April 30, 1935. K. W. NICKERSON 1,999,571

SYRINGE RENOVATOR

Filed July 2, 1934 2 Sheets-Sheet 1

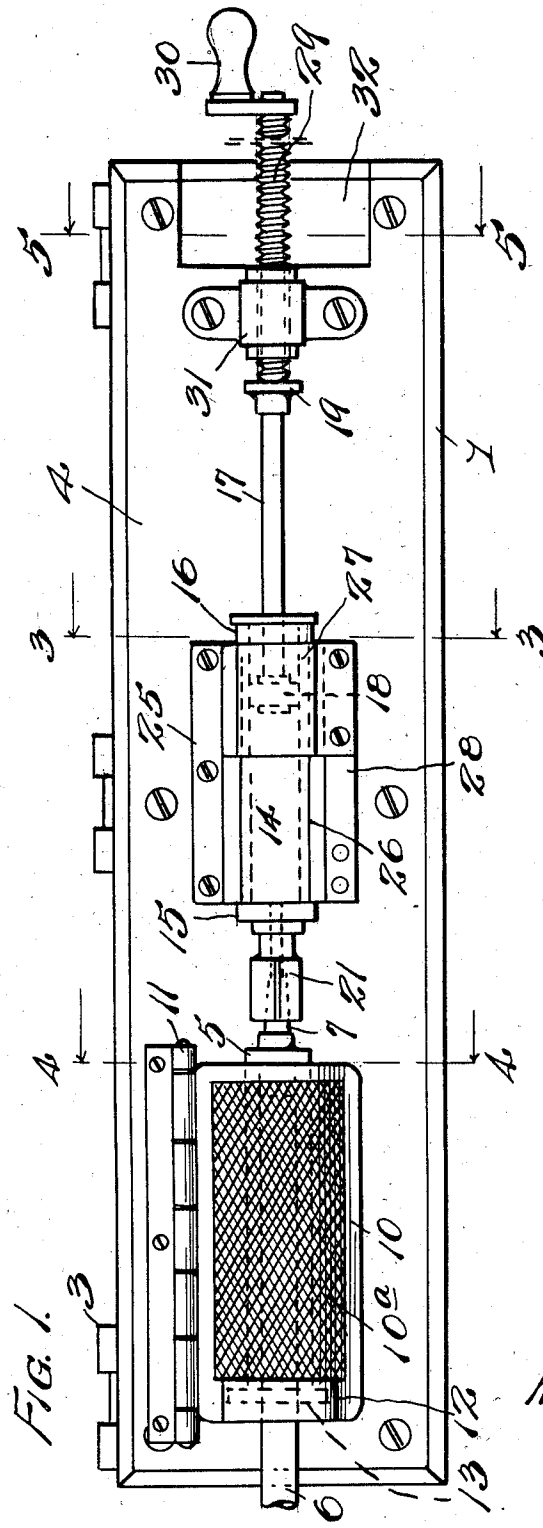


FIG. 1.

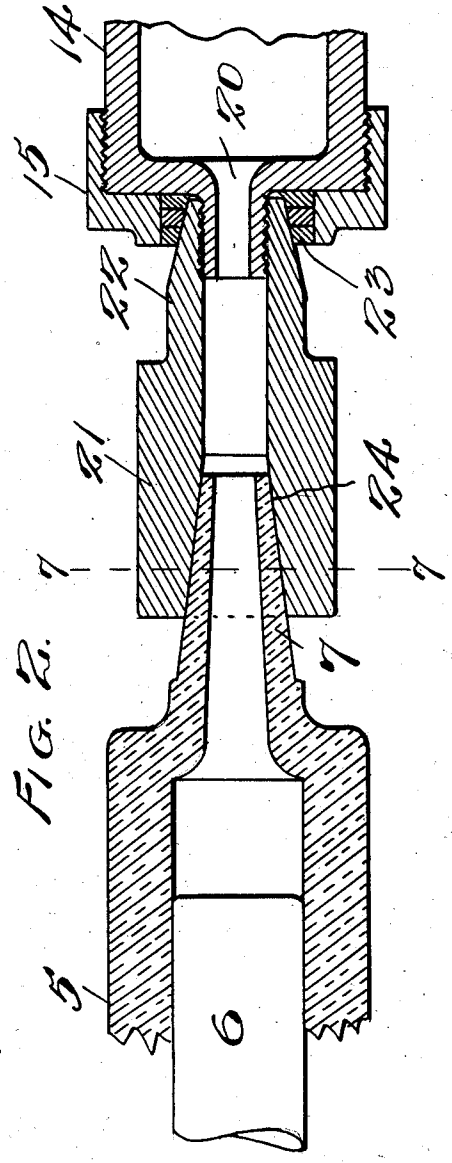


FIG. 2.

Inventor

KENNETH W. NICKERSON

By Thomas R. Harney

Attorney

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SYRINGE RENOVATOR

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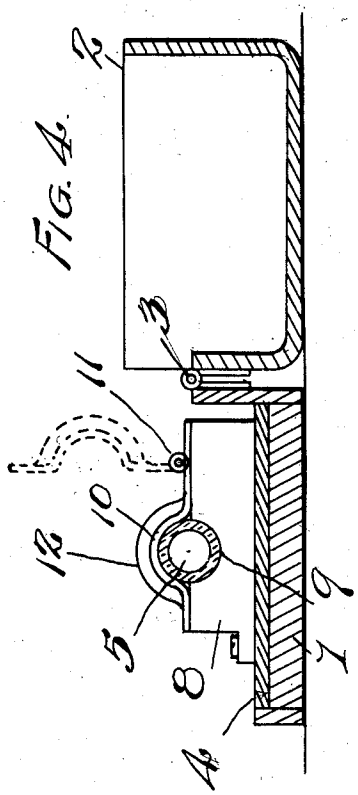


FIG. 4.

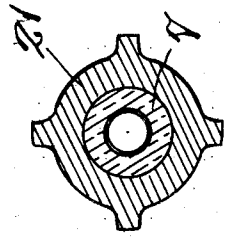


FIG. 7.

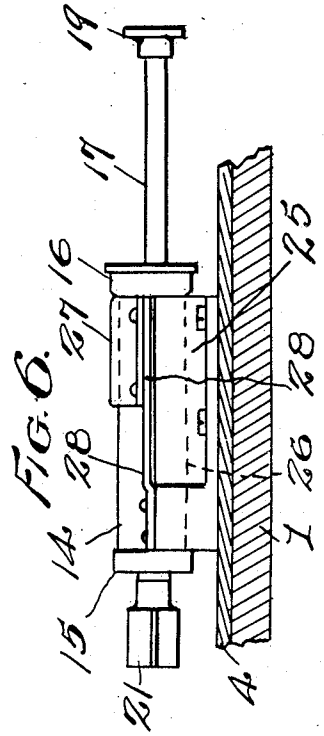


FIG. 6.

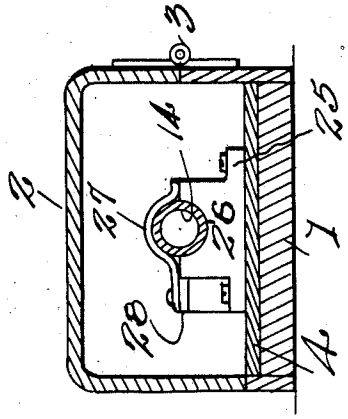


FIG. 3.

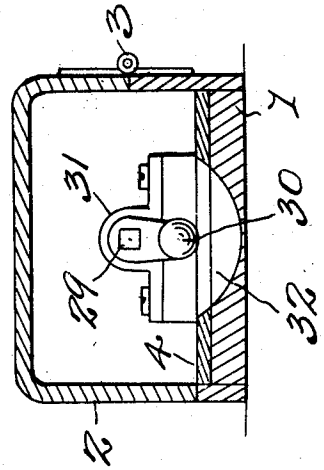


FIG. 5.

Inventor

KENNETH W. NICKERSON

By Thomas R. Harney

Attorney

Patented Apr. 30, 1935 1,999,571

UNITED STATES PATENT OFFICE

1,999,571

SYRINGE RENOVATOR

Kenneth W. Nickerson, Dedham, Mass.

Application July 2, 1934, Serial No. 733,482

4 Claims. (Cl. 128—234)

My present invention relates to a syringe renovator or hydraulic pressure instrument that is manually operated in freeing "frozen" or stuck plungers or pistons of syringes.

As is well known to those skilled in the practice of surgery, hospital work, and in other fields where syringes are employed, the plunger, piston, or the ejector of the piston-type of syringe, frequently becomes "frozen" or stuck in the barrel or cylinder of the syringe. Under such conditions, extreme difficulty is encountered in attempting to free the frozen or stuck plunger, especially in the use of glass hypodermic syringes, which because of the fragile material employed in their construction, are easily broken.

The primary object of my invention is the provision of means whereby the frozen or stuck ejector, piston, or plunger of the syringe may, with facility and reliability, be freed from the walls of the cylinder without danger of breaking any part of the instrument.

In carrying out my invention I utilize a portable apparatus of the hydraulic-pressure type, which is manually controlled to gradually build up in the cylinder a pressure that is imposed against the "frozen" or stuck piston for the purpose of releasing or freeing the latter from the walls of the cylinder.

The invention consists in certain novel combinations and arrangements of parts for performing the above functions, as will hereinafter be more fully set forth and claimed. In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged according to one mode I have thus far devised for the practical application of the principles of my invention. It will be understood, however, that I have herein illustrated one specific embodiment of the apparatus, and that various changes and alterations are contemplated and may be made in the exemplification of the invention, within the scope of my appended claims without departing from the principles of my invention.

Figure 1 is a plan view showing the instrument or apparatus, with parts in position ready for use, the cover or lid being omitted, and parts broken away, for convenience of illustration.

Figure 2 is an enlarged, longitudinal, sectional view showing the coupling between the syringe and the hydraulic-pressure instrument or device.

Figure 3, Figure 4, and Figure 5, are, respectively, transverse sectional views at lines 3—3, 4—4, and 5—5 of Figure 1.

Figure 6 is a view in side elevation showing the hydraulic-pressure device and its coupling.

Figure 7 is a transverse sectional view at line 7—7 of Figure 2.

As illustrated in Figure 1 the various parts of the portable apparatus are mounted upon a base block 1 of rectangular shape and of suitable size, and a cover or lid 2 is hinged to the block at 3, for protection of the parts when the apparatus is not in use. A base plate 4, of brass or other suitable material, is secured to the base block, and these parts may be finished in appropriate and convenient manner.

For the purpose of illustrating the utility of my invention I have shown a well known type of glass, hypodermic-syringe, having a barrel or cylinder 5, and in which it is assumed that the glass plunger, or ejector 6, is stuck or "frozen" near the tapering nozzle 7 of the syringe, and of course within the cylinder.

Means are mounted near one end of the base and base-plate for supporting and retaining the glass syringe in position in order that the frozen plunger may be freed, which means includes a holder or saddle block 8 having a semi-circular groove 9 in its upper face adapted to receive the glass cylinder 5 of the syringe, and provide a solid support for the glass tube of the instrument. The syringe is placed in the saddle-block, with the nozzle 7 pointing toward the center of the base, and while supported therein, the syringe is retained against displacement, preferably by pressure of the hand against a clamp frame 10, which is hinged at 11 at one side of the saddle block 8. The clamp frame is semi-circular in cross section and complementary in shape to the syringe, and preferably it is fashioned with a screen-body 10a of wire-mesh, in order to insure flexibility of the retaining frame, as the latter is manually pressed against the upper half of the syringe to prevent its displacement when the device is being operated. Near one end of the clamp-frame an enlarged, semi-circular head 12 may be fashioned to fit over the usual annular flange 13 of the syringe, and this confinement of the flange within the head on the clamp-frame assists in holding the syringe in place, under manual pressure on the clamp frame, while the hydraulic pressure is being applied for freeing the frozen plunger of the syringe. Before locating the syringe in its holder, the clamp frame is turned back on its hinge, as indicated in dotted lines Figure 4, to permit placing of the syringe in the holder, and then the clamp frame is turned back to full line position indicated in Figures 1 and 4. By pressure of

the left hand on the flexible clamp frame, the syringe is rigidly held in its holder or support against longitudinal displacement when the hydraulic pressure is applied to the plunger of the syringe.

As a part of the hydraulic-pressure device, I may utilize any well known type of suction-ejector syringe suitable for the purpose, as for instance the metal instrument best illustrated in Figures 1 and 6, but it will be understood that changes may be made in this part of the apparatus, as well as in other parts, when necessary or desirable. As illustrated in the drawings I use a hydraulic cylinder 14, having the two enlarged heads 15 and 16; the piston stem 17, and its piston 18 within the cylinder, and the stem is provided with a usual exterior head 19, at its outer end.

The cylinder 14, as best seen in Figure 2 is provided with an exteriorly threaded nozzle 20, and the nozzle of the hydraulic cylinder is rigidly connected with the tapered nozzle of the glass syringe by means of the coupling of the luer-type, as 21. This coupling has a tapered attaching nipple 22 with an inner screw thread, and the latter is threaded on the exterior threads of the nozzle 20 of the cylinder, packing gaskets as 23 being located in the head 15 of the cylinder, around the threaded joint to insure an airtight and watertight joint between the coupling and the nozzle.

One end of the coupling has a tapered bore 24 complementary to the tapered nozzle 7 of the glass syringe, and a close frictional joint is made between the coupling and the nozzle by first slipping the nozzle into the tapered coupling for close frictional contact therewith, after which, a slight turn of one part with relation to the other part, firmly secures these parts in close airtight and watertight relation.

For the support of the hydraulic pressure device I employ a second saddle block 25, which is secured firmly to the base plate 4, and this block, in its upper face, is provided with a recess or groove 26 of semi-circular shape, conforming to the curvature of the cylinder 14, and alined axially, with the groove or recess of the first block or syringe-holder. As shown in Figure 1 the holder for the hydraulic pressure device is located at the approximate center of the base block, and the groove or recess 26 of the saddle block is of required length to accommodate the cylinder, with the two heads 15 and 16 forming retaining collars at the opposite ends of the block.

For retaining the hydraulic cylinder 14 in its support, I employ a spring clamp plate 27 having one edge rigidly secured to or integral with a spring blade 28, and one end of the latter is rigidly secured to the saddle block 25 at one side of the groove of the block. The clamp plate extends transversely of the saddle block, and is of semi-circular shape to fit closely against the upper part of the cylinder 14, and one of its arcuate edges forms an abutment against which the head 16 of the cylinder 14 impinges, when the hydraulic pressure is applied. In this manner the saddle block and the clamp plate, jointly, form an annular clamp for the cylinder 14, as do also the saddle block 8 and the clamp frame 10 perform a like function for retaining the glass syringe 5.

For actuating the hydraulic pressure device I employ a screw bar 29, having a crank handle 30, and the screw bar is threaded in a fixed nut or bearing 31, the latter firmly secured to the base plate, with the axis of the screw alined with the axis of the glass syringe and also with the axis of the hydraulic pressure cylinder 14. The screw and its crank handle are conveniently located at one end of the base block, and the latter may be provided with a depression as 32 to accommodate the handle when the parts are stored within the closed case or box formed by the base block and the cover or lid 2.

Before placing the pressure device in its holder, the stem 17 is grasped by the handle-head or knob 19, the nozzle 20, or the coupling 21 if already in place, is inserted in water, and the stem 17 is pulled back to the position of Figure 1 to draw, by suction, a charge of water into the cylinder, the piston 18 now being in the dotted position of Figure 1. The spring clamp plate 27 is then lifted to permit insertion of the pressure device into its holder, and then the plate is released to clamp down on the cylinder 14 and retain the hydraulic device in position. After the clamp frame 10 has been turned to dotted position in Figure 4, the glass syringe 5 is placed in position in its holder, the nozzle 7 of the syringe is connected with the coupling 21, as described, and the parts are thus prepared for the operation of the hydraulic device; the clamp frame is pressed, by hand, down on the syringe to hold the syringe, and of course the hydraulic cylinder 14 is held by its clamp plate 27.

Before the hydraulic device is placed in position, the crank handle 30 is turned to back the screw 29 out of its nut, or threaded bearing, to the position in Figure 1, where the crank handle is readily accessible to and may be grasped by the right hand of the operator, while the left hand of the operator applies pressure on the clamping frame 10 to hold the syringe against displacement.

It will be apparent that by turning the crank handle, the free end of the screw applies pressure against the head or knob 19 of the hydraulic pressure device, the stem 17 and piston 18 are pushed into the cylinder 14 to compress the charge of water in the cylinder, and the pressure through the water is applied to or imposed against the near end of the plunger 6 of the syringe. As the fluid pressure is gradually applied the frozen plunger is freed, the syringe is removed, and is again ready for use. The hydraulic device may now be withdrawn from its holder, emptied in usual manner, and then replaced for storage. The crank handle is turned to bring it within the confines of the enclosure or box, the lid or cover is then closed, and the apparatus is put aside for future use.

From the above description taken in connection with my drawings it will be apparent that I have provided an apparatus, instrument or portable device by means of which the "frozen" plungers of syringes may with convenience, safety, and reliability, be freed from their cylinders to prolong their usefulness and maintain the instruments in proper working condition.

As before stated, I have shown an exemplifying structure as the physical embodiment of my invention, and it will be understood that I contemplate making changes and alterations in the disclosed apparatus, within the scope of my appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination in an apparatus for freeing frozen plungers of syringes, with a base, a support mounted on the base and means for retaining the syringe on said support, an alined

support mounted on the base and means for retaining a fluid pressure generating device on this support, a detachable coupling between the syringe and the device, and means for operating said device whereby fluid pressure is imposed against the frozen plunger.

2. The combination in an apparatus for freeing frozen plungers of syringes, with a base, a support mounted on the base and a flexible, hinged, clamping frame mounted on the support for retaining the syringe in operative position, a second, alined support on the base, a fluid pressure generating device mounted in the second support and means for retaining said device in its support, a detachable coupling between the device and the syringe, and means for operating said device for imposing pressure against the frozen plunger.

3. The combination in an apparatus for freeing frozen plungers of syringes, with a base, a grooved syringe-holder mounted on the base and a hinged clamping frame mounted on the holder to retain the syringe, a grooved support alined with the holder, a fluid pressure generating device including a cylinder and its piston and mounted in said support, a spring-clamp mounted on the support for retaining the device, a detachable coupling between the device and the syringe, a screw bar mounted on the base for advancing said piston, and means for turning the screw bar for imposing fluid pressure against the frozen plunger.

4. In a fluid pressure device of the character described the combination with a support, a syringe having a nozzle and means for retaining the syringe on the support, of a fluid pressure generating cylinder having a nozzle, a detachable coupling having a socket to receive the syringe-nozzle, a nipple on said coupling for attachment to the nozzle of the cylinder, a piston in the cylinder and a stem for the piston, and actuating means co-acting with said stem for imposing fluid pressure against the frozen plunger of the syringe.

KENNETH W. NICKERSON.