

April 19, 1927.

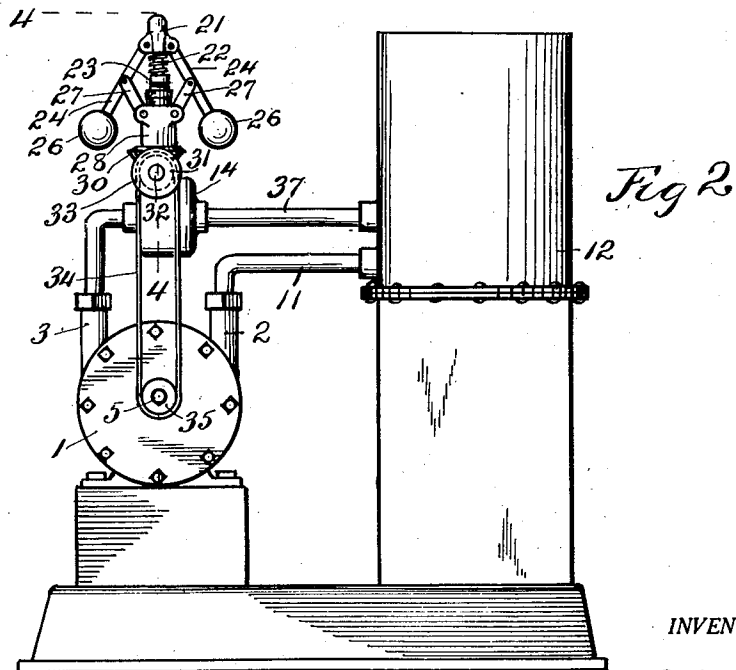
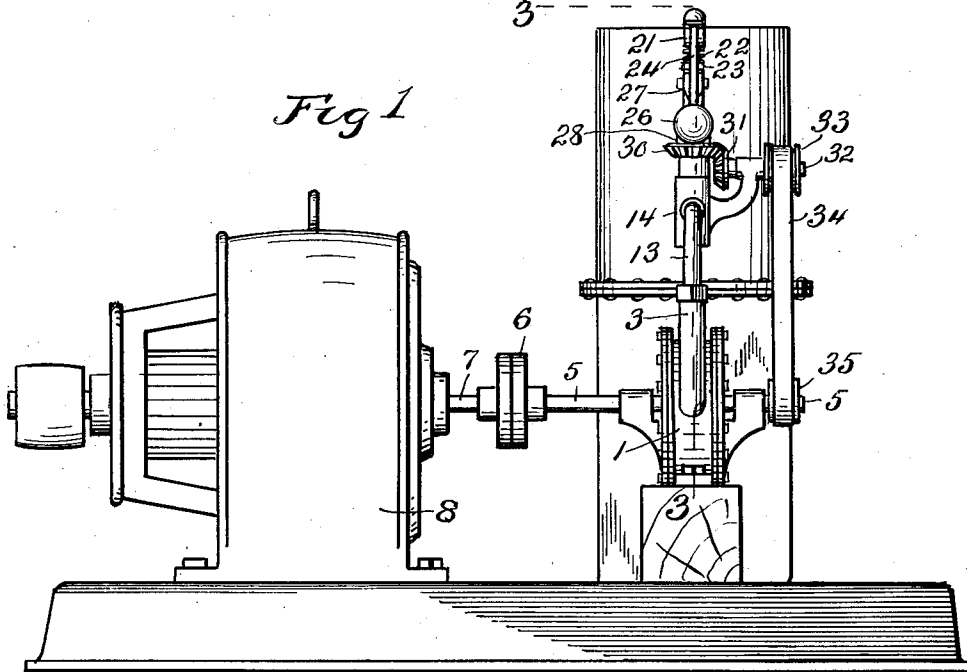
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C. B. HUTCHISON

SPEED CONTROLLING MECHANISM FOR MOTORS

Filed April 28, 1924

2 Sheets-Sheet 1



INVENTOR.

Witness:
R. Hamilton

BY *Charles B. Hutchison*
Warren D. House
His ATTORNEY.

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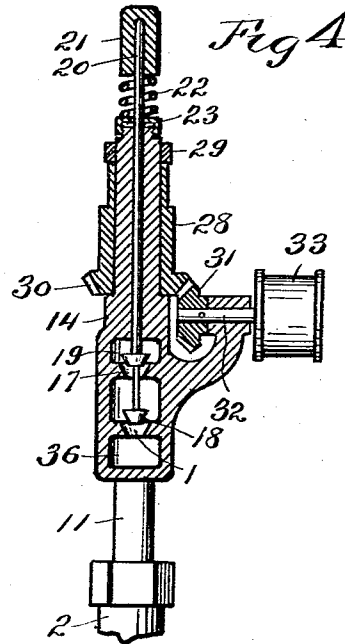
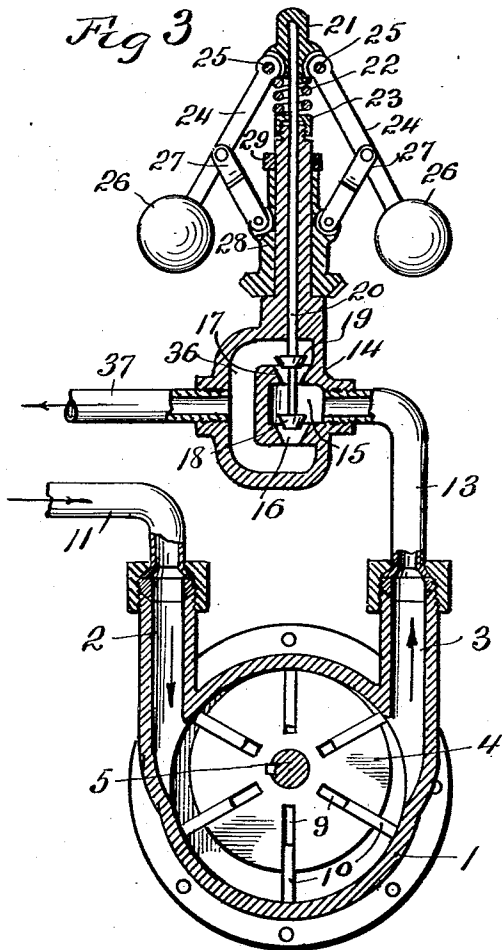
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SPEED CONTROLLING MECHANISM FOR MOTORS

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UNITED STATES PATENT OFFICE.

CHARLES B. HUTCHISON, OF PARSONS, KANSAS.

SPEED-CONTROLLING MECHANISM FOR MOTORS.

Application filed April 28, 1924. Serial No. 709,342.

My invention relates to improvements in speed controlling mechanisms for motors.

It is particularly well adapted for automatically controlling the speed of a battery driven motor.

One of the objects of my invention is to provide novel means of the kind described, which is simple, comparatively cheap to make, is durable, and not liable to get out of order, and which will reliably govern the speed of the motor to which it is attached.

A further object of my invention is to provide novel means for utilizing fluid to automatically increase and decrease the load carried by a motor as the speed of the latter respectively increases and decreases.

The novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings, which illustrate the preferred embodiment of my invention,

Fig. 1 is a side elevation of an electric motor, to the driving shaft to which is attached my improved speed controlling mechanism.

Fig. 2 is an end elevation of the same.

Fig. 3 is an enlarged sectional view on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged sectional view on the line 4—4 of Fig. 2.

Similar reference characters designate similar parts in the different views.

In the form of my invention illustrated in the drawing, there is provided a fluid container comprising a cylinder closed at its ends and designated by 1, the cylinder being provided with a peripheral intake port 2 and an exhaust port 3. Co-operating with the cylinder 1 is a rotary piston having a head 4 of cylindrical form and a horizontal rotary piston rod 5, on which the head 4 is keyed, the rod 5 being disposed eccentrically in the cylinder 1. One end of the piston rod 5 is rigidly attached by a suitable coupling 6 to the adjacent end of the rotary driving element comprising the armature shaft 7 of an electric motor 8, which may be operated by a battery or other source of power.

The piston head 4 is provided with radial slots 9, in which are respectively fitted radially slidable paddles 10, which have their outer ends held by centrifugal force against the inner periphery of the cylinder 1.

The intake port 2 may be connected by a conductor 11 to a tank 12, adapted to contain a liquid, oil preferred.

Connected to the exhaust port 3 by a conductor 13 is a valve casing 14 having a chamber 15 into which the conductor 13 discharges. The chamber 15 has two vertical aligned valve openings 16 and 17 adapted to respectively receive two valves 18 and 19, which are rigidly secured to a valve stem 20 which is vertically slidably fitted in the casing 14 and which has rigidly secured to its upper end a block 21, against the under side of which bears the upper end of a coil spring 22, which encircles the stem 20, and the lower end of which bears upon a vertically adjustable screw cap 23, which has threaded connection with the upper end of the casing 14. By adjusting the cap 23, the tension of the spring 22 may be changed.

Two governor arms 24 have their upper ends respectively pivoted to two diametrically opposite horizontal pins 25, mounted in the block 21. Governor balls 26 are respectively attached to the lower ends of the arms 24. Two links 27 have their upper end respectively pivoted to the arms 24, their lower ends being pivoted to a sleeve 28 which is rotatably mounted on the casing 14, and which is held from upward movement by a collar 29 rigidly secured on the casing 14 at the upper end of the sleeve 28. The latter has at its lower end, and preferably integral therewith, a bevel gear wheel 30, which meshes with a bevel gear wheel 31, which is rigidly attached to a horizontal shaft 32, rotatably mounted in the casing 14 and having rigidly mounted on it a pulley 33, which is connected by a belt 34, with a pulley 35, rigidly secured to the rotary piston rod 5.

The valve casing 14 is provided with a chamber 36, which communicates with the openings 16 and 17 and with a conductor 37, which communicates with the tank 12.

In the operation of the apparatus just above described and illustrated, the armature shaft 7 in revolving revolves the piston rod 5 and with it the head 4 in a counter-clockwise direction, as viewed in Fig. 3. The paddles 10 force the fluid in the cylinder 1 from the intake port 2 to and through the exhaust port 3, from which the fluid passes, through the conductor 13 into the chamber 15, thence through the openings 16 and 17 into the chamber 36, and thence through the conductor 37 into the tank 12, from which the fluid passes to the intake port 2 through the conductor 11.

The piston rod 5 in revolving effects rotation of the sleeve 28 through the intermediacy of the pulley 35, belt 34, pulley 33, shaft 32, gear wheels 31 and 30. The sleeve 28 effects rotation of the block 21 by means of the links 27 and arms 24.

As the speed of the motor shaft 7 increases, the speed of the piston rod 5 and head 4 and of the sleeve 28 and block 21 will correspondingly increase. This increase of speed will cause the governor balls 26 to swing outwardly by centrifugal force, thus forcing downwardly the block 21 and valve stem 20, against the pressure of the coil spring 22. The downwardly movement of the stem 20 will force the valves 18 and 19 toward the closed position, with respect to the openings 16 and 17, thus restricting the discharge of fluid through said openings into the chamber 36. This restriction of the discharge of the fluid will set up a resistance to the passage of the fluid through the exhaust port 3, and will correspondingly increase the resistance of the movement of the paddle 10 in the cylinder 1, which resistance will be communicated to the armature shaft 7 through the head 4, rod 5 and coupling 6.

The operation just described will be reversed, in case that the speed of rotation of the armature shaft 7 decreases.

From the above, it will be understood that with the increase of speed of the armature shaft, a correspondingly increased load will be thrust upon it, and with a decrease in speed, the load will be correspondingly decreased. The speed of the motor shaft will thus be automatically regulated by its own speed of rotation.

By adjusting the screw cap 23, the tension of the spring 22 may be varied, so as to vary the maximum speed of rotation of the shaft 7.

I do not limit my invention to the structure shown and described, as many modifications, within the scope of the appended claims, may be made without departing from the spirit of my invention.

What I claim is:—

1. In a speed controlling mechanism, of the kind described, the combination with a driving element of a motor, of a cylinder having an intake port and an exhaust port for fluid, a piston attached to and movable by said driving element in said cylinder and arranged to force fluid from said intake port to said exhaust port, and governing means controlled by the speed of movement of said motor driving element for controlling the discharge of fluid through said exhaust port, in a manner such that the discharge will be respectively increased and decreased, as the speed of the driving element is reduced and increased.

2. In a speed controlling mechanism of the kind described, the combination with a

rotary driving shaft of a motor, of a cylinder having an intake port and an exhaust port for fluid, a piston attached to and movable by said shaft and arranged to force fluid from said intake port to said exhaust port, and governing means controlling by the speed of rotation of said shaft for reducing the discharge of fluid from said exhaust port when the speed of rotation of the shaft increases, and for increasing the discharge of fluid from the exhaust port, when the speed of the shaft decreases.

3. In a speed controlling mechanism of the kind described, the combination with the driving element of a motor, of a cylinder having an intake port and an exhaust port for fluid, a valve for controlling said exhaust port, a piston attached to and movable by said driving element in said cylinder arranged to force fluid from said intake port to said exhaust port, and governing means controlled by the speed of said driving element for moving said valve toward and from the closed position, as the speed of said driving element increases and decreases respectively.

4. In a speed controlling mechanism of the kind described, the combination with a rotary driving shaft of a motor, of a cylinder having an intake port and an exhaust port for fluid, a valve controlling said exhaust port, a piston attached to and movable in said cylinder by said shaft and arranged to force fluid from said intake port to said exhaust port, and governing means controlled by the speed of said shaft for moving said valve respectively toward and from the closed position, as the speed of said shaft increases and decreases.

5. In a speed controlling mechanism of the kind described, the combination with a rotary driving shaft of a motor, of a cylinder having an intake port and an exhaust port for fluid, a valve controlling said exhaust port, a rotary piston in said cylinder attached to and movable by said shaft arranged to force fluid from said intake port to said exhaust port, and governing means controlled by the speed of said shaft for moving said valve toward and from the closed position as the speed of the shaft respectively increases and decreases.

6. In a speed controlling mechanism of the kind described, the combination with a moving driving element of a motor, of a fluid container having an intake port and an exhaust port, means attached to and actuated by said driving element for forcing the fluid in said container from said intake port to said exhaust port, and governing means controlled by the speed of said driving element for increasing the resistance to flow of fluid through said exhaust port as the speed of the driving element increases and for reducing the resistance to the flow

through the exhaust port as the speed of the driving element decreases.

7. In a speed controlling mechanism of the kind described, the combination with a moving driving element of a motor, of a fluid container having an intake port and an exhaust port, a valve controlling said exhaust port, means attached to and actuated by said driving element for forcing fluid in said container from said intake port to said exhaust port, and governing means controlled by the speed of the driving element for moving said valve respectively toward and from the closed position, as the speed of said driving element increases and decreases.

8. In a speed controlling mechanism of the kind described, the combination with a moving driving element of a motor, of a tank for holding fluid, fluid conducting means connected at its ends to said tank, pumping means connected with and actuated by said driving element arranged to force fluid through said conducting means from said tank back into the tank, and governing means controlled by the speed of said driving element by which the load upon the pumping means is increased with the increase of speed of the driving element.

9. In a speed controlling mechanism of

the kind described, the combination with a moving driving element of a motor, of a tank for holding fluid, fluid conducting means having its inlet and outlet ends connected with said tank, pumping means in said conducting means, governing means actuated by the speed of the driving element, and means actuated by said governing means for restricting the flow of fluid in said conducting means intermediate the outlet end thereof and said pumping means when the speed of the driving element increases.

10. In a speed controlling mechanism of the kind described, the combination with a moving driving element of a motor, of a tank for holding fluid, fluid conducting means having its inlet and outlet ends connected with said tank, pumping means in said conducting means for forcing fluid therethrough from said inlet to said outlet end, a shut off valve in said conducting means intermediate of the outlet end thereof and said pumping means, and governing means controlled by the speed of said driving element for moving said valve toward its closed position as the speed of the driving element increases.

In testimony whereof I have signed my name to this specification.

CHARLES B. HUTCHISON.