

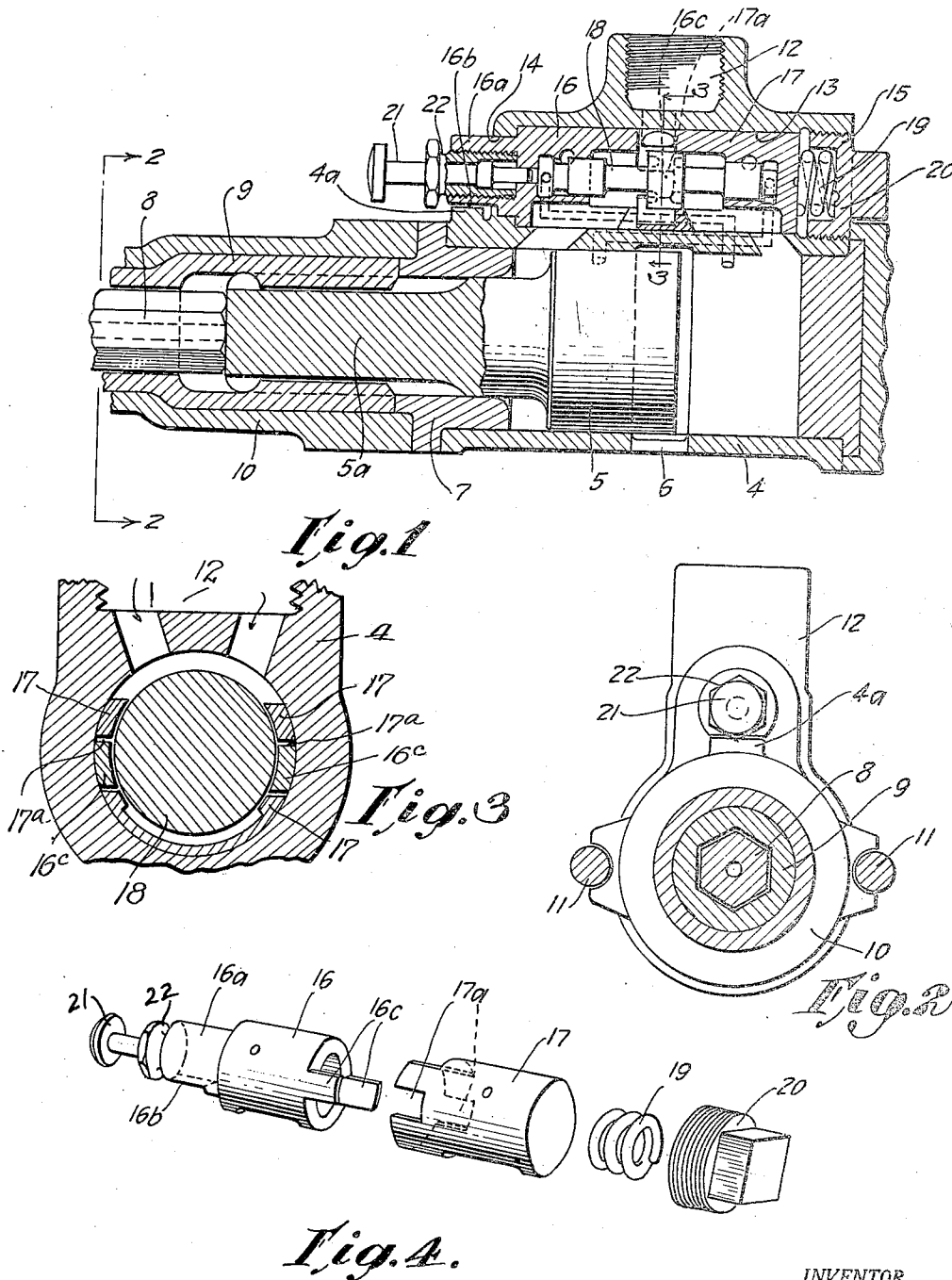
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REGISTRATION OF VALVE CHESTS AND BUSHINGS

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REGISTRATION OF VALVE CHESTS AND BUSHINGS

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This invention relates to fluid pressure tools having automatically thrown valves for controlling the distribution of the motive fluid to the piston chamber. More particularly it concerns the valve chamber and the bushings which line the walls thereof and take the wear of the valve.

One object of the invention is to provide an improved arrangement for insuring the insertion of valve bushings in the valve chest in proper relation to the ports in the same and in proper relation to each other and securely to hold them in such position. Another object is to arrange a manually operable blowing plunger on a bushing for insertion as a unit in a valve chest. Other objects will be apparent from the detailed description which follows.

In order to illustrate the invention one concrete embodiment thereof is shown in the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view through a fluid pressure percussive drill;

Fig. 2 is a transverse sectional view substantially on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary transverse sectional view on an enlarged scale substantially on the line 3—3 of Fig. 1; and

Fig. 4 is a perspective view of the valve bushing parts in spaced alignment to indicate the manner of assembling the same in the valve chest.

Fig. 1 illustrates a fluid pressure drill of the valved type comprising a cylinder 4 in which reciprocates a hammer piston controlling a main exhaust 6 and having an extension 5a guided in a cylinder bushing 7 and arranged to impart blows to a drill steel or other working tool 8 supported in a chuck 9 rotatably arranged in front head 10 which may be secured to the cylinder 4 in any suitable manner as by the conventional side rods or through bolts 11 (Fig. 2). Adjacent the fluid inlet port 12 cylinder 4 provides an elongate valve chest 13 having a small opening 14 toward the forward end of the tool and a larger threaded opening 15 at the back, the chest being adjacent to and in parallelism with the piston chamber and connected to the same with various ports and passages as

indicated. These ports and passages are arranged to register with ports and passages in valve bushings 16 and 17 in valve chest 13, which bushings slidably receive a pressure-thrown automatic valve 18 which controls the distribution of the motive fluid to the piston chamber and moves in timed relation with piston 5. The valve arrangement and porting may be of any known type and since it forms no part of the present invention further description thereof is omitted.

The valve bushing assembly and arrangement to which the invention relates will now be described. In the assembly of the tool either originally or after repairs, it is essential to the proper functioning of the tool that bushings 16 and 17 when placed in valve chest 13 be in the proper position to cause the ports and passages therein to register with the ports leading to the piston chamber. At least one of the bushings must be disposed in the valve chest in the proper angular position and positively held against turning movement. In the present instance the outer or forward bushing 16 has an extension 16a which projects through small opening 14 of the valve chest and serves as a closure for the same. A projection 4a on cylinder 4 adjacent valve chest opening 14 provides a flat which slidably engages a cooperating flat 16b on bushing 16 so that it is possible to insert this bushing through opening 15 into valve chamber 13 and to seat the same in small opening 14 in one angular position only, namely, the one in which flat 16b cooperates with the flat on projection 4a. To insure that the inner or rearward bushing 17 is as positively held in one position of angular adjustment only in the valve chest, off-center projections 16c are provided on bushing 16 to cooperate with off-center sockets 17a in bushing 17. Since there are two such sockets and projections, it is impossible to assemble the two bushings in axial alignment in more than one position. Projections 16c and the lugs on bushing 17 between sockets 17a not only form an interlock between the two bushings but, by engaging the bushings respectively with their ends, determine the longitudinal spacing of the bushings. A spring 19 interposed between bush-

ing 17 and a screw plug 20 threaded into opening 15 yieldingly maintains the bushings in engagement.

End 16a of bushing 16 which projects through small chest opening 14 has a bore opening into the valve chamber to receive a manually operated plunger 21 which is held in place by a retainer plug 22 threaded into the enlarged counterbore. By forcing plunger 21 inwardly the operator may interrupt the movement of valve 18 and retain it in the retracted position shown in Fig. 1 so as to hold piston 5 at the end of its rearward stroke and permit motive fluid from the forward end of the piston chamber to blow down through the hollow drill steel to remove cuttings from the drill hole.

While the invention has been herein shown and described in what is now considered to be a preferred form, it is to be understood that the invention is not limited to the specific details thereof, but covers all changes, modifications, and adaptations within the scope of the appended claims.

I claim as my invention:

1. A fluid pressure tool having a valve chest provided with ports, an automatically thrown valve for controlling said ports, and bushings insertable axially into said chest, cooperating means on said tool and one of said bushings providing for one position only of the latter in said chest, and mutually cooperating engaging means on said bushings permitting assembly of the same in one position only.

2. A fluid pressure tool having a valve chest with open ends and ports for control by an automatically thrown valve, bushings insertable into said chest having ports to register with the ports in the same, one of said bushings serving as a closure for one of the open ends of said chest, cooperating flats on said tool and chest permitting insertion of said closure bushing in one position of angular adjustment only, and cooperating off-center engaging means on both bushings permitting axial assembly of the same in one position of axial alignment only, and resilient means for holding said bushings in engagement.

3. A fluid pressure tool having a valve chest with open ends and ports for control by an automatically thrown valve, bushings insertable into said chest having ports to register with the ports in the same, one of said bushings serving as a closure for one of the open ends of said chest, cooperating flats on said tool and chest permitting insertion of said closure bushing in one position of angular adjustment only, cooperating off-center engaging means on both bushings permitting assembly of the same in one position of axial alignment only, a plug closing the other open end of said valve chest, and a spring interposed between said plug and the adjacent

bushing to hold said bushings in interlocking engagement.

4. A fluid pressure tool having a valve chest with open ends, bushings insertable into said chest through one of said open ends, cooperating means on said tool and on one of said bushings providing for one position only of the latter in said chest, one of said bushings forming a closure for the other open end, mutually cooperating engaging means on said bushings permitting assembly of the same in one position of axial alignment only, a valve slidable in said bushings for controlling the distribution of motive fluid to the tool, and a manually operable plunger projecting from said closure bushing for positively holding said valve in one position against movement.

5. A fluid pressure tool having a valve chest with open ends, bushings insertable into said chest through one of said open ends, one of said bushings forming a closure for the other open end, a valve slidable in said bushings for controlling the distribution of motive fluid to the tool, spacing and interlocking means on said bushings providing for assembly of the same in axial alignment in one position only of angular adjustment, and cooperating engaging means on said tool and on one of said bushings permitting but one angular position of the same in said valve chest.

6. A fluid pressure tool having a valve chest with open ends, bushings insertable into said chest through one of said open ends, one of said bushings forming a closure for the other open end, a valve slidable in said bushings for controlling the distribution of motive fluid to the tool, spacing and interlocking means on said bushings providing for assembly of the same in axial alignment in one position only of angular adjustment, cooperating engaging means on said closure bushing and said tool permitting but one angular position of the same in said valve chest, and a manually operable plunger projecting from said closure bushing for positively holding said valve in one position against movement.

7. A valve bushing assembly for insertion as a unit into a valve chest comprising two bushings adapted for assembly in axial alignment and providing therebetween a valve chamber, mutually interengaging means on said bushings permitting assembly of the same in but one angular position, and means on one of said bushings for engagement with the valve chest to maintain the unit in a particular relation thereto.

8. A valve bushing assembly for insertion as a unit into a valve chest comprising two bushings adapted for assembly in axial alignment and providing therebetween a valve chamber, off-center mutually interlocking means on said bushings limiting the assembly of the same to one position of angular adjustment.

ment, and a flat on one of said bushings for engagement with the valve chest to maintain the unit in a particular relation thereto.

5 9. A valve bushing assembly for insertion as a unit into a valve chest comprising two bushings adapted for assembly in axial alignment and providing therebetween a valve chamber, and two off-center axial projections on one of said bushings engaging cooperating
10 sockets in the other bushing to provide interlocking spacing and locating means and for positively preventing misassembly of the same.

15 10. A valve bushing assembly for insertion as a unit into a valve chest comprising two bushings adapted for assembly in axial alignment and providing therebetween a valve chamber, off-center mutually interlocking means on said bushings limiting the assembly of the same to one position of angular
20 adjustment, and a flat on one of said bushings to form an interlock with the valve chest.

11. A valve bushing assembly for insertion as a unit into a valve chest comprising
25 two bushings adapted for assembly in axial alignment and providing therebetween a valve chamber, off-center mutually interlocking means on said bushings limiting the assembly of the same to one position of angular
30 adjustment, and an axial projection on one of said bushings having a flat to form an interlock with the valve chest into which the assembly is to be inserted.

12. A valve bushing assembly for insertion
35 as a unit into a valve chest comprising two bushings adapted for assembly in axial alignment and providing therebetween a valve chamber, off-center mutually interlocking means on said bushings limiting the assembly of the same to one position of angular
40 adjustment, an axial projection on one of said bushings having a flat to form an interlock with the valve chest into which the assembly is to be inserted, and a plunger slidably mounted in said axial projection and
45 projectable into the valve chamber.

Signed by me at Detroit, in the county of Wayne and State of Michigan, this 4th day of April, 1929.

50 GUSTAVE M. NELL.