G. H. GILMAN.

THROTTLING DEVICE FOR PNEUMATIC TOOLS OR THE LIKE.

APPLICATION FILED FEB. 2, 1907.

984,424. Patented Feb. 14, 1911.

Fig 1.

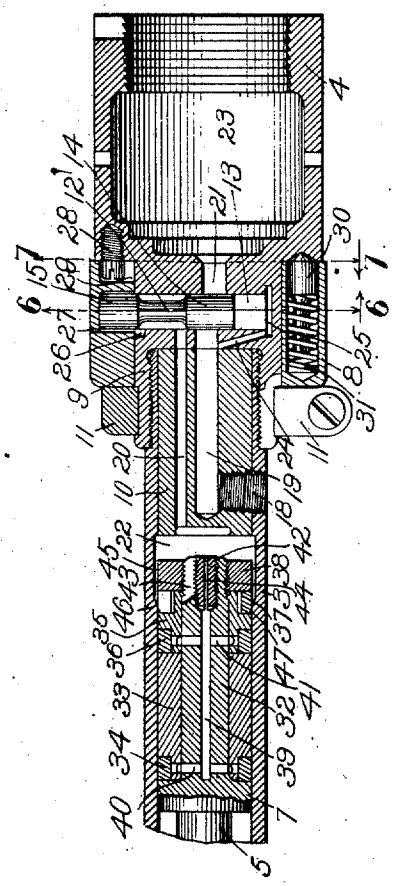


Fig 2.

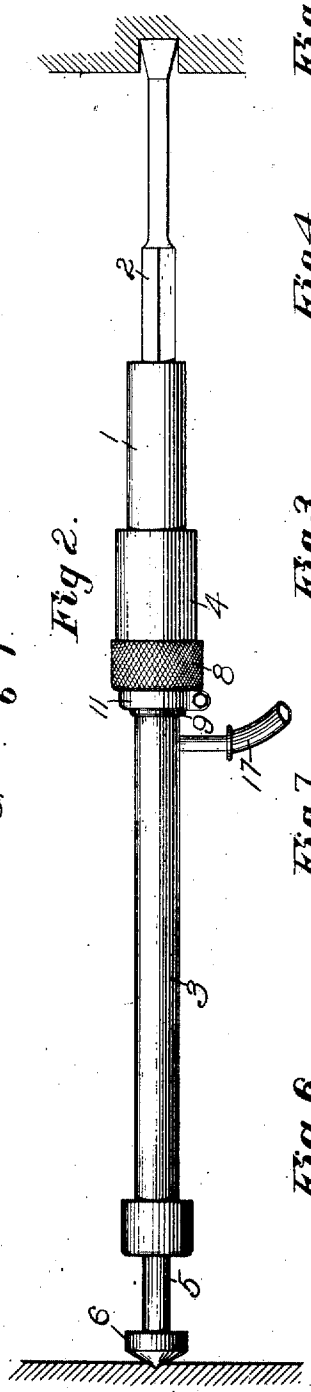


Fig 5

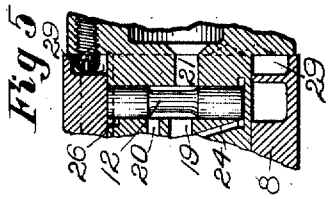


Fig 4

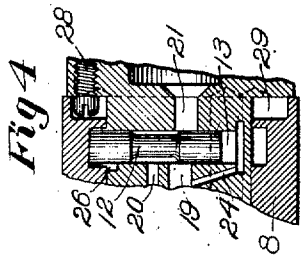


Fig 3

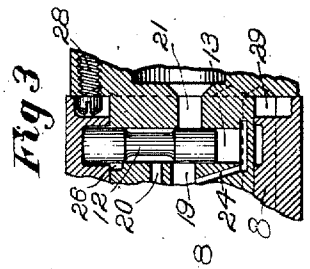


Fig 7

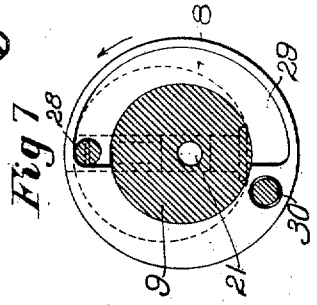
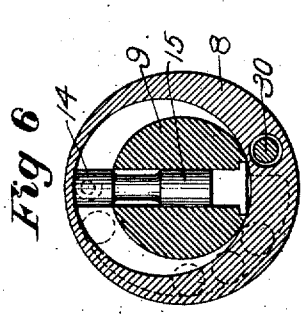


Fig 6



Witnesses:
Jesse A. Holton.
Robert H. Kammler.

Inventor.
George H. Gilman
by Emery Booth
Attys

UNITED STATES PATENT OFFICE.

GEORGE H. GILMAN, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, OF CLAREMONT, NEW HAMPSHIRE, A CORPORATION OF MAINE.

THROTTLING DEVICE FOR PNEUMATIC TOOLS OR THE LIKE.

984,424. Specification of Letters Patent. Patented Feb. 14, 1911.

Application filed February 2, 1907. Serial No. 355,493.

To all whom it may concern:

Be it known that I, GEORGE H. GILMAN, a citizen of the United States, residing at Claremont, in the county of Sullivan, State of New Hampshire, have invented an Improvement in Throttling Devices for Pneumatic Tools or the Like, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to throttling devices, being more particularly concerned with the throttle control of the tool operated by compressed air or other pressure fluid, and particularly where such tools are fed toward or held to the work by means of a pressure actuated feeding device.

My invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof while its scope will be more particularly pointed out in the appended claims.

In the drawings:—Figure 1 represents in fragmentary sectional central elevation a tool appliance to which is applied one form of my invention; Fig. 2 represents in side elevation on a smaller scale the tool appliance shown in Fig. 1; Figs. 3, 4 and 5 show a reproduction of a fragmentary portion of the sectional view in Fig. 1, the throttle valve, however, being shown in different positions. Fig. 6 is a section on the line 6—6 in Fig. 1 looking in the direction of the arrow, and, Fig. 7 is a section on the line 7—7 in Fig. 1 looking in the direction of the arrow, shown in connection therewith.

Referring to the drawings and to the embodiment of my invention there shown, I have illustrated the principles thereof by showing its application to a pneumatic hammer drill of ordinary and usual construction.

The details of the drill are not shown, it being sufficient to say that in the apparatus described the cutting tool 2 is held in a suitable chuck at the end of the drill tool cylinder 1, and is struck a series of rapidly reoccurring blows by a reciprocatory piston (not shown) within the drill tool cylinder, all of which is well understood by those skilled in the art.

Associated with the drill tool I have shown pressure fluid feeding means for holding the cutting tool up against its work, said means acting also to feed the tool as the cut deepens. My invention is in no respect limited to the particular type of feeding means shown, but the same herein consists of a cylinder 3 having one end fixedly attached to the head block 4 of the drill tool and the opposite end provided with a packed aperture through which projects the piston rod 5, carrying at its end the pointed foot 6 adapted to be braced against a vertical side wall of a mine or quarry, in which the apparatus is used. Within the cylinder the piston rod is secured to the piston 7, so that when air is admitted to the cylinder between the piston and the forward cylinder head or that next adjacent the drill tool, the cylinder with its attached head is pressed forwardly in much the same fashion as if the hammer drill were pressed forward against the work by the hand of the operator.

For controlling the admission of pressure fluid not only to the feeding cylinder but also to the tool itself, there is provided a rotatable sleeve 8 which is mounted upon a reduced portion 9 of the drill tool head 4. Into the end of the reduced head portion 9 is threaded the end of the feeding cylinder 3, so that the latter and the cylinder head block 10, which closes the end of the cylinder, are seated against and fixedly held by the walls of the drill head.

To retain the sleeve 8 longitudinally in position there is provided the split clamping collar 11, which is clamped about the necked-down end of the reduced head portion 9. In order that this clamp may also assist in securing the cylinder end more firmly, the interiorly threaded necked-down portion of the head portion is preferably provided with two or more longitudinal slits (not shown) so that when the clamping collar is set up tight it also clamps the head and the cylinder into firm threaded engagement with each other.

Arranged transversely within the reduced portion of the drill head is provided the throttle valve 12, herein shown of the piston type, working in a cylindrical-pocket or recess 13 and controlled by rotative movement of the sleeve 8. This valve is provided with an inner head 14, an outer head 15 and a reduced connecting portion. The outer head 15 contacts with the seat or bottom of an annular groove or recess, such groove or re-

cess, however, being eccentrically formed (see Fig. 6) in the sleeve so as to provide at its bottom face a cam surface which engages the outer projecting head of the valve.

Pressure fluid is supplied jointly from any suitable source (not shown) to the feeding cylinder and the tool by the pipe 17, which latter has a threaded nipple connected to the admission opening 18 at the side of the cylinder near its attachment to the drill tool. Communicating with the admission opening 18 is the main supply port 19, which extends longitudinally forward through the cylinder head block 10 and the tool head block to the valve pocket 13, access of the pressure fluid from this port to the valve pocket being controlled by the inner head 14 of the valve, which may be moved to open the exit wholly or partially or to completely close the same. Opening out of the valve pocket are two passages 20 and 21, the former being arranged parallel with the admission port 19 and leading back to the pressure space 22 within the feeding cylinder. The second and shorter passage 21 leads from the valve pocket in the opposite direction to the pressure space 23 of the drill tool, whence pressure is supplied to the tool cylinder through the control of a suitable differential or other valve (not shown) of any usual or suitable construction.

To cause the valve to seat normally out against the bottom of the eccentric sleeve groove there is provided means for maintaining constant pressure upon the inner end of the valve. While this might be effected by mechanical means, such as a spring, for simplicity and greater effectiveness I provide a pressure duct 24 connecting the pressure fluid supply port 19 and the enlarged bottom 25 of the valve pocket. Pressure fluid acting against the enlarged inner head of the valve presses it constantly outward against the cam surface of the sleeve groove.

When the apparatus is in disuse the sleeve is turned to a position which places the valve as shown in Fig. 1. Under these conditions the cylinder passage 20 is uncovered and placed in communication with the upper part of the valve pocket. The outer end of the valve pocket is provided with a notch or recess 26, and this connects the upper end of the valve pocket with the eccentric groove or recess, which is made somewhat wider than the diameter of the valve head 15 and is also vented through one or more apertures 27 leading to the exterior, so that with the valve as shown in Fig. 1 the cylinder space 22 is connected directly to the atmosphere and the pressure fluid is exhausted. Under these conditions also, the inner valve head 14 closes the passages 19 and 21 cutting off the supply of pressure fluid to the drill tool. If the sleeve is then turned from the position shown in Figs. 1 and 6, the increasing shallowness of the cam groove forces the valve inwardly. This first closes the exhaust from the feeding cylinder by covering the notch 26 with the outer head of the throttle valve and then causes the uncovering of the admission port 19, so that the latter is placed in communication with the cylinder port 20, admitting feeding pressure to the cylinder space 22. The valve is then in some such position as shown in Fig. 3, the drill port 21 still being closed. With the drill tool pressed against the work by the pressure fluid in the feeding cylinder, if the sleeve is turned still farther in the same direction the valve will be forced to some such position as shown in Fig. 4 where a restricted admission of pressure fluid takes place to the drill tool through the port 21. Further movement of the sleeve forces the valve toward the position shown in Fig. 5, where full admission to the drill tool takes place, the pressure fluid as before freely entering the cylinder port 20 to keep the tool pressed against its work.

It will thus be seen that in the illustrative embodiment of the invention submitted there is provided a single controlling device which acts to control both the feeding pressure fluid and the tool pressure fluid, this being accomplished in the present instance by successive steps, so that before the tool pressure fluid is applied feeding pressure fluid for holding the tool against the work is first admitted.

In order that the sleeve may have a definite range of movement and be turned with certainty from a fixed initial position to a definite final position there is provided a fixed stop pin 28 projecting longitudinally and rearwardly from the enlarged portion 4 of the drill head and working (see Fig. 7) within a segmental groove or recess 29 in the side of the sleeve. When the sleeve is turned to one limit of its movement, corresponding to the valve position in Fig. 1, the pin is caused to abut against one end of the groove and when turned to the opposite limit of movement and in the direction of the arrow in Fig. 7, corresponding to position shown in Fig. 5, the pin is caused to abut against the opposite end of the groove.

In order to assist the retention of the sleeve in both the extreme and intermediate positions assigned, and to assist the operator in finding, by the sensation of touch alone, those intermediate positions which practice may show are the more often required, I have provided a positioning device for the sleeve, comprising a pin 30 seated in a longitudinal pocket in the sleeve, and having its beveled head pressed outwardly by the spring 31, so as to seat in any one of a series

of depressions formed in the opposing face of the head block, the latter being brought into successive alinement with the pin as the sleeve is turned. In the illustrated form of the device there are five such depressions (see Fig. 6) formed corresponding to the two extreme positions of the sleeve and the three intermediate positions. As may be readily understood these are of such formation that when the pin 30 is brought opposite one of the depressions it snaps into the same, holding the sleeve against accidental displacement, although readily yieldable to permit further turning of the sleeve under the grasp of the operator's hand.

While the piston may be of any desired construction, in order to better prevent leakage from the pressure cylinder, the piston, in the apparatus shown, has a reduced end 32 (Fig. 1) on which there is provided a sleeve 33. The inner end of said sleeve has formed thereon a shoulder adapted to receive a packing ring 34, which latter, therefore, rests between the shoulder and the enlarged portion of the piston 7. Beyond the sleeve 33 there is also provided another shouldered sleeve carrying a second packing ring 36. On an outer shoulder of the sleeve 35 is arranged a split expanding ring 37 and this, together with the sleeve 35, is retained in place by the feed-piston-nut 38 secured to the threaded end of the reduced piston portion 32. The reduced piston portion is provided with an axial passage 39 extending part way into the same and opening into the pressure space 22, radial passages 40 alining with the piston ring 34 and other radial passages 41 alining with the piston ring 36 being extended from the axial passage through the piston and the respective sleeves, so as to admit pressure fluid constantly to the inside of the piston rings. So long, therefore, as feeding pressure fluid is admitted to the pressure space, it also acts to expand the rings and better to prevent leakage. A tapered plug 42 is threaded into the end of said piston and the latter is split at 43, so that the plug expands the piston end within the threaded nut 38 and prevents any loosening of the parts. The plug is provided with an axial passage 44, which places the piston passage 39 in communication with the pressure space 22. The inner end of the feeding cylinder is enlarged slightly at 45 where its walls engage the spring 37 in the contracted condition of the piston, so that the expansion of the ring tends to retain the piston normally in that position, rendering it more convenient for purposes of transportation or handling. The enlarged portion of the cylinder, however, is beveled at 46 and the end of the ring is also rounded at 47, so that pressure fluid when admitted will readily force the piston outward by forcing the ring to contact and ride over the beveled wall. This construction constitutes a convenient retention device for retaining the apparatus in its contracted condition.

While I have shown and described in detail one form of my invention it is to be understood that the same is not to be limited to the particular detail or form or relation of parts shown, but that extensive modifications may be made therein without departing from the spirit of my invention.

Claims.

1. The combination with a pressure fluid tool of pressure fluid feeding means therefor, a movable sleeve and means operated by the movement of said sleeve for controlling the admission of pressure fluid to said tool and to said feeding means.

2. The combination with a pressure fluid tool of pressure fluid feeding means therefor, a rotatable sleeve and means operated by the rotated movement of said sleeve for controlling pressure fluid admission to said tool and to said feeding means.

3. The combination with a pressure fluid tool of pressure fluid feeding means alined therewith and sleeve controlled throttling means both for the tool and the feeding means and located between the same.

4. The combination with a pressure fluid tool of pressure fluid feeding means therefor, a feeding cylinder having its head end connected thereto, a feeding piston and piston rod, the latter extending through the opposite cylinder end, a tool throttle valve and a rotatable sleeve for controlling said throttle valve.

5. The combination with a fluid pressure tool of a feeding cylinder in substantial alinement therewith, a drill tool-head to which said feeding cylinder is attached, the latter containing suitable passages or spaces for the reception of the valve and other parts, the said feeding cylinder having threaded connection with said drill tool-head, a feeding piston in said feed cylinder, a piston rod connected thereto and projecting through the open opposite end of said cylinder, a throttle valve and a sleeve for controlling said valve mounted upon a reduced portion of said drill tool-head.

6. The combination with a fluid pressure tool, of a feeding cylinder rigidly secured to the end of said tool, a feeding piston slidably mounted within said cylinder, a piston rod connected thereto and projecting through the opposite open end of said cylinder, a valve and a valve controlling sleeve for controlling the pressure fluid supply to said feeding cylinder, said sleeve being mounted in a reduced portion of said drill tool.

7. In an apparatus of the class described, a pressure fluid tool having a tool-cylinder, a feeding cylinder, a drill tool-head connected at one end with the tool cylinder and

of the other with the feeding cylinder, a sleeve encircling a reduced portion of the drill tool-head near the feeding cylinder and a valve transversely arranged in said drill tool-head and controlling a pressure fluid passage leading to said feed cylinder, said valve being controlled by said encircling sleeve.

8. The combination with a pressure fluid tool of pressure fluid feeding means therefor, and a controlling device for said tool and said feeding means comprising a member having pressure fluid supply passages leading, respectively, to said tool and said feeding means, a sleeve mounted for turning movement on said member and a valve arranged transversely in said member to control the pressure supply passage and adapted to be actuated by movement of the sleeve.

9. The combination with a pressure fluid tool of pressure fluid feeding means therefor, the same comprising a feeding cylinder and a relatively movable feeding piston, the one attached to the tool and the other adapted to be held by a suitable support, a movable sleeve, and means operated by the movement of said sleeve for controlling the admission of pressure fluid to the tool and to the feeding means.

10. The combination with a pressure fluid tool of pressure fluid feeding means therefor, the same comprising a feeding cylinder and a relatively movable feeding piston, one of which is attached to said tool and alined therewith, whereby the apparatus is given a column-like formation, a movable sleeve mounted upon said column-like formation, and means operated by the movement of said sleeve for controlling the admission of pressure fluid to the tool and to said feeding means.

11. The combination with a pressure fluid tool of pressure fluid feeding means therefor, and a rotatable sleeve throttle for the tool and the feeding means located between the tool and the feeding means.

12. The combination with a pressure fluid tool of pressure fluid feeding means therefor, a rotatable sleeve, means operated by movement of said sleeve for controlling the admission of pressure fluid to the tool and to the feeding means, and positioning means for said sleeve.

13. The combination with a pressure fluid tool of pressure fluid feeding means therefor, fluid pressure supply passages leading to said tool and to said feeding means, a valve controlling the same, a rotatable sleeve for operating said valve and positioning means for said sleeve comprising a spring-pressed member carried by said sleeve and adapted to engage with one or more depressions in an adjacent operating member.

14. The combination with a pressure fluid tool of pressure fluid feeding means therefor, a rotatable sleeve, means controlled by the movement of said sleeve for admitting pressure fluid to said tool and to said feeding means, a fixed member adjacent the sleeve, a plurality of depressions in said fixed member, a pocket in said sleeve, and a spring-pressed pin in said pocket adapted to engage with depressions on rotation of said sleeve.

15. The combination with a pressure fluid tool of pressure fluid feeding means substantially alined therewith, the same comprising a feeding cylinder and a feeding piston, one of which is attached to the head of said tool, suitable pressure fluid passages in the tool head, a throttle valve also in said tool head controlling admission of pressure fluid to the tool and to the feeding cylinder, and a sleeve for controlling said throttle valve movably mounted upon said tool head.

16. The combination with an apparatus having a pressure fluid tool of pressure fluid feeding means therefor, a valve for said tool and said feeding means, and means for actuating said valve through the assistance of the pressure fluid.

17. An apparatus of the class described having the pressure fluid tool 1, the feeding cylinder 3, the feeding piston 7, the sleeve 8, the throttle valve 14, and pressure fluid supply passages 19, 20 and 21 controlled thereby.

18. In an air feed hammer drill, a head block, an air supply, an air feed cylinder attached directly to the head block, a piston located in the cylinder having its rod extended rearwardly to form a rear support for the tool, and a manually operated valve in the head block for controlling communication between the air supply, the air feed cylinder and the hammer.

19. In an air feed hammer drill, a head block, a hammer tool, an air supply, an air feed cylinder attached to the head block, its piston having a part extending from the rear of said cylinder, and a manually operated valve in the head block having passages arranged when in one position to open communication between the air supply and the air feed cylinder and close communication between the air supply and hammer and when in another position to open communication between the air supply and the air feed cylinder and the hammer.

20. In an air feed hammer drill, a head block, a hammer tool, an air supply, an air feed cylinder attached to the head block, a piston having a part extending from the rear of said cylinder, and a manually operated valve in the head block having passages arranged when in its first position to open communication between the air feed cylinder and external atmosphere and close communication between the air supply, the

air feed cylinder and the hammer; when in its second position to close communication between the air feed cylinder and external atmosphere and between the air supply and hammer and to open communication between the air supply and air feed cylinder; and when in its third position to open communication between the air supply, the air feed cylinder and the hammer.

21. In an air feed hammer drill, a head block, a hammer tool connected thereto, an air supply, an air feed cylinder attached to the head block, a piston having a part extending from the rear of said cylinder, and a manually operated valve having passages arranged when in one position to open communication between the air supply and the air feed cylinder and close communication between the air supply and hammer and when in another position to open communication between the air supply and the air feed cylinder and the hammer.

22. In an air feed hammer drill, the combination with a hammer tool, of a feed cylinder having a rigid connection to the tool, a feeding piston within the cylinder, a fluid passage leading to the hammer tool, a fluid passage leading to the cylinder for admitting pressure fluid thereto, and a single manually operated valve controlling said passages and arranged when in one position to open communication between the air supply and the air feed cylinder and close communication between the air supply and hammer, and when in another position to open communication between the air supply and the air feed cylinder and the hammer.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE H. GILMAN.

Witnesses:

L. WILLSON HALL,

E. J. BURCHARD.