July 9, 1929. J. J. N. VAN HAMERSVELD 1,720,652

GOVERNOR FOR FLUID PRESSURE MOTORS

Original Filed July 14, 1926

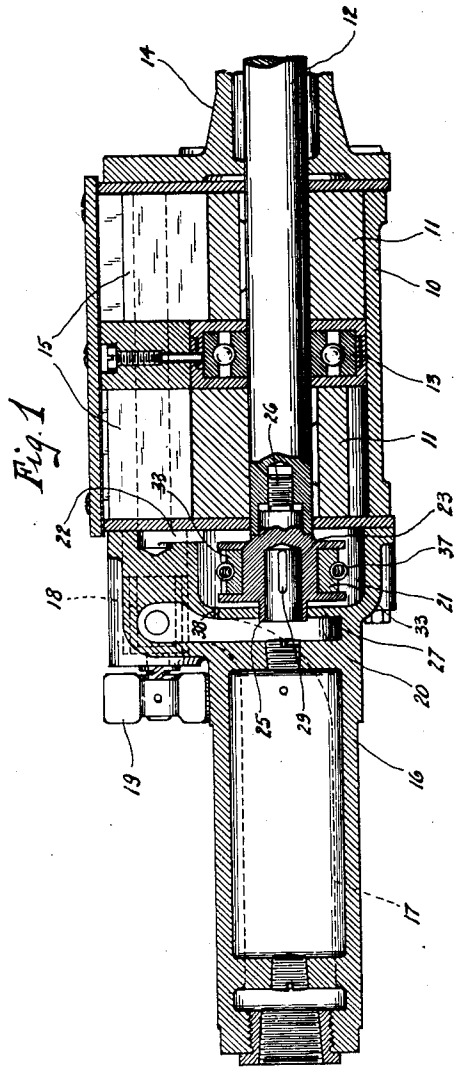


Fig. 1

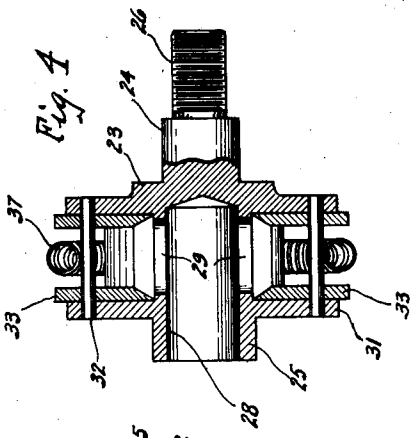


Fig. 4

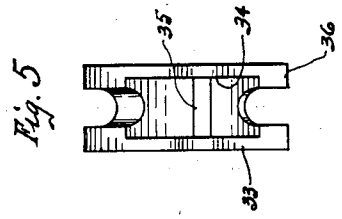


Fig. 5

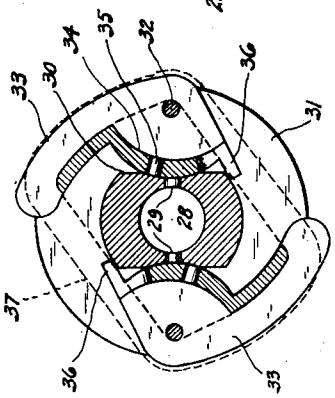


Fig. 2

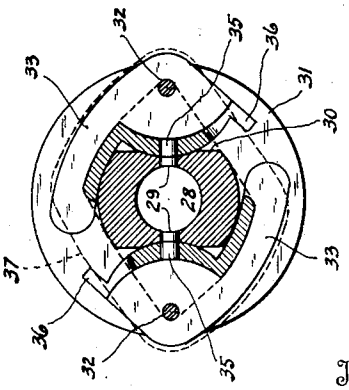


Fig. 3

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UNITED STATES PATENT OFFICE.

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GOVERNOR FOR FLUID-PRESSURE MOTORS.

Original application filed July 14, 1926, Serial No. 122,351. Divided and this application filed November 23, 1927. Serial No. 235,133.

This invention relates to a governor for fluid pressure motors and is a division of my prior application Serial No. 122,351, filed July 14, 1926 (Patent No. 1,674,579).

One of the objects of the present invention is to provide a governor for limiting the speed of the motor 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 operated 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 for a fluid pressure motor a governor which is simple and inexpensive in construction, which occupies little space, and which can be readily attached to the end of the motor spindle and detached as a self-contained unit.

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 sheet of drawings wherein I have shown an embodiment of the invention which operates very effectively, Fig. 1 is a longitudinal sectional view through a fluid pressure motor equipped with a governor arranged and constructed in accordance with my invention; Fig. 2 is an end view of the governor detached from the motor, showing the weights in position with the governor ports closed; Fig. 3 is a similar view with the weights in position to open the ports; Fig. 4 is a longitudinal sectional view through the governor; and Fig. 5 is a detached view of one of the weights of the governor.

Referring now to the drawings, I have illustrated in Fig. 1 a fluid pressure motor which is generally operated by air and which is utilized to rotate a suitable tool, such as a grinding wheel. The motor illustrated is preferably constructed like the motor illustrated in the Van Hamersveld and Cook Patent No. 1,653,748, and as the motor per se forms no part of the present invention, it will be described very briefly. This motor includes a housing 10 having a cylindrical bore extending from end to end therethrough and receiving two eccentric pistons 11 secured to a tool spindle 12. This spindle is supported in a center bearing 13 and also in a second bearing, not shown, at the outer end of a handle 14 which is secured to one end of the motor housing and through which the spindle extends, as illustrated in Fig. 1. The housing or stationary part of the motor is provided with radial slots or guideways in which slide a pair of abutment blades 15, the inner edges of which are adapted to engage the outer surfaces of the two eccentric pistons 11.

At the end of the motor opposite that at which the handle 14 is attached is a second handle 16 which is oppositely disposed with respect to the handle 14. This handle 16 has an air passageway 17 extending therethrough, this passageway communicating with a valve indicated by dotted lines at 18 and controlled by a lever 19 which is manipulated by the finger or thumb of the operator's hand grasping the handle 16. From the valve 18 the air passes by way of a passageway 20 into the governor which is carried by the end of the motor spindle 12 and is located in a governor chamber 21 formed in the handle 16 next to the body of the motor. From this governor chamber the air passes by way of a passageway 22 into the body or housing of the motor and from this passageway by inlet passageways, not shown, to the cylinder bore of the motor.

The governor is composed of a housing 23 which is provided with oppositely disposed cylindrical extensions 24 and 25, the former having a threaded stem 26 which is screwed into a threaded opening formed axially in the end of the spindle. By this means the governor is attached direct to the end of the spindle of the motor and is rotated therewith in the governor chamber 21. The cylindrical extension 25 formed on the opposite end of the governor housing from the extension 24 is received in a cylindrical opening formed in the wall 27 of the handle 16 separating the passageway 20 from the governor chamber 21. Extending through the cylindrical extension 25 and into the body of the governor housing is a central opening 28, which open-

ing is at all times in communication with the passageway 20. Leading outward from this central opening 28 the housing is provided with two diametrically opposite ports 29 which at their outer ends are in small cylindrical depressions formed in two opposite flat faces 30 of the housing and located between two annular flanges 31 which are spaced apart axially of the housing a distance substantially equal to the length of the ports 29 (note Fig. 4).

Pivotally mounted between the flanges 31 on diametrically opposite bearing pins 32 are two weights 33 having cylindrically curved portions 34 adapted to engage the cylindrically curved seats which are provided with the ports 29. These cylindrical portions 34 are provided with ports 35 which, as the weights are rocked, are adapted to be brought into and out of registration with the ports 29 of the governor housing. Beyond the ports 35 the weights are cut away so that the air passing outwardly through the ports 29 and 35 may pass freely around or on both sides of the pins 32.

It will be sufficient to state that when the weights are in their innermost positions, illustrated in Fig. 3, the ports 32 register with the ports 29 allowing a free flow of air from the passageway 20 in the handle 16 into the central opening of the valve housing and out into the governor chamber 21 which communicates, as before stated, with the inlet passageways of the motor. On the other hand, when the weights are moved outwardly by centrifugal force to their outermost position, as shown in Fig. 2, the ports 29 are closed by the cylindrically curved portions of the weights, the outward movement of the weights being limited by the engagement of heels 36 formed on the weights with the body of the governor housing as illustrated in Fig. 2.

Preferably a single, endless tension spring 37 which is fitted about the two weights and lies in grooves formed in the outer portions of the weights is employed to yieldingly oppose the action of centrifugal force on the weights and to move them inwardly to their innermost position. This spring 37 is shown by full lines in Figs. 1 and 4 and by dotted lines in Figs. 2 and 3. It is desirable, when the tool such as a 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, and, accordingly, I provide in the wall 27 a by-pass 38 which will allow a sufficient flow of air from the passageway 20 to the governor chamber 21 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. 2.

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.

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 at the inner end of handle 16, 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.

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 since 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, any pressure of the air on the weights being in line with the weight supporting pins 32 and being taken thereby. 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 very 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 inner-

most 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, I do not desire to be confined to the exact details of arrangement and construction shown but aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of my invention in its broadest aspects.

Having thus described by invention, I claim:

1. A governor for fluid pressure motors and the like comprising a housing having a curved seat with a port and provided with a pivoted weight with a ported portion engaging said curved seat and movable substantially transversely of said port.

2. A governor for fluid pressure motors and the like comprising a housing having a curved seat with a port and provided with a rocking weight with a ported portion engaging said curved seat and movable substantially transversely of said port, the housing and weight having engageable portions which limit the outward movement of the weight.

3. A governor for fluid pressure motors and the like comprising a housing having a pair of flanges spaced apart axially of the housing and having ports between the flanges, and weights mounted to move between said flanges and provided with ports adapted to be moved into and out of registration with the first-named ports.

4. A governor for fluid pressure motors and the like comprising a housing having a central opening and provided with a pair of seats with ports radial with respect to said central opening and communicating with said central opening, and a pair of weights movable over said seats and having ported portions movable inwardly and outwardly at substantially right angles to said ports.

5. A governor for fluid pressure motors and the like comprising a housing having a central opening and provided with a pair of parallel flanges spaced apart axially and provided between said flanges with a pair of seats having ports extending inwardly to said central opening, and weights pivotally supported between said flanges and engaging said seats, the seat engaging portions of the weights having ports adapted to move into and out of registration with the first-named ports.

6. A governor for fluid pressure motors and the like provided with a central opening and having a pair of parallel flanges spaced apart axially of the housing, the housing being provided between the flanges with seats having ports extending inwardly to said central opening, and a pair of weights pivotally supported on pins extending between the flanges and having between the pins and said seats ported seat engaging portions.

7. A governor for fluid pressure motors and the like provided with a central opening and having a pair of parallel flanges spaced apart axially of the housing, the housing being provided between the flanges with seats having ports extending inwardly to said central opening, a pair of weights pivotally supported on pins extending between the flanges and having between the pins and said seats ported seat engaging portions, and spring means for resisting the outward movement of the weights.

8. A governor for fluid pressure motors and the like comprising a housing having a central opening and provided with seats with ports extending inwardly to said central opening, weights pivoted outwardly of said seats and having ported seat engaging portions and each having a groove, and a spring encircling the weights and engaging the grooves thereof.

9. A governor for fluid pressure motors and the like comprising a body having a central opening and provided with a pair of spaced parallel flanges and between the flanges being provided with seats with ports extending inwardly to the central opening, a plurality of weights pivotally supported between said flanges on pivots adjacent the peripheries thereof and having ported seat engaging portions, said weights having grooved portions, and a spring encircling the weights and engaging the grooved portions thereof.

10. A governor for fluid pressure motors and the like comprising a body having a central opening and provided with a pair of spaced parallel flanges and between the flanges being provided with seats with ports extending inwardly to the central opening, a plurality of weights pivotally supported between said flanges on pivots adjacent the peripheries thereof and having ported seat engaging portions, said weights having grooved portions, and a spring encircling the weights and engaging the grooved portions thereof, said housing having at one end an air inlet passageway leading to said central opening and having at the other end means by which it may be attached to a rotating member.

11. A governor comprising a rotary governor body having a central chamber and having a seat outwardly of said chamber, a port disposed radially with respect to the axis of rotation of the governor body and extending from the chamber to said seat, and a weight engaging said seat and adapted to cover and uncover said port.

12. A governor comprising a rotary governor body having an inner chamber and having on its outer surface a concave seat, a port

leading from the chamber to said seat, and a weight pivotally mounted on the governor body and having a convex portion engaging said seat and adapted to cover and uncover said port.

13. A governor comprising a rotary governor body having an inner chamber and having on opposite sides of the axis of rotation of the body a pair of concave seats and having ports leading from said chamber to said seats, and a pair of weights having convex portions engaging said seats and adapted to cover and uncover the ports.

14. A governor comprising a rotary governor body having a pair of flanges spaced apart axially thereof and having a port between the flanges, and a weight mounted to move between the flanges and adapted to cover and uncover said port.

15. A governor comprising a governor body having an inner chamber, a governor weight pivoted outwardly of said chamber, the governor body and the governor weight having engaging surfaces located between said inner chamber and the pivot of the governor weight, and there being a port extending from the inner chamber to said surface of the governor body and controlled by the governor weight.

In testimony whereof, I hereunto affix my signature.

JOHN J. N. VAN HAMERSVELD.