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OIL IMPELLER FOR GOVERNORS

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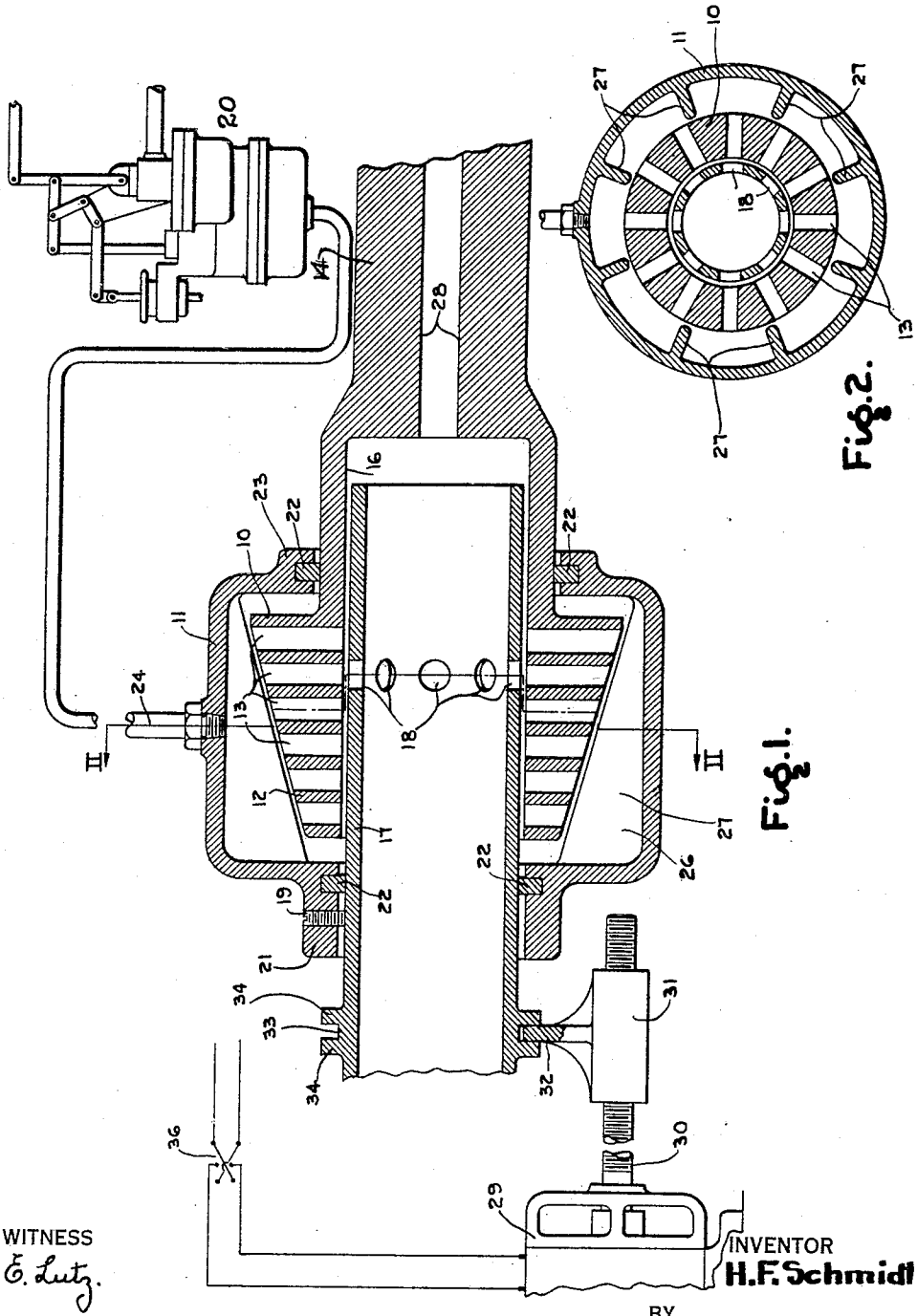


Fig. 1.

Fig. 2.

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OIL IMPELLER FOR GOVERNORS

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My invention relates to fluid impellers, and more particularly to impellers for fluid pressure governing systems, and it has for an object, to widen the scope of application of apparatus of this character.

The pressure created by impellers, of the type described, is a function of their speed of rotation and of their respective diameters, so that, when the pressure-volume characteristics of an impeller are known, the pressure corresponding to different speeds may be readily determined. To change the pressure produced, it is necessary to change the dimensions of the impelling surfaces.

It may occur that the pressure of an impeller must be changed in order to meet new operating requirements, and although this may involve no more than changing the length of the vanes, the desired change cannot be effected without interrupting the operation, and removing the impeller. Such delays, and the expense incidental thereto, can be avoided by providing an impeller which is capable of meeting different operating conditions.

More particularly, therefore, an object of my invention is to provide an impeller which shall have a variable pressure creating ability, and which shall embody means for changing its head without any appreciable interruption to its operation.

Apparatus embodying the features of my invention is shown in the accompanying drawings, in which:

Fig. 1 is a view showing a fluid impeller in longitudinal section and a fluid pressure governor in elevation; and

Fig. 2 is a transverse section taken along the broken line II—II of Fig. 1.

According to my invention, an impeller is provided with a plurality of sets of impelling surfaces, or vanes, and means are provided for selectively admitting the fluid media, which may be either a liquid or a gas, to the vanes having the desired characteristics. Preferably, the impeller is in the form of a hollow cone in which holes are bored in circumferential rows, so that one, or more, of the rows may provide a set of impelling surfaces. A sleeve is movably mounted within the cone and it is provided with a circumferential series of openings which correspond with any one set of the holes which provide the impelling surfaces in the cone. By adjusting the sleeve with respect to the cone, the actuating media can be admitted to any of the various sets of impelling surfaces, and the desired pressure thus obtained.

Referring now to the drawings for a better understanding of my invention, I show a fluid impeller, at 10, enclosed in a housing 11. In the form shown, the impeller proper comprises a frusto-conical portion 12, which is provided with a plurality of groups of circumferentially arranged and transversely-extending holes 13.

The frusto-conical portion 12 is preferably made integral with the shaft 14, and the frusto-conical portion is bored to provide an axially-extending, cylindrical recess 16, the recess extending beyond the base of the frustum and into the shaft, as shown. It will thus be seen that the holes 13 provide radial impelling vanes to which fluid may be admitted through the cylindrical recess 16.

In order to provide for selectively controlling the diameter of the impeller, and consequently the pressure of the fluid delivered thereby, I insert the sleeve 17 into the cylindrical recess 16, and provide the sleeve with a series of circumferentially arranged openings, such as the bored holes 18, which correspond in size with the radial holes 13 of the impeller. The holes 18 may be made large enough to admit fluid to two or more of the circumferential groups of the radial holes, or to only one group as shown, depending on the operating requirements.

Furthermore, the circumferential groups of holes 13 may be arranged to have fundamentally different characteristics. For example, one circumferential group may have radial holes, so as to provide radial vanes, while another group may have curved holes, or passages, to provide either forwardly or backwardly tipped vanes and various degrees of curvature may be embodied in different circumferential groups of vanes.

In order to provide for manually adjusting the sleeve 17 and for holding it in the various

adjusted positions, I mount one or more set screws 19 in the boss 21, of the housing, through which the sleeve is inserted. Obviously, however, any suitable holding arrangement, other than the set screws 19, may be employed. I also provide suitable packing 22 between the boss 21 and the sleeve 17, and between the boss 23, which receives the shaft 14, and the shaft.

A connection 24 is provided at some convenient point on the housing, but preferably substantially midway of the frustum 12 of the impeller, so that the impelled fluid may pass from the chamber 26 to any other part of the system, as for example, to a fluid governor. A suitable number of longitudinally-extending vanes 27 are secured to the inner walls of the chamber 26 and are arranged contiguous to the tapered surface of the impeller for the purpose of preventing the whirling motion of the fluid in the chamber 26. In this manner, it is ensured that the pressure of the fluid passing through the connection 24 will be the pressure created by the particular set of impelling vanes 13 which is in communication with the openings 18 of the sleeve 17 and that this pressure will not be affected by any whirl due to the rotation of the other impelling vanes.

The shaft 14 may also be bored as indicated at 28, to provide an axial passage for admitting fluid to the inlet of the impeller. Or, if desired, this passage may be omitted, and the fluid may be admitted through the sleeve 17, or the fluid may be admitted through both the passage 28 and through the sleeve 17.

In the operation of the impeller, it is merely necessary to loosen the screw 19 to adjust the sleeve to the desired position with respect to the impeller, and, this being effected, the screw 19 is tightened and the device is ready for operation.

The fluid pressure governor 20 may be of any type known in the art which is responsive to variable fluid pressure. For example, it may be of the type and construction shown in my Patent No. 1,533,767, issued April 14, 1925.

The advantage of this form of impeller in connection with a fluid pressure governor is wide variation of governing speeds without change of adjustment of the governor.

The governor 20 is controlled by a fluid pressure which is substantially constant but varies within narrow limits to effect operation of the governor, and when no change in adjustment is made, the fluid pressure effecting a given position of the governor is necessarily always the same. By moving the sleeve 17 to admit fluid to the shorter holes 13, greater speed of the shaft 14 is required to develop the fluid pressure which operates the governor 20; in this way higher governing speeds are obtained. As the same speed variation effects the same variation in fluid pressure at any governing speed, it is apparent that the same operation of the governor is obtained over a wide range of governing speeds.

I have also provided a remote control system for adjusting the sleeve 17 to the desired positions. This remote control system comprises a reversible motor, such as the electric motor 29, the shaft 30, of the motor being extended and threaded for engagement with the internally threaded, split sleeve 31. The latter carries the fork 32, which is adapted to ride in the groove 33 provided by the spaced collars 34 on the sleeve 17. In the drawing, one of the prongs of the fork is shown as being broken away for purposes of illustration.

The motor 28 is controlled by a reversing switch 36, which may be located at any point remote from the motor, and hence, by manipulating the switch 36, it is possible to operate the motor to move the sleeve 31 in either direction and thus, to effect an adjustment of the sleeve 17 from a distant station. Since the purpose of this adjustment is primarily to obtain a certain pressure in the pipe 24, the extent of the adjustment required can be determined by placing any suitable indicating apparatus, such for example as a pressure gauge (not shown), in communication with the pipe 24. It will also be understood that, when the remote control system is used, the set screw, or screws 19, are loosened. On the other hand, when the adjustment is to be made manually by means of the set screw 19, the sleeve 31 may be disconnected from the sleeve 17.

It will thus be seen that I have provided a simple, and yet rugged and efficient impeller having a variable pressure-creating ability, and that I have also provided means for controlling my impeller from a distant station. These features make it possible to use a device of this class for producing different pressures intermittently, without dismantling, or in any way interfering with the operation of the device, and hence, considerably increase the scope of its field of application.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:—

1. A fluid impeller comprising an axially tapered rotor having a central inlet, means providing a plurality of transverse passages through the rotor arranged in circumferential groups, and means for selectively controlling the admission of media to circumferential groups of the respective passages.

2. A fluid impeller comprising an axially

tapered rotor having a central inlet, means providing a plurality of longitudinally spaced, radial passages through the rotor, and means for selectively controlling the admission of media to certain of the respective passages.

3. The combination with a tapered impeller having a central inlet and transversely-extending impelling passages therein, of a sleeve valve for admitting fluid to some of said transversely-extending passages, a reversible motor, and means for adjusting said valve by actuating the motor.

4. The combination with an impeller having transversely extending impelling passages and a central inlet, and a sleeve extending within the inlet and having openings therein for selectively admitting fluid to some of said transversely extending passages and for shutting off admission of fluid to other of said passages, of a reversible motor and means for converting rotary motion of said motor into rectilinear motion and for imparting such rectilinear motion to the sleeve, whereby said sleeve may be adjusted by actuating said motor.

5. The combination with an impeller having a plurality of sets of impelling surfaces and a central inlet, and a reciprocable valve member for controlling the admission of fluid to the respective sets of said impelling surfaces, of a reversible motor, a shaft adapted to be operated from said motor, and a member threaded on said shaft and in interlocking engagement with said valve member, whereby the valve member may be adjusted with respect to said impeller by actuating said motor.

6. In a device of the type described, the combination of an impeller having a plurality of sets of impelling surfaces and a central inlet, and a reciprocable valve member for controlling the admission of fluid to the respective sets of impelling surfaces.

7. The combination with an impeller having a plurality of sets of impelling surfaces, each of said sets of impelling surfaces being adapted to develop different pressures, of means for admitting fluid to any of said sets and excluding fluid from the other, or others of said sets of impelling surfaces.

In testimony whereof, I have hereunto subscribed my name this fifth day of October, 1927.

HENRY F. SCHMIDT.