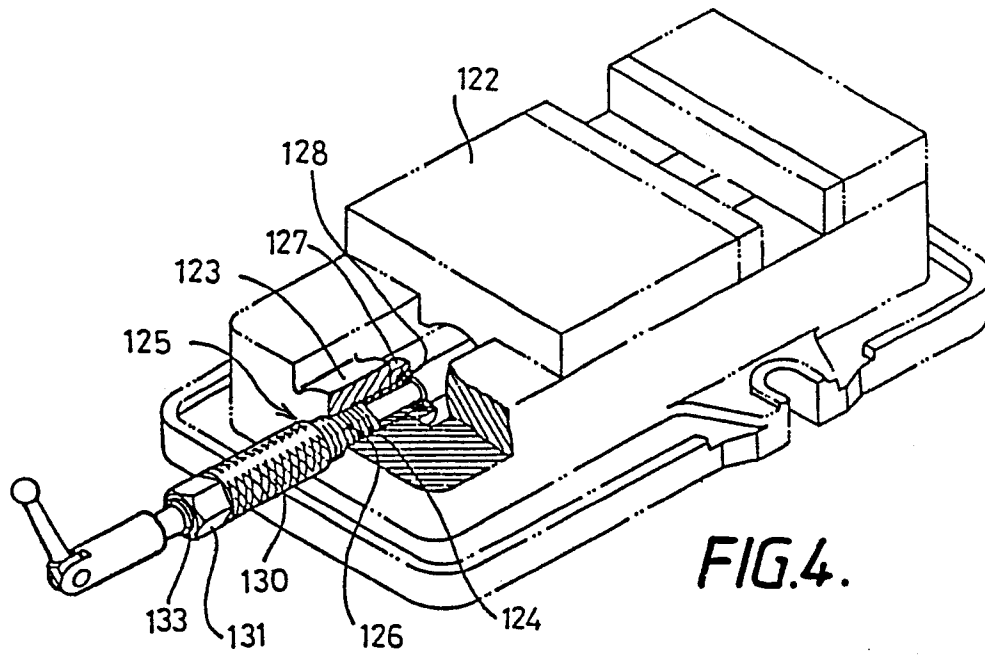


FIG. 4.

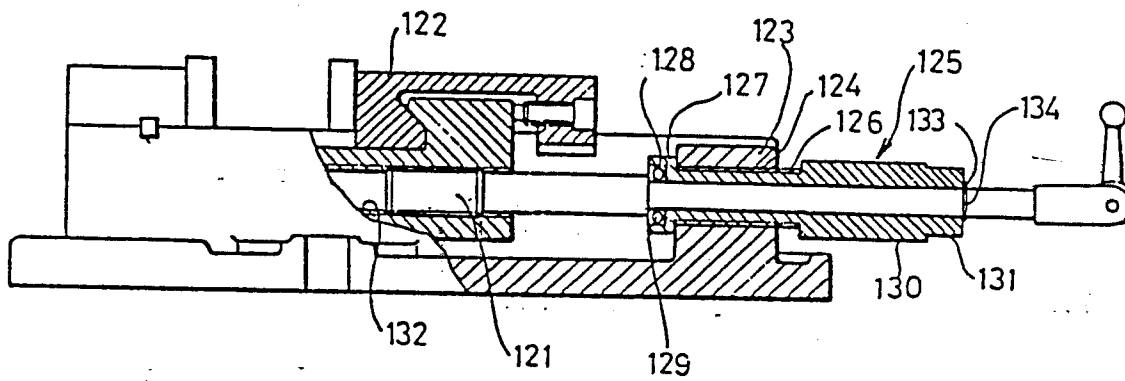


FIG. 5.

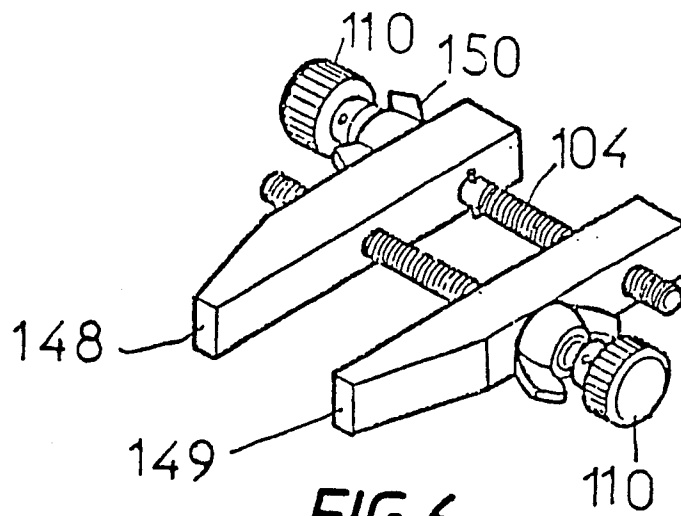


FIG. 6.

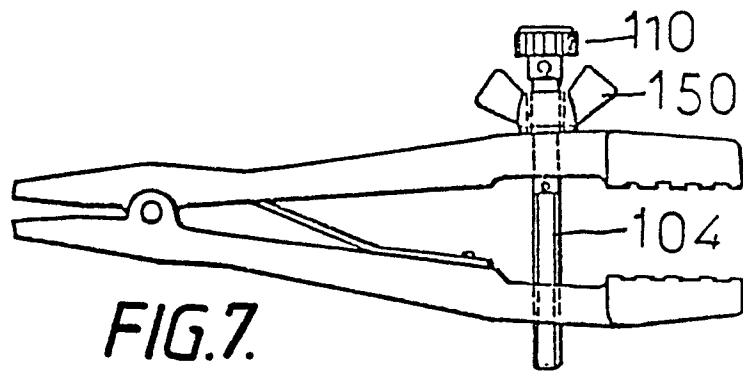


FIG. 7.

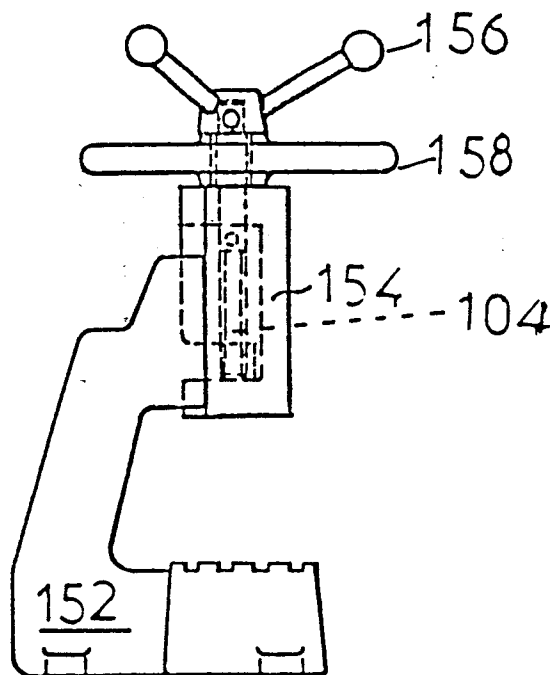


FIG. 8.