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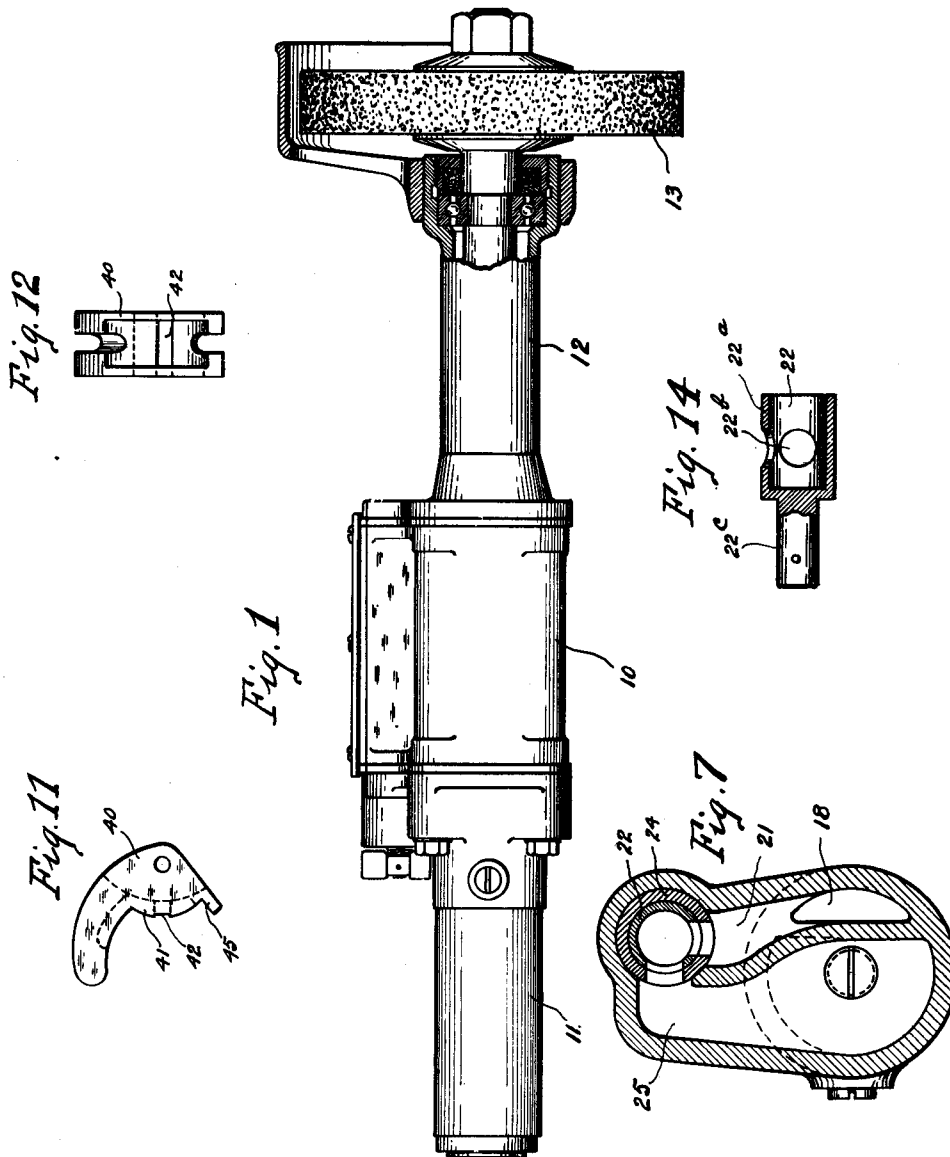
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J. J. N. VAN HAMERSVELD

GOVERNOR CONTROLLED FLUID PRESSURE TOOL

Filed July 14, 1926

3 Sheets-Sheet 1



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June 19, 1928.

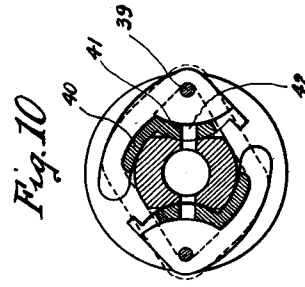
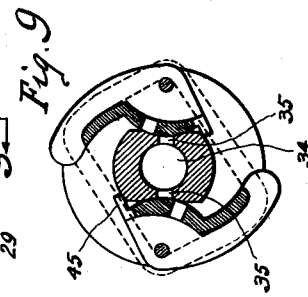
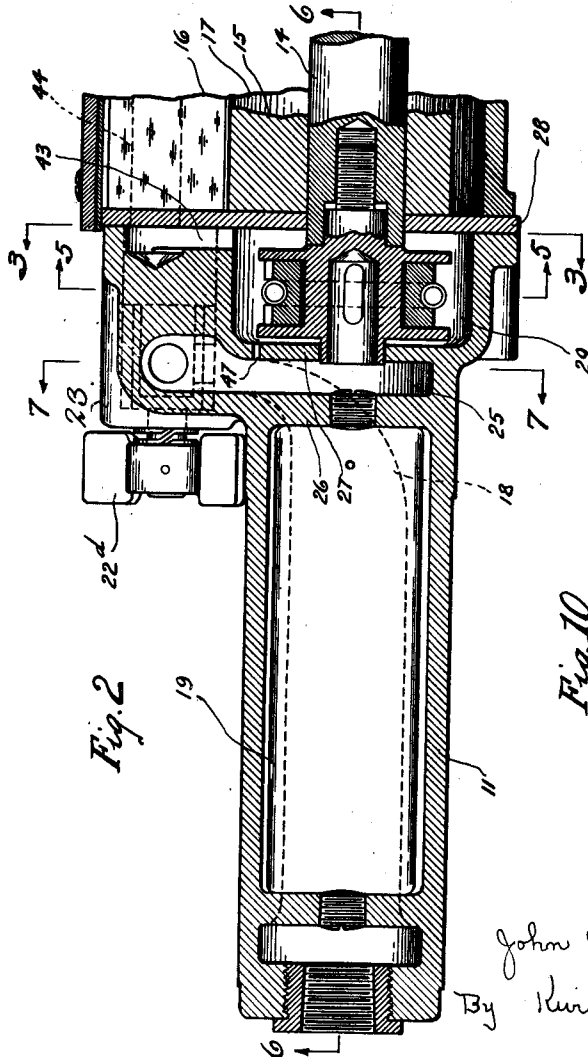
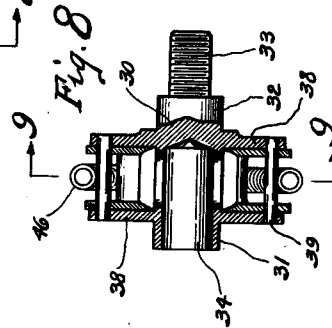
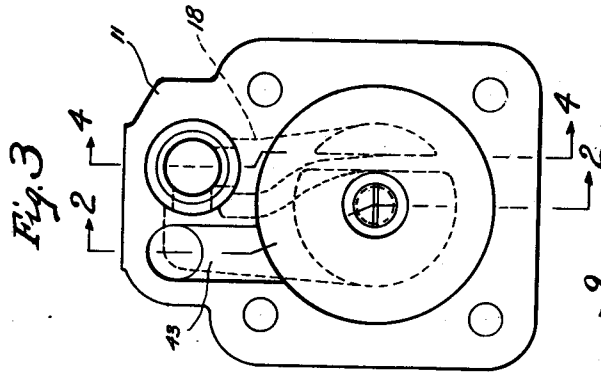
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GOVERNOR CONTROLLED FLUID PRESSURE TOOL

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3 Sheets-Sheet 2



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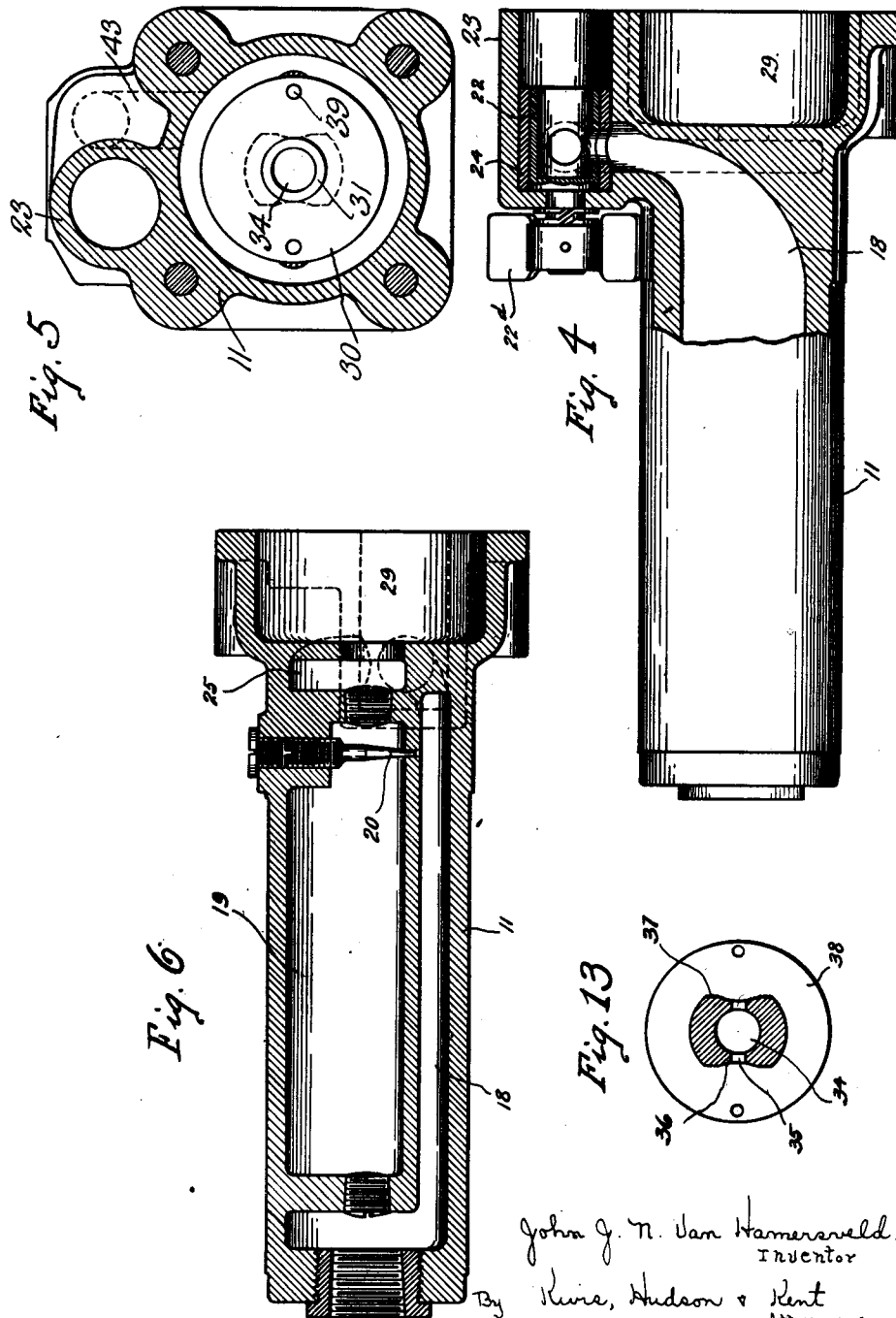
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GOVERNOR CONTROLLED FLUID PRESSURE TOOL

Filed July 14, 1926

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

JOHN J. N. VAN HAMERSVELD, OF CLEVELAND HEIGHTS, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE ROTOR AIR TOOL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

GOVERNOR-CONTROLLED FLUID-PRESSURE TOOL.

Application filed July 14, 1926. Serial No. 122,351.

This invention relates to fluid pressure rotary motor tools and particularly rotary pneumatic tools such as grinders.

One of the objects of the invention is to provide such a tool with a governor for limiting the speed so as to prevent racing and possible breakage, with the governor so constructed as to be sensitive and effective on a comparatively small change in speed, while at the same time permitting a high working speed with the tool as a whole operating at maximum efficiency. That is to say it is one of the objects to provide a governor for a high speed tool adapted to operate under load or service conditions at a certain maximum high speed, which governor becomes effective to shut off or throttle the flow of air on a small increment of speed over the maximum working speed.

A further object is to provide a tool of this character having a governor which is simple and inexpensive in construction, which occupies little space and which can be readily attached and detached as a self-contained unit.

A further object is to incorporate the governor at the most approved point and particularly between the motor spindle and the main control valve, so that leakage through the governor chamber will not prevent the stopping of the motor by the closure of the main valve.

The above and other objects are attained by my invention which may be here briefly summarized as consisting in certain novel details of construction and combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

In the accompanying sheets of drawings wherein I have shown the preferred embodiment of my invention, Fig. 1 is a side elevation of a pneumatic grinder embodying the invention; Fig. 2 is an enlarged fragmentary sectional view substantially along the line 2—2 of Fig. 3, this view showing a portion of the motor proper, including a portion of the spindle to which the governor is attached as well as showing one of the handles and the governor and certain of the passageways in the handle and the chamber housing the governor; Fig. 3 is a sectional view substantially along the line 3—3 of

Fig. 2; Fig. 4 is a view similar to Fig. 2, the section being taken substantially along the line 4—4 of Fig. 3; Fig. 5 is a sectional view substantially along the line 5—5 of Fig. 2; Fig. 6 is a longitudinal sectional view substantially along the line 6—6 of Fig. 2 omitting the governor and the motor proper; Fig. 7 is a transverse sectional view substantially along the line 7—7 of Fig. 2; Fig. 8 is a longitudinal sectional view of the governor; Fig. 9 is a transverse sectional view of the governor substantially along the line 9—9 of Fig. 8 showing the weights in their outermost position; Fig. 10 is a similar view showing the weights in their innermost position; Figs. 11 and 12 are detached views of one of the weights of the governor; Fig. 13 is a detached transverse sectional view of the governor housing, the plane of the section being as in Figs. 9 and 10; and Fig. 14 is a detached view of the main valve, the same being partly in section.

Referring now to the drawings, the rotary pneumatic motor tool herein illustrated includes a motor 10 which may be and preferably is of the general construction illustrated in a prior application Serial No. 70,642, filed November 21, 1925, now Patent 1,653,748. At opposite ends of the motor are two handles 11 and 12 through the latter of which the spindle of the motor extends, the same being provided at its outer end with a tool here illustrated as a grinding wheel 13. The general arrangement is illustrated in Fig. 1, and in Fig. 2, I have illustrated at 14 a portion of the spindle, at 15 a portion of a rotor and at 16 the cylinder which has a cylindrical bore 17 receiving the rotors 15, (two of which are preferably provided) which are eccentrically arranged on the spindle 14. However, the details of the motor form no part of the present invention.

The handle 11 has extending through it from its outer end an air inlet passageway 18, which passageway is arranged at the side of a somewhat larger chamber 19 for a lubricant which is entrained in the flowing stream of air and is controlled by a needle valve 20, the chamber 19 extending the major portion of the length of the handle, as illustrated in Fig. 6.

The air passageway 18 at its inner end curves upwardly as indicated by dotted lines

in Fig. 2 and as indicated by full lines at 21 in Fig. 7, this portion of the passageway leading to the main control valve 22 which is mounted in an enlargement 23 at the inner end of the handle. This valve as preferably constructed is composed of an open ended thimble 22^a having two ports 22^b at right angles to each other, and having a stem 22^c which extends out through the wall of the enlargement and is provided at its outer end with a lever 22^a within convenient reach of the fingers of the operator while grasping the handle 11. In the construction illustrated the thimble 22^a of the valve 22 is seated in a bushing 24 having two ports with respect to which the two ports of the valve are adapted to be brought into and out of registration. At the side of the portion 21 of the inlet passageway 18 (see Fig. 7) is a passageway 25 leading from the valve 22 and extending down between two walls 26 and 27. Between the last mentioned wall and a cylinder plate 28 forming and closing the end of cylinder 17, is a governor chamber 29 receiving the governor which will next be explained.

The governor is composed of a housing 30 provided with oppositely disposed cylindrical extensions 31 and 32, the latter having a threaded stem 33. The cylindrical extensions 31 and 32 are received respectively in a cylindrical opening of the wall 27 and in a cylindrical opening formed in the end of spindle 14, the stem 33 being screwed into a threaded opening formed axially in the spindle. In brief, the governor is attached directly to the end of the spindle of the motor and rotated therewith in the governor chamber 29.

The governor housing 30 has a central opening 34 extending inwardly from the end formed by the cylindrical extension 31, this opening at all times being in communication with the passageway 25 and extending toward but not through the cylindrical extension 32. Leading outward from the central opening 34, the housing is provided with two diametrically opposite ports 35, which at their outer ends are in relatively small cylindrical depressions 36 formed in two opposite flat faces 37 of the housing and between two annular flanges 38 which are spaced apart axially of the housing a distance substantially equal to the length of the ports 35.

Pivotaly mounted between the flanges 38 on diametrically opposite pins 39 are two weights 40 having cylindrically curved portions 41 adapted to engage the cylindrically curved seats 36 of the governor housing and provided with ports 42 which as the weights are rocked, are adapted to be brought into and out of registration with the ports 35 of the governor housing. Outwardly of the ports 42 the weights are cut away so that

the air passing outwardly through the ports 35 and 42 may pass freely around the pins 39.

It will be sufficient to state that when the weights are in their innermost position as illustrated in Fig. 10, the ports 42 register with the ports 35, allowing free flow of air from passageway 25 into the central opening of the valve housing and out into the governor chamber 29 which communicates by means of a passageway 43 with the inlet passageway 44 extending through the cylinder of the motor. On the other hand when the weights are moved outwardly by centrifugal force to their outmost position, the ports 35 are closed by the cylindrically curved portions of the weights, the outward movement of the weights being limited by the engagement of heels 45 with the body of the governor housing, as illustrated in Fig. 9.

Preferably a single endless tension spring 46 which is fitted about the two weights, as illustrated, and lies in grooves formed in the outer portions of the weights, is employed to yieldably oppose the action of the centrifugal force on the weights and to move them inwardly to their innermost position.

It is desirable when the grinding wheel is removed from the work that the tool be allowed to rotate idly at a safe speed which will avoid all danger of breakage of the grinding wheel, and accordingly I provide in the wall 27 a by-pass 47 which will allow sufficient flow of air from the passageway 25 to the governor chamber 29 to allow the tool to rotate at the safe idle speed, this by-pass being desirable when the governor has closely fitting parts as herein illustrated which avoid leakage when the ports are closed as in Fig. 9.

It will be noted that the air enters the outer end of the handle 11, passes inwardly through passageway 18 then upwardly or outwardly through the main control valve 22, when the latter is open, then downwardly or radially inward through passageway 25, then axially into the governor and outwardly into governor chamber 29, and then by passageway 43 to the motor proper, it being noted that the air passes through the main control valve before passing through the governor. By reason of the fact that the governor is located between the main valve and the motor proper, the tool can be put into service or at work, or can be removed from the work and allowed to run at safe idle speed, at which time little air is consumed, without the necessity of shifting the main control valve, and when the main control valve is closed, the motor is stopped without any liability of the wastage of air or of the rotor operating even at slow speed by the likelihood of leakage at the governor or at any other point, assuming, of course,

that a tight main control valve is employed.

It will be noted also that the governor itself is compact and occupies little space and since it is attached directly to the end of the spindle and located in the chamber in the inner end of the handle 11, the tool is practically no larger by reason of the fact that it is equipped with this governor than it would be if not so equipped and as illustrated in the prior application referred to.

Furthermore, the arrangement of the governor in the handle and its attachment direct to the end of the spindle adjacent the inner face of the handle makes it possible to readily remove or apply the governor and to obtain access to it for repairs or any other purpose since it is only necessary to remove a few nuts to remove the handle, and when the handle is removed, the entire governor is exposed as it is left projecting from the end of the spindle.

Not only is the governor compact in form but it can be made very inexpensively as the housing can be produced as a screw machine product which requires very little machining after being produced on the screw machine.

Furthermore, in connection with the governor it will be noted that the flow of air through the governor has absolutely no effect on the position of the weights since they move at substantially right angles to the direction that the air flows through the ports 35 of the governor housing. In fact with this construction though the governor permits a very high working speed (in practice approximately 4400 revolutions per minute) at which speed the air flows through the governor without any restriction by the weights, when the grinder is removed from the work a relatively small increase in speed (in practice approximately 400 revolutions per minute) causes the weights to be thrown outwardly to their outermost position closing the ports, the motor then running idly at this predetermined high speed which at the figures mentioned would be approximately 4800 revolutions per minute, it being understood that the motor runs idle at this speed under a small flow of air. When, however, the grinding wheel is again applied to the work and when the speed slows down to about the working speed previously mentioned, the weights are by this relatively small reduction in speed moved to their innermost position allowing the full flow of air under normal pressure and at the increased volume.

In this manner the speed is governor-controlled with the tool operating at substantially maximum efficiency.

While I have shown the preferred construction of the governor and its preferred arrangement, I do not desire to be confined to the exact details of construction or arrangements but aim in my claims to cover

all modifications which do not involve a departure from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In a portable fluid pressure motor tool, a motor frame having a handle, a spindle extending from the motor frame, passageways for the motive fluid, including a passageway extending through said handle and a second passageway leading to the motor, and a governor for controlling the flow of fluid through said passageways and located between said passageways in said last-mentioned handle and attached to the spindle.

2. In a portable fluid pressure motor tool, a motor portion having stationary and rotatable members, a handle having a fluid passageway extending therethrough and a second passageway leading to the motor, and a speed governor located in the handle between said passageways so as to control the flow of fluid therethrough and connected to one of the rotary parts of the motor.

3. A portable fluid pressure motor tool comprising a motor proper including a pressure actuated part and a rotary spindle connected thereto, a handle having passageways for the motive fluid and a speed governor located in the handle between said passageways so as to control the flow of fluid therethrough and connected to one end of the spindle.

4. In a portable fluid pressure motor tool, a motor frame or casing, a pressure actuated member therein, a spindle connected thereto, a handle at one end of the frame or casing, a fluid pressure passageway extending through the handle, a second passageway leading to the motor, a main control valve and a speed governor both located in said handle between said passageways and serving to control the motive fluid supplied to the motor, the governor being mounted on the spindle.

5. In a portable fluid pressure motor tool, a motor frame or casing, a pressure actuated member therein, a spindle connected thereto, a handle at one end of the frame or casing, a fluid pressure passageway extending through the handle, a second passageway leading to the motor, a main control valve and a speed governor both located in said handle between said passageways and serving to control the motive fluid supplied to the motor, the control valve being in advance of the governor and the latter being mounted on the spindle.

6. In a portable fluid pressure motor tool, a motor frame having a pressure actuated rotor, a spindle connected to the rotor, a handle at one end of the frame, a governor chamber in the handle opposite the rotor, two passageways one leading to and the other from the chamber and one connecting

the latter to the motor, and a speed governor connected to the spindle and located in said chamber between said passageways so as to control the passage of fluid therethrough.

5 7. In a portable fluid pressure rotary motor tool, a motor frame, a rotor therein, a spindle to which the rotor is attached, a handle at one end of the frame provided with a governor chamber located adjacent one end
10 of the rotor, two passageways one leading to and the other from the chamber and one connecting the latter to the motor, and a governor connected to the spindle and located in said chamber between said passageways
15 so as to control the passage of fluid therethrough.

8. In a rotary portable fluid pressure motor tool, a motor frame, a rotor therein, a spindle to which the rotor is attached, a handle at one end of the frame having fluid
20 passageways and provided with a control valve and a chamber located opposite the end of the rotor between said passageways, and a governor attached to the spindle and
25 located in said chamber so as to control the passage of fluid through the passageways.

9. In a portable fluid pressure motor tool, a motor having stationary and rotatable members including a spindle, said station-
30 ary member having a handle, the said handle having a fluid passageway extending therethrough and there being a second pas-

sageway leading to the motor, means for automatically controlling the passage of fluid through the said passageways, said
35 means including a speed governor located in the handle and connected with the spindle.

10. In a portable fluid pressure motor tool, a motor having stationary and rotatable members including a spindle, said station-
40 ary member having a handle provided with a chamber, the said handle having a fluid passageway extending therethrough and there being a second passageway leading to the motor, means for automatically
45 controlling the passage of fluid through said passageways, said means including a speed governor located in the chamber in the handle and connected with the spindle.

11. In a portable fluid pressure motor tool, 50
a motor frame having a handle, a motor spindle extending from the motor frame, passageways for the motive fluid including a passageway extending through said handle, and a second passageway leading to the motor, means for automatically controlling the
55 passage of fluid through said passageways, said means including a speed governor mounted upon the said spindle and located in the handle. 60

In testimony whereof, I hereunto affix my signature.

JOHN J. N. VAN HAMERSVELD.