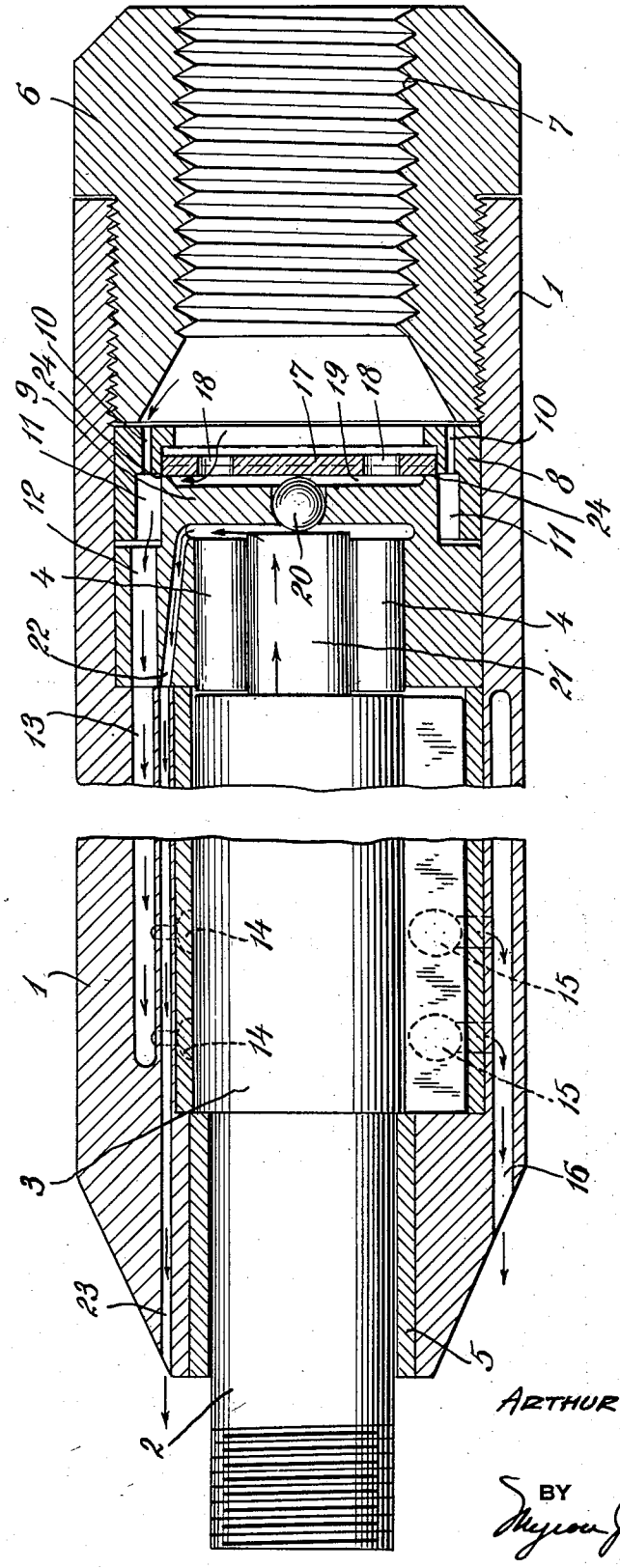
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TUBE CLEANER MOTOR

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TUBE CLEANER MOTOR

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3 Claims. (Cl. 253—3)

This invention relates to rotary compressed air motors, particularly for tube cleaners, and more especially to means for governing such motors.

These motors, used as driving means upon rotary cleaners for cleaning scale, carbon, coke, etc., from tubes of oil stills, boilers, and the like are normally designed for mounting between the rotary cleaner and the air supply hose, and in operation, are pushed within the tube behind the cleaner. Consequently they are of small diameter and must be relatively short in axial dimension in order to be properly flexible for use. Further, since no length can be sacrificed to complicated governor and valve mechanism, control is usually accomplished wholly by a hand valve at the opposite end of the hose from the motor. Such control is not particularly satisfactory.

It is an object of this invention to provide a compact, efficient governing mechanism, mounted internally of such motor, capable of relieving the external hand valve of the duty of regulating motor speed in proportion to work being done. A further object is the provision of means whereby greater power is available in the motor proportionately to greater axial thrusts encountered in passing through obstructions.

The manner in which these objects are accomplished may be understood by reference to the drawing attached to this specification, the single figure of which, in somewhat diagrammatic form, shows a cross section through a motor to which my invention has been applied.

In this drawing, 1 is a casing of the motor, within which there is mounted shaft 2, and rotor 3, which rotor may be of any of the usual types. A rear end bearing 4—4 supports this rotor, being so mounted as to permit axial travel of the rotor in response to axial thrust due to obstructions in the tube being cleaned. The shaft is supported in bearing 5. The motor is confined within casing 1 by the sleeve 6, which is fitted with threads 7 for hose attachment, and by port blocks 8 and 9. Port blocks 8 and 9 are provided with air inlet passages 10, 11, 12, leading to air passage 13 in casing 1 and in turn to air inlets 14 through which air is introduced to the rotor chamber. Leaving the rotor chamber by outlets 15, the air is exhausted through passage 16. Returning now to the air inlet end of the motor, it is noted that between port block 8 and port block 9 there is confined a disc 17, leaving ports 18 which establish communication between incoming air and space 19. Centrally located in block 9 there is retained a steel ball, plunger, or other device, shown here as a ball 20, sufficiently great in axial dimension along the center line of the motor to contact the motor shaft 21 and the disc 17. Additionally, there is an exhaust passage 22 in block 9, communicating with passage 23 in casing 1. Disc 17 cooperates with rim 24 on block 9 to form a valve and seat isolating space 19 from passage 11, and the ball 20 is so fitted into block 9 as to prevent substantial leakage from space 19 to the rotor chamber.

In operation of the usual motor, without any improvement, air supply to the motor is wholly through ports such as 10, to which at times, governors depending upon revolution speed have been applied.

In the operation of my improved motor, the relative size of ports 10 is greatly reduced, and only sufficient air passes therethrough to rotate the motor at normal speed under a light cleaning load. Upon encountering a heavy cleaning load, which gives an increase in axial thrust, axial travel of shaft 2 and rotor 3 cause contact between rotor shaft 21 and ball 20, which acts to lift disc 17 from seat 24 permitting increased flow of air through ports 18 into chamber 19 and from chamber 19 into passage 11 and thence to rotor 3. The usual types of devices for limiting axial travel of the shaft permit sufficient end play to allow this governing action to take place. Thus it is seen that I have accomplished a governing which permits flow of power fluid in direct proportion and response to load encountered, which is clearly more effective than a governing based solely upon rotative speed.

The purpose of passages 22 and 23 is that exhaust air from the rotor may be used to balance end thrust to a degree sufficient for the normal operation by air admitted through ports 10.

In practice it has been found that the method of governing tends to give a relatively constant shaft speed and more efficient cleaning operation, as well as being less destructive of clean tubes in that when passing over them, the motor is rotating at a very much lower speed.

I claim:

1. A rotary fluid motor comprising a casing, and therein a rotor, passages adapted to admit a predetermined supply of power fluid to said rotor, other passages adapted to admit additional power fluid to said rotor, and valve means actuated by said rotor and acting to vary the amount of power fluid admitted to said other passages proportionately to the axial thrust developed in

said rotor by the external load applied to said rotor.

2. In a rotary fluid motor, a casing, a rotor in said casing, a power fluid supply chamber, passages leading power fluid from said supply chamber to said rotor, at least one port admitting a constant amount of power fluid from said supply chamber to said passages, valve means admitting additional power fluid from said supply chamber to said passages, and thrust transmission means between said valve and said rotor whereby axial thrust developed in said rotor by the external loading applied thereto may operate to open said valve an amount proportional to said axial thrust.

3. In a rotary motor, a casing, a rotor in said casing, bearing means for said rotor permitting limited axial travel of the rotor under axial thrust developed by external loading, a power fluid supply chamber, passages leading power fluid from said supply chamber to said rotor, at least one port admitting a constant supply of power fluid from said supply chamber to said passages, sufficient in amount to rotate the rotor under light load, axial thrust balancing means sufficient to overcome axial thrust of light loads, valve means admitting additional power fluid from supply chamber to said passages, thrust transmission means between said rotor and said valve, said thrust transmission means acting to translate axial travel of said rotor arising from unbalanced end thrust due to increased external load into a proportional opening of said valve for the admission to the rotor of additional power fluid.

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