Nov. 20, 1945. O. E. WATSON 2,389,475

INJECTOR OPERATING MEANS

Filed Dec. 4, 1944

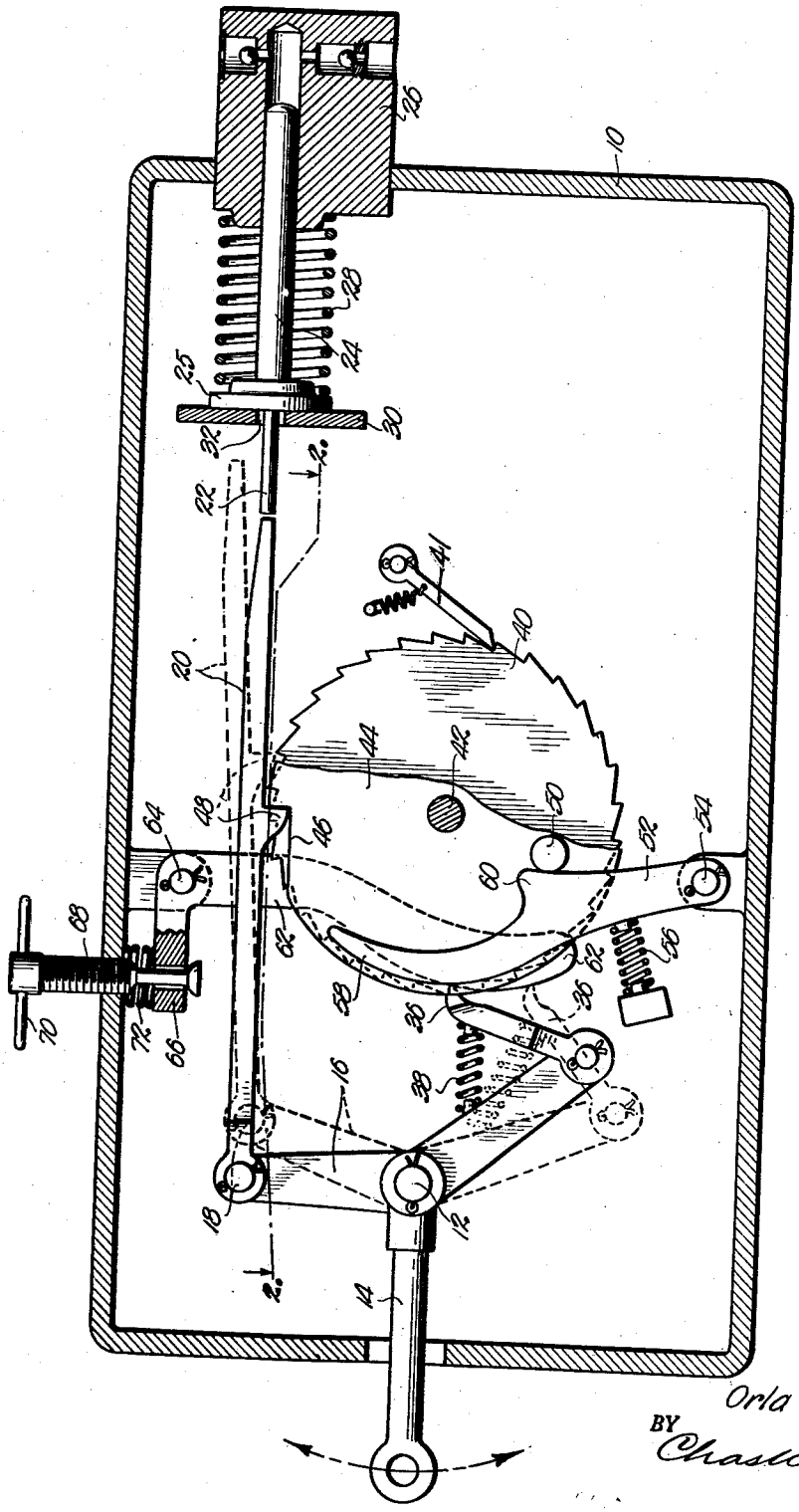


Fig. 1.

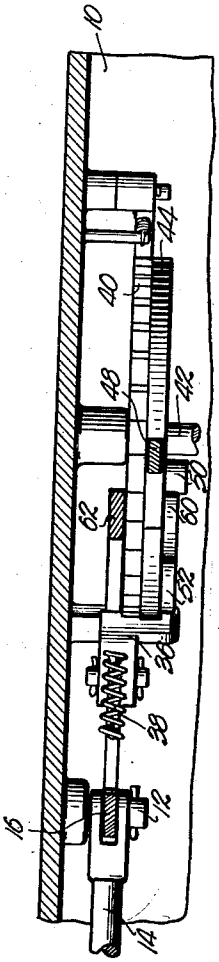


Fig. 2.

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Patented Nov. 20, 1945 2,389,475

UNITED STATES PATENT OFFICE

2,389,475

INJECTOR OPERATING MEANS

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Application December 4, 1944, Serial No. 566,579

8 Claims. (Cl. 103—153)

The present invention relates to injector operating means, and aims to provide a novel and improved construction adapted for efficient and uniform operation in the intermittent feeding of relatively small amounts of fluids under pressure.

Accordingly, the primary object of the invention is to provide means for injector operation in which the operating movement takes place by a quick and effective feeding stroke produced by a full stroke of the injector plunger, and for carrying out said operation at regular and accurately timed intervals, which are subject to convenient control and regulation by the operator.

A further object of the invention is to provide a construction which is relatively simple as well as efficient and practical, and comprised of comparatively few parts in a sturdy assembly having no operating elements likely to get out of order.

With the foregoing general objects in view, the invention will now be described by reference to the accompanying drawing illustrating one form of construction which has been found suitable for the practical embodiment of the proposed improvements, after which those features and combinations deemed to be novel and patentable will be particularly set forth and claimed.

In the drawing—

Figure 1 is a vertical sectional elevation showinjector operating means constructed in accordance with the present invention; and

Figure 2 is a detail sectional view representing a section taken on the line 2—2 of Figure 1.

In most injector appliances for the feeding of fluids under pressure, the operating pistons have relatively slow movement, or are actuated in such a manner as to produce short operative or feeding strokes adapted to feed only correspondingly small quantities of the fluid. For many duties this character of feed operation is not entirely satisfactory, and it is therefore the purpose of the present improved construction to devise operating means calculated to feed both intermittently and also by a full quick feeding movement for each stroke of the feed plunger, and to combine such operating means with suitable provision for properly timing the feed interval of the operation.

Referring now to the drawing, this illustrates the improved operating means as assembled in a suitable casing or housing 10 in which is journaled a shaft stud 12 provided with an operating arm 14 fixed to said shaft and projecting to the exterior of said housing 10 and adapted to have its outer end linked with any conventional form of transmission for imparting a vertical oscillatory or swinging movement to the arm 14 and thereby correspondingly oscillating the shaft 12.

Also fixed to the shaft 12 is a bell crank arm 16 to the upper end of which is pivoted (as at 18) one end of a plunger operating rod or bar 20, the opposite end of which is designed to be intermittently engaged with a stem 22 forming the shank of a plunger 24 constituting part of an injector pump 26 of any conventional type, and illustrated as supported in the upper portion of the casing or housing 10. The plunger 24 is maintained in normally retracted position by means of a coil spring 28 interposed between the body of the pump 26 and the head portion 25 of the plunger—the retracting movement of the plunger being limited by engagement of said head 25 with a fixed plate 30 having a suitable opening 32 for the shank or stem portion 22 of the plunger.

While the plunger operating rod or bar 20 is continuously reciprocated by the arm 16, it actuates the plunger only at those intervals when its movement is in a direct line with the plunger, and this alinement of the rod or bar 20 with said plunger and the desired timing thereof are accomplished by means of the following construction.

The lower end of the bell crank arm 16 is provided with a suitable pawl 36 actuated by a spring 38 into engagement with the teeth of a ratchet wheel 40 forming part of a combination cam and ratchet wheel assembly which is mounted on a shaft 42 underneath the plunger operating bar 20, said assembly including a conventional detent 41 for confining the wheel 40 to rotative movement in one direction only. The cam wheel portion 44 of said assembly is formed with a peripheral notch 46 deep enough to accommodate a tooth 48 on said bar 20, thereby allowing the latter to drop momentarily into alinement with the plunger, or long enough to produce a working stroke of said plunger. The diameter of the remaining portion of the cam wheel portion 44 is, on the other hand, adapted to maintain said plunger operating bar 20 at all times out of alinement with the plunger, so that a working or feeding stroke can take place only once during each revolution of the cam and ratchet wheel assembly.

The cam wheel 44 is further provided with a pin 50 adapted to engage and actuate a pawl-

releasing arm 52 which is pivotally mounted at 54 and supported in operative position by means of a coil spring 56. This arm 52 has a pawl-releasing portion comprising a curved extension 58 projecting alongside a portion of the periphery of the wheel 44 in position to engage a laterally projecting finger on the pawl 36 and maintain the latter completely out of engagement with the ratchet wheel 40 when the pin 50 engages a hump or projection 60 on the shank portion of said arm 52, thereby forcing said arm outwardly against the action of its spring 56 into operative engagement with said pawl.

Conventional means is provided for regulating the operative action of the pawl 36, the same comprising a pawl engaging and releasing arm 62 pivoted at 64, at the top of the casing 10, and projecting downwardly alongside a portion of the periphery of the ratchet wheel 40 in position for engagement with the pawl 36 as indicated by dotted lines in Figure 1. The upper end of the arm 62 is formed with a shank portion 66 engaged and operated by a suitable adjusting screw 68 threaded through the casing wall and provided with an exterior handle portion 70. A compression spring 72 is interposed between said shank 66 and the casing for actuating the arm 62 normally away from the pawl 36, whereas said arm is adjusted by said screw 68 in the opposite direction for regulating the extent of operative engagement of the pawl with the teeth of the ratchet wheel 40 in a well-known manner, and thus to a corresponding extent timing the operation of the cam wheel 44.

From the foregoing it will be understood that in the operation of the device, a continuous reciprocating motion is imparted to the arm 14, whereby a reciprocating movement is also imparted to the plunger operating bar 20, and at the same time rotary movement is transmitted to the cam and ratchet wheel assembly at a rate according to the adjustment of the screw 68 and arm 62. The cam and ratchet wheel elements rotate in unison and maintain said bar 20 in raised position or out of alinement with the plunger 24 except for the operating interval illustrated in Figure 1, at which time the notch 46 arrives in position approximately opposite the tooth 48, thus allowing said bar 20 to drop into direct alinement with the plunger 24. At the same time the pin 50 on the cam wheel 44 engages and operates the arm 52, whereby the extension 58 is caused to release the pawl 36 from the ratchet wheel 40, so that the rotation of the cam and ratchet wheel assembly is momentarily stopped. Consequently the next following reciprocation of said bar 20 constitutes a working stroke for driving the plunger 24 the full length of the operating movement of said bar 20 and therefore a corresponding full stroke of said plunger. During this working stroke of the bar 20, the tooth 48 engages a shoulder 46' formed at one end of the notch 46, and thereby imparts a partial rotation to the cam and ratchet wheel assembly, which causes the pin 50 to ride on past the hump or projection 60 on the arm 52, which is then moved out of engagement with the pawl 36 by the action of its spring 56.

This completes a cycle of the operation, which then proceeds in the same manner to effect an operative or working stroke of the plunger operating bar 20 for each succeeding rotation of the cam and ratchet wheel assembly.

It will thus be apparent that I have devised a very practical and at the same time highly efficient arrangement and construction for the carrying out of the aforesaid objects of my invention, and while I have illustrated and described one form of apparatus suitable for the embodiment of my proposed features of improvement I desire to be understood as reserving the right to make all changes or modifications which fairly fall within the scope of my invention as defined by the appended claims.

What I claim is:

1. Injector operating means comprising, in combination with an injector pump having a reciprocating plunger, a reciprocating drive bar movable into and out of alinement with said plunger, means for actuating said drive bar, and means for intermittently moving said bar into and out of alinement with said plunger.

2. Injector operating means comprising, in combination with an injector pump having a reciprocating plunger, a reciprocating drive bar movable into and out of alinement with said plunger, means for continuously reciprocating said drive bar, and means acting at intervals to effect alinement of said drive bar with said plunger.

3. Injector operating means comprising, in combination with an injector pump having a reciprocating plunger, a reciprocating drive bar movable into and out of alinement with said plunger, means for continuously reciprocating said drive bar, and means actuated by said first means for intermittently alining said drive bar with said plunger.

4. Injector operating means comprising, in combination with an injector pump having a reciprocating plunger, a reciprocating drive bar movable into and out of alinement with said plunger, means for continuously reciprocating said drive bar, and variable operating means actuated by said first means for alining said drive bar at timed intervals with said plunger.

5. Injector operating means comprising, in combination with an injector pump having a reciprocating plunger, a reciprocating drive bar movable into and out of alinement with said plunger, means for actuating said drive bar, and means for supporting said drive bar out of alinement with said plunger, including means for periodically dropping said bar and supporting the same in alinement with said plunger.

6. Injector operating means comprising, in combination with an injector pump having a reciprocating plunger, a reciprocating drive bar movable into and out of alinement with said plunger, means for actuating said drive bar, and a rotary supporting member actuated by said first means and acting to maintain said drive bar out of alinement with said plunger and including means for periodically dropping said drive bar into operative driving alinement with said plunger.

7. Injector operating means comprising, in combination with an injector pump having a reciprocating plunger, a reciprocating drive bar movable into and out of alined driving relation to said plunger, means for actuating said drive bar, and a rotary member actuated by said first means with its periphery in supporting engagement with said drive bar for maintaining the same out of alinement with said plunger, the periphery of said rotary member having an irregular portion permitting said drive bar to drop into a position in alined driving relation to said plunger.

8. Injector operating means comprising, in

combination with an injector pump having a reciprocating plunger, a reciprocating drive bar movable into and out of alined driving relation to said plunger, means for actuating said drive bar, a rotary member having its periphery in supporting engagement with said drive bar for maintaining the same out of alinement with said plunger and having a portion of its periphery adapted to drop said bar into position for alinement with said plunger, and means for actuating said rotary member and including provision for interrupting the rotary movement thereof during the intervals of alinement of said drive bar with said plunger.

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