

Dec. 24, 1929.

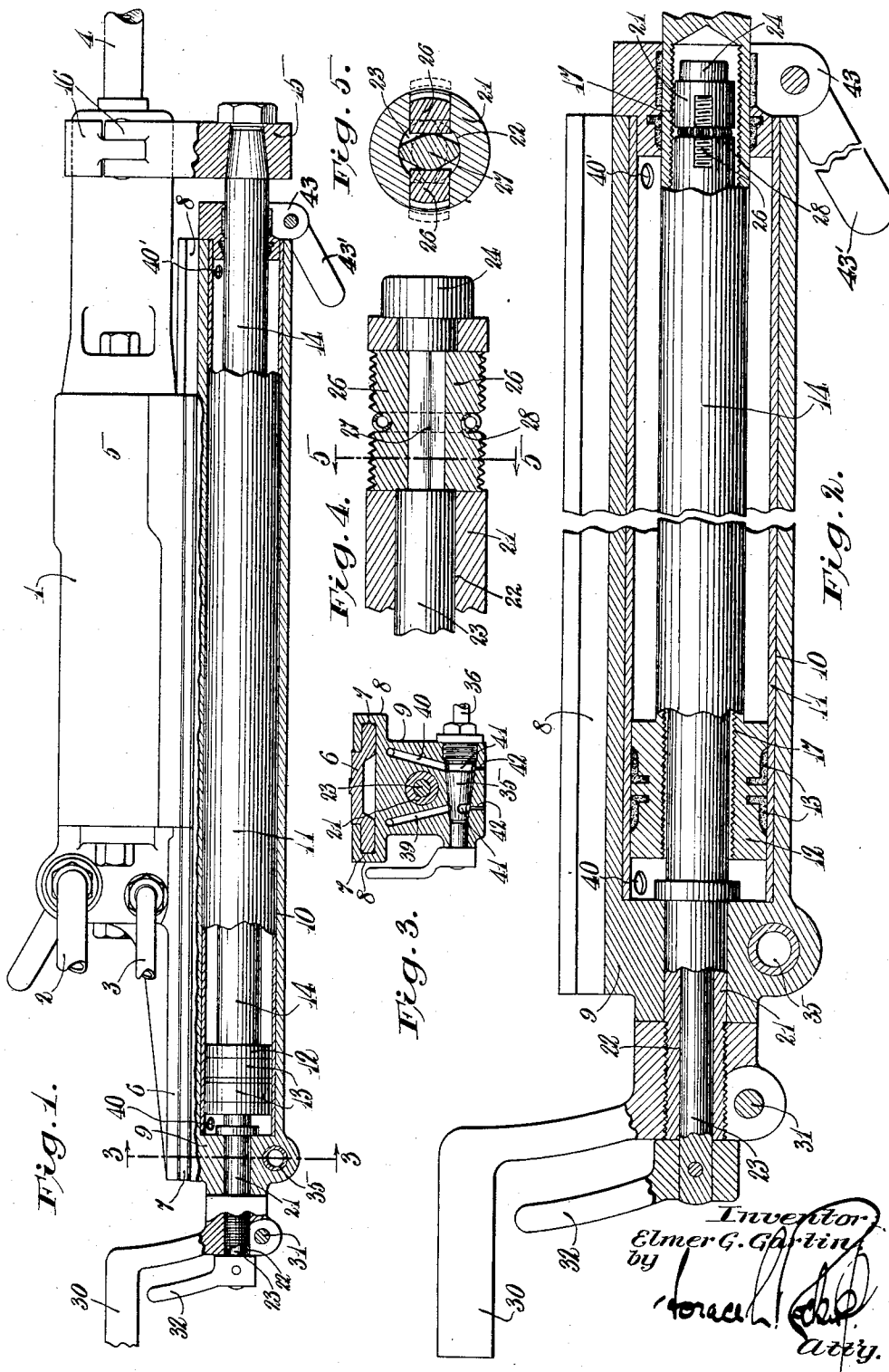
E. G. GARTIN

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FEEDING APPARATUS

Filed July 12, 1920

2 Sheets-Sheet 1



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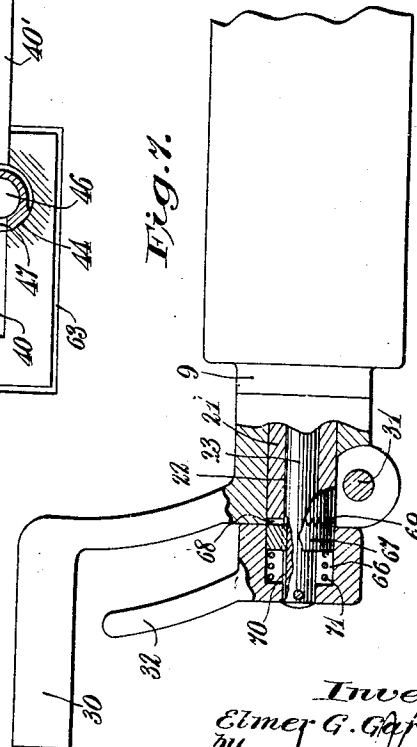
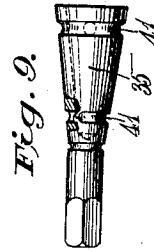
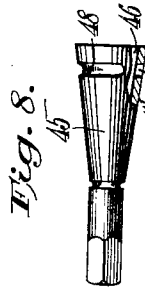
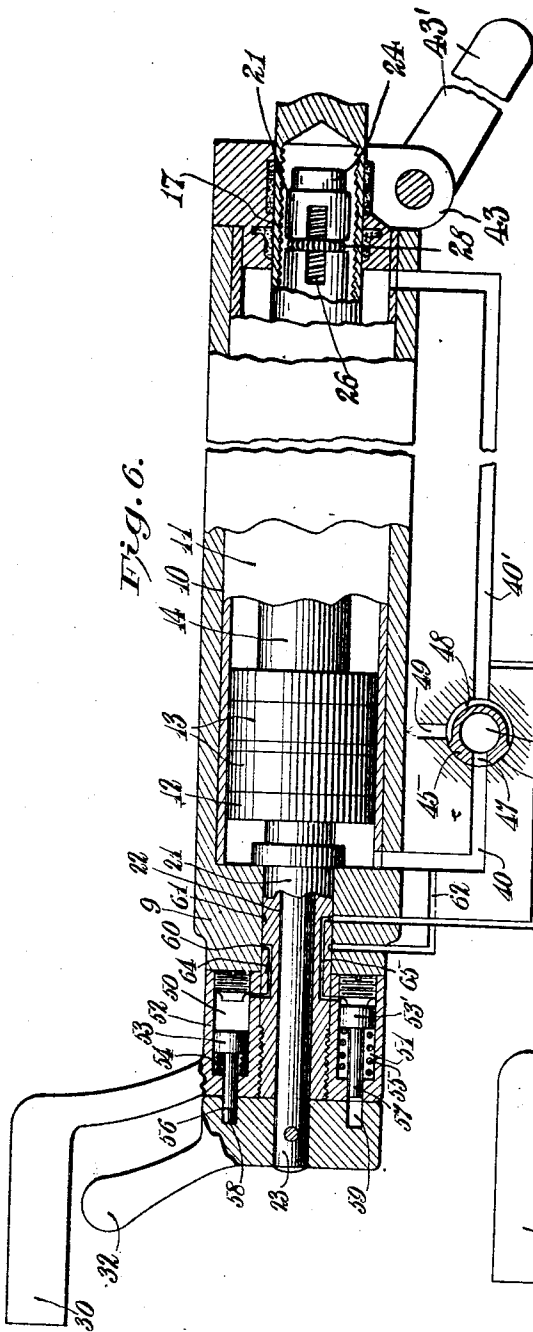
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2 Sheets-Sheet 2



Inventor:
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UNITED STATES PATENT OFFICE

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FEEDING APPARATUS

Application filed July 12, 1920. Serial No. 395,727.

My invention relates to feeding apparatus and more particularly to feeding mechanism for rock drills.

It has for its object to provide an improved feeding mechanism for work performing means. Another object of my invention is to provide an improved feeding mechanism for rock drills in which pneumatic and manual control is provided. A further object of my invention is to provide an improved feeding mechanism for rock drills in which mechanical feeding mechanism is combined with a pressure fluid feed cylinder and piston and in which a ready change from one method of feed to the other is presented. A still further object of my invention is to provide an improved interlocking mechanism between the pneumatic and manual feeding mechanisms.

In the accompanying drawings, I have shown for purposes of illustration one form, together with various modifications thereof, which my invention may assume in practice.

In these drawings,—

Fig. 1 is a view, with parts broken away, partially in elevation and partially in central vertical longitudinal section, showing my improved feeding mechanism adapted to the feeding of a rock drill.

Fig. 2 is an enlarged central vertical longitudinal section through the feed cylinder and partially through the feed piston and piston rod.

Fig. 3 is a transverse section on the line 3—3 of Fig. 1.

Fig. 4 is a detail showing in section of the forward end of the manual control mechanism.

Fig. 5 is a transverse section on the line 5—5 of Fig. 4.

Fig. 6 is a developed view on a section similar to that of Fig. 1, showing an automatic pneumatic interlock.

Fig. 7 is a view partly in elevation and

partly in section showing a mechanical interlock.

Fig. 8 is a side elevation, with parts broken away, of the control valve shown in Fig. 6.

Fig. 9 is a similar view of the valve shown in Fig. 3.

I have shown the illustrative embodiment of my improved feeding mechanism cooperating with a pressure actuated tool 1 which may be of any well-known type having fluid pressure and cleansing fluid supplied thereto as designated at 2 and 3, and actuating a steel 4.

The cylinder 5 of the tool is provided at the bottom side thereof with a base portion 6 and gibs 7 which cooperate with guides 8 formed on a member 9 within which the feed cylinder, which constitutes a portion of my improved construction, is formed. The feed cylinder, as stated, is formed in a block 9 upon which the guides 8 are formed and comprises a bore 10 into which is pressed or otherwise suitably inserted, a liner 11 of cylindrical form. Reciprocable within the liner 11 is a feed piston 12 of usual exterior construction provided with packing rings 13 and secured to a piston rod 14 which at its forward end is joined to a clamp member 15 which receives between its jaws 16 the forward end of the chuck housing of the fluid pressure actuated tool 1. From the description so far presented, it will be obvious that the movements of the piston 12 within the cylinder liner 11 will result in the reciprocation of the tool 1 in guided relation to the feed cylinder due to the co-action of the gibs 7 and guides 8.

Referring to the mechanical feed, it will be noted that the feed piston 12 and piston rod 14 are bored out and internally threaded for substantially the entire length of the piston rod as indicated by 17; and mounted in the rear head of the feed cylinder is a member 21 which projects longitudinally into the cylinder liner 11 and concentrically there-

with. This member 21 has a free fit in the threaded bore 17 and is in turn provided with a central bore 22 in which a rod 23 is rotatably mounted. The rod 23 at its forward end is provided with a head 24 and within slots in the forward end of the member 21 are arranged a pair of members 26 which are generally rectangular in cross section and which are provided with threads of the same pitch as the threads in the bore 17. The forward end of the rod 23 is reduced at diametrically opposite portions in such manner as to provide a portion generally oval in cross section, this being designated 27. In suitable grooves 28, formed between the ends of the members 26, is a spring which normally retains the members 26 in contact with the flattened sides of the oval portion 27 mentioned. When, however, the member 23 is rotated through an angle with respect to the member 21, the oval portion is shifted with respect to the members 26 in such manner that its longer axis lies perpendicularly between them and accordingly the members 26 are forced outward and the teeth thereon move into mesh with the internal teeth of the bore 17. At this time, it will be obvious that the member 21 and the piston rod 14 will be locked against longitudinal movement and it will further be obvious that rotation of the member 21 will cause longitudinal movement of the piston rod 14 by reason of the screw and nut action between the parts. For the purpose of permitting ready rotation of the member 21, a handle 30 is secured to the rear end thereof by means of clamp 31 and for the purpose of moving the member 23 angularly relatively to the member 31, a second handle 32 is secured to the rear end of the member 23. From the foregoing description, it will be obvious that movement of the handle 32 relative to the handle 30 will result in a movement of the segments 26 into and out of mesh with the threaded bore 17 in such manner that the piston rod and accordingly the fluid pressure operated motor can be moved with respect to the mounting of the feed cylinder member in a longitudinal direction by mechanical means when desired. I have also provided a pneumatic means for the control of the feed piston 12 comprising a hollow valve 35 to the interior of which fluid pressure is supplied by a connection 36 and which is adapted to supply from its interior live fluid to ports 39 and 40 running to the opposite ends of the feed cylinder liner 11. Suitable grooves 41 are also provided to cooperate with exhaust ports 42 to permit the exhaust of fluid from one end of the cylinder while admitting it to the other or simultaneous connection of both ends of the cylinder to exhaust. It will further be noted that the forward end of the feed cylinder is split, as at 43, and is provided with a friction brake adjustably controlled by a clamping

member 43'. When it is desired to retard the feed of the drilling motor relative to the feed cylinder, the clamp 43' may be tightened, thereby causing the brake to frictionally engage the rod 14.

From the foregoing description taken as a whole, it will be obvious that if it be desired to use my improved feed mechanism entirely as a pneumatic type feed, the handle 32 will be moved into such relation with the handle 30 as to permit the spring in the groove 28 to retract the segments 26 to their minimum distance apart as in that position they do not mesh with the teeth formed in the interior of the bore 17. There will then be an entire freedom of feed piston and piston rod for movement under the action of the live fluid. If, however, it be desired to employ a manual feed either to get a more delicate control or for any other reason that may arise, the pneumatic feed will be discontinued and both ends of the feed cylinder connected to the exhaust and thereafter the handle 32 moved with respect to the handle 30 in such manner as to separate the segments 26 and cause them to bring their teeth into mesh with the teeth of the bore 17. Thereafter, the feed will depend entirely upon the movement of the handle 30.

It will be obvious that should the relative positions of the handles 30 and 32 be accidentally changed during the use of the pneumatic feed in such manner as to cause a partial protrusion of the blocks 26, the teeth on the blocks would tend to mesh with the internal teeth 17 of the piston and piston rod and would either lock the mechanism or cause wearing away of the points of the teeth. Obviously various means can be employed for the purpose of preventing disturbance of the relative position of the handles at the will of the operator and I preferably employ a mechanism such as is shown in Fig. 6 for this purpose. In this figure, I have illustrated automatic interlocking means controlled by the valve which distributes pressure fluid to the opposite ends of the feed cylinder in such manner that when either end of the cylinder is supplied with pressure fluid, the handles 30 and 32 will be locked against relative rotation. It will be obvious that a valve similar to that shown in Fig. 3 could be used for the control of the feed cylinder with a mechanism of this type, but for the purpose of simplifying the construction somewhat and bringing the ports into a single plane, I have shown a modified valve construction comprising a valve chest 44 in which there is rotatably mounted a valve member 45 having an internal chamber 46 in constant communication with pressure fluid, a port 47 connecting the internal and external peripheries of the valve and an exhaust groove 48 extending about two thirds of the way around the external pe-

riphery of the valve and in the same transverse plane with the port 47. From the opposite sides of the valve casing, passages 40 and 40' extend to the opposite ends of the feed cylinder and at a point 90° removed from each of these passages, an exhaust port 49 is provided. It will be obvious that with the valve in the position shown, pressure fluid is transmitted to the passage 40, and the passage 40' is in communication with the exhaust 49. A rotation of the valve through 90° in a counter-clockwise direction, will bring the passages 40 and 40' both into communication with the exhaust 49. A further rotation of 90° will leave the passage 40 in communication with the exhaust while supplying live fluid to the passage 40'. It will thus be obvious that the feed cylinder may have pressure fluid supplied to either end thereof to cause motion of the piston in either direction that may be desired or that both ends of the cylinder may be connected to the exhaust in such manner as to leave the piston freely movable for manual control of the piston. For the purpose of providing an automatic lock, I arrange cylinders 50 and 51 parallel to the axis of the piston rod and in the collar member 52 surrounding the latter. Within these cylinders are reciprocable pistons 53 and 53', these pistons being moved in one direction by springs 54 and 55, and in the opposite direction by pressure fluid in a manner hereinafter described. Each of the pistons is provided with a locking stem 56 and 57 in position to engage sockets 58 and 59 respectively formed in the member with which the handle 32 is integral. It will be obvious that when either of the stems 56 or 57 is within its respective socket 58 or 59 relative rotation of the handles 30 and 32 is impossible. The piston rod is provided within the rear head of the cylinder with a pair of longitudinally separated annular grooves 60 and 61, which grooves are connected with passages 40 and 40' by passages 62 and 63. U-shaped connections 64 and 65 respectively connect the groove 60 with the forward end of cylinder 50 and the groove 61 with the forward end of cylinder 51. From the foregoing description, it will be obvious that whenever fluid pressure is supplied either to passage 40 or 40' one of the pistons 53 or 53' will be forced rearward in its cylinder against the pressure of the spring 54 or 55 and will lock the two handles against relative movement. When, however, both the passages 40 and 40' are in communication with the exhaust, the passages 62 and 63 will also communicate with the exhaust and the springs will force the pistons 53 and 53' into release position, thereby permitting relative rotation of the handles 30 and 32.

If it be desired to employ a purely mechanical lock of the non-positive type, this

may be done by arranging within the hub of the handle member 32, a socket 66 coaxial with the rod 23 and a locking member 67 provided with crown teeth 68 adapted to mesh with similar teeth 69 on the rear end of the member 21, the member 67 having a splined sliding connection as at 70 with the member 23 and being forced forwardly by a spring 71. Obviously, movement of the handles relative to each other can be accomplished by reason of the fact that the inclined surface of the teeth will coact, upon lateral pressure upon one of the handles, while the other remains stationary, to cause rearward movement of the member 67, but as soon as rotation of the handle ceases, the spring 71 will force forward the member 67 and lock the two handles against rotation due to vibration.

While I have in this application specifically described certain forms which my invention may assume in practice, it will be understood that these forms are shown for purposes of illustration and that the invention may be modified and embodied in other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In combination with work performing means, pressure fluid actuated feeding means and manually operable feeding means for said work performing means, control means for each of said feeding means, and means for preventing simultaneous effective operation of both said control means, said latter means comprising a fluid actuated interlocking connection cooperating with one of said control means.

2. In combination with work performing means, pressure fluid actuated feeding means and manually operable means for feeding said work performing means, said latter means including elements disposed wholly within elements constituting said first mentioned feeding means, and means for preventing operation of one of said feeding means as long as the other thereof is operative.

3. In combination with work performing means, feeding means therefor comprising a feed cylinder, means for supplying pressure fluid to said cylinder, a manually controllable expansible thread engaging feed member arranged in said cylinder, and a feed piston having an internally threaded hollow piston rod with which said expansible feed member is engageable and operatively connected to said work performing means, said piston being reciprocable in said cylinder selectively under the control of pressure fluid or said expansible feeding member.

4. In combination with work performing means, feeding means therefor comprising a feed cylinder provided with guides for said

work performing means, a reciprocable piston contained in said cylinder, a piston rod secured respectively to said piston and to said work performing means, said piston rod
 5 having an internally threaded longitudinally extending bore, a rotatable member arranged within said piston and piston rod, an expansible threaded nut arranged on said rotatable member, and means for expanding said
 10 nut into engagement with the internally threaded bore of said piston rod.

5. In combination with work performing means, feeding means therefor comprising a member forming a chamber, a member reciprocable therein, means for supplying fluid
 15 to said chamber to effect reciprocation of said second mentioned member in opposite directions, a plurality of concentrically arranged members cooperating with said reciprocable member to effect its reciprocation,
 20 and means controlled by the pressure fluid used to effect reciprocation of said second mentioned member to lock said concentrically arranged members together.

25 6. In combination with work performing means, feeding means therefor comprising a member forming a chamber, a reciprocable member contained in said chamber, means for supplying pressure fluid to said chamber to
 30 effect reciprocation of said second mentioned member in opposite directions, a plurality of concentrically arranged, relatively rotatable members cooperating with said reciprocable member to effect its reciprocation, and means
 35 to positively prevent relative rotation between said concentrically arranged members.

7. In combination with work performing means, feeding means therefor comprising a feed cylinder, a reciprocable piston contained
 40 therein, means for supplying pressure fluid to the opposite ends of said cylinder to effect reciprocation of said piston in opposite directions, a pair of relatively rotatable members adapted to cooperate with said piston to
 45 effect rectilinear movements thereof, and means for controlling the relative rotation of said members to control their cooperation with said piston, said latter controlling means being operated by the pressure fluid supplied
 50 to either end of said cylinder.

8. In combination with work performing means, feeding means therefor comprising a feed cylinder, a reciprocable piston contained therein, means for supplying pressure fluid
 55 to the opposite ends of said cylinder to effect reciprocation of said piston in opposite directions, a pair of relatively rotatable members adapted to cooperate with said piston to effect rectilinear movements thereof, and
 60 means for controlling the relative rotation of said control members to control their cooperation with said piston, said latter means including separate locking elements respectively operated by the pressure fluid supplied
 65 to either end of said cylinder.

9. In combination with work performing means, feeding means therefor comprising a pressure fluid actuated feeding mechanism, a mechanical feeding mechanism, and pressure fluid controlled means for preventing
 70 operation of one of said feeding mechanisms as long as the other thereof is operative.

10. In combination with work performing means, feeding means therefor comprising a pressure fluid actuated feeding mechanism, controlling means therefor, a mechanical feeding mechanism, controlling means therefor, and means disposed between said controlling means for positively preventing simultaneous effective operation thereof.
 80

11. In combination with a pressure fluid actuated drilling motor, feeding mechanism therefor comprising a pressure fluid feed cylinder and piston reciprocable therein, a piston rod connected to said piston and said
 85 drilling motor, said piston rod being provided with an internally threaded bore, an expansible nut arranged therein, manually controlled cam means adapted to expand said nut into engagement with said threaded bore,
 90 and means cooperating with said nut when expanded to effect a manual feed of said drilling motor.

12. In combination with work performing means, feeding means therefor comprising a feed cylinder, a reciprocable piston contained in said cylinder and having an internally threaded hollow piston rod operatively connected to said work performing means, means
 95 for supplying pressure fluid to said cylinder to effect reciprocation of said piston in opposite directions, a manually operable member extending axially within said cylinder, expansible nut forming elements carried by
 100 said latter member, means disposed coaxially within said latter member for expanding said nut elements into engagement with the internally threaded bore of said piston rod, and means for preventing operation of said nut
 105 expanding means necessarily operative when fluid is being supplied to said cylinder.

13. In combination with work performing means, feeding means therefor comprising a feed cylinder, a reciprocable piston contained in said cylinder and having an internally threaded hollow piston rod operatively connected to said work performing means, means
 110 for supplying pressure fluid to said cylinder to effect reciprocation of said piston in opposite directions, said means including a manually operable valve, a manually operable member extending axially within said piston rod, expansible nut forming elements carried by said latter member, means disposed
 115 coaxially within said latter member for expanding said nut elements into engagement with the internally threaded bore of said piston rod, and means controlled by said valve for preventing operation of said nut
 120
 125
 130

expanding means necessarily operative when fluid is being supplied to said cylinder.

14. In combination with work performing means, pressure fluid actuated feeding means therefor, means for controlling the supply of
5 pressure fluid to said feeding means, manually operable feeding means for said work performing means, control means for said manually operable feeding means, and means controlled by said pressure fluid supply control
10 means for preventing operation of said manually operable feeding means necessarily operative when fluid is being supplied to said fluid actuated feeding means.

In testimony whereof I affix my signature.

ELMER G. GARTIN.