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SPEED CONTROL MECHANISM

Filed Aug. 20, 1931

Fig. 1.

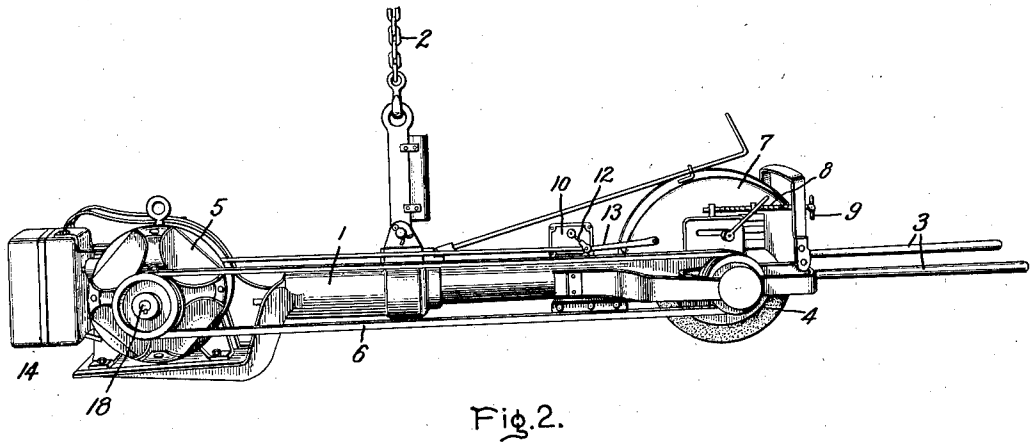


Fig. 2.

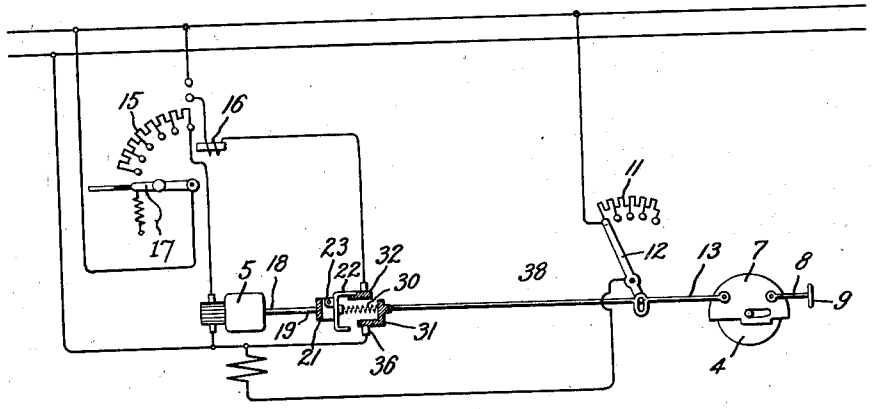
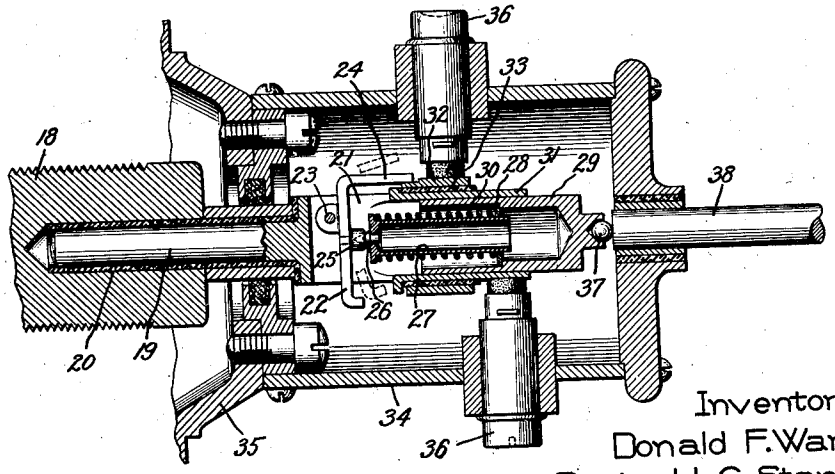


Fig. 3.



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SPEED CONTROL MECHANISM

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Application August 20, 1931, Serial No. 558,339

13 Claims. (Cl. 51—99)

In connection with certain types of driven machines, it is desirable to adjust certain parts of the driven machine and at the same time adjust the speed of the driving machine. Such an instance is met with, for example, in the case of motor driven grinders wherein as the grinding wheel wears down it is desirable to adjust the guard for the wheel and to adjust the speed of the motor so as to maintain the peripheral speed of the wheel at the desired value. With such machines it is desirable also to provide an emergency governor for limiting the speed

The object of the present invention is to provide in connection with a machine of the type referred to an improved construction and arrangement of emergency speed governor, and for a consideration of what we believe to be novel and our invention attention is directed to the following specification and the claims appended thereto.

In the drawing, Fig. 1 shows a known type of grinding machine provided with adjusting and governing means embodying our invention; Fig. 2 is a diagrammatic view comprising a wiring diagram, and Fig. 3 is a sectional view of the emergency governor.

Referring to the drawing, Fig. 1 shows a grinder of the swing frame type, the frame 1 being hung on a chain 2 and being movable by means of the handles 3. Mounted in the frame is a grinding wheel 4 driven by a variable speed electric motor 5 by means of a belt 6. Located over the grinding wheel is a guard 7 which is adjusted toward the left in Fig. 1 as the wheel wears down, the adjustment being effected by means of a threaded rod 8 having a handle 9 at its end. The details of structure for effecting adjustment of the guard is not shown as it forms no part of the present invention. The arrangement indicated is a known one. Mounted on the frame adjacent to guard 7 is a contact box 10 in which is located a field resistance 11 (Fig. 2) for adjusting the speed of the motor. The switch arm 12 of the contact box is connected by a link 13 to guard 7 so that the switch arm is moved when the guard is adjusted. At 14 is indicated the motor starting box comprising the starting resistance 15 and the holding coil 16 for the contact arm 17, the latter being biased to open or off position.

Mounted on motor shaft 18 is an emergency governor or speed limiting governor comprising a spindle 19 which is fixed in an opening in the end of the shaft and is suitably insulated therefrom as is indicated at 20 (Fig. 3). The outer end of spindle 19 comprises a yoke 21 between the arms of which is pivoted an eccentric emergency governor weight 22, the pivot being indicated at 23. As shown in Figs. 2 and 3, the upper end of weight 22 is the heavy end and is in the form of a contact arm 24. Weight 22 below pivot 23 as shown in Figs. 2 and 3 is provided with a conical bearing seat 25 with which engages a bearing cone 26 carried on one end of a tube 27. The other end of tube 27 is slidably mounted in a washer 28 of insulating material mounted in a sleeve 29, and located between washer 28 and a flange on tube 27 is a governor spring 30 which presses bearing cone 26 against seat 25. Sleeve 29 is slidably mounted in a slip ring or contact cylinder 31 formed integral with yoke 21. Mounted on slip ring 31 is a second slip ring or contact cylinder 32 insulated therefrom by an insulating sleeve 33. When motor shaft 18 rotates, spindle 19, yoke 21, governor weight 22, tube 27, sleeve 29 and cylinders 31 and 32 rotate with it as a unit. This rotating unit is located in a casing 34 the inner end of which is fastened to the end frame 35 of the motor. Mounted in casing 34 are contact brushes 36 which engage slip rings 31 and 32. In the end of sleeve 29 is a thrust bearing ball 37 which engages the end of a rod 38 suitably connected to the link 13. In the diagrammatic view of Fig. 2, the rod 38 forms a continuation of link 13. Rod 38 is slidably mounted in a suitable bearing in the end wall of casing 34. With this arrangement when guard 7 is adjusted, sleeve 29 is moved axially to adjust the compression of spring 30. The emergency speed governor per se is claimed in our divisional application, Serial No. 21,052, filed May 11, 1935.

Referring to Fig. 2, it will be seen that resistance 11 is connected in series with the motor field and that brushes 36 and slip rings 31 and 32 of the emergency governor are located in the circuit of holding coil 16. The circuit through the emergency governor comprises the governor weight 22, the circuit being closed as long as contact end 24 engages slip ring 32.

In the use of the invention, emergency governor weight 22 is set by means of spring 30 for a speed slightly higher than that at which it is desired to run the grinding wheel. When the motor is running arm 17 closes the circuit through holding coil 16 and this circuit is maintained closed as long as the desired speed is not exceeded. In case the desired speed is exceeded, governor weight 22 will fly out, moving from the full line position, thus moving contact end 24 from engagement with slip ring 32 and opening

the circuit through holding coil 16. When the circuit is opened through coil 16, arm 17 moves automatically to off position, opening the motor circuit.

When guard 7 is adjusted to take care of wear of the grinding wheel and to increase the speed of the motor by adjusting resistance 11, at the same time rod 36 is moved to change the compression of spring 30 thus adjusting the emergency governor weight for the new motor speed. With this arrangement, therefore, when the driven machine is adjusted, the speed of the driving machine and the setting of the emergency governor for the driving machine are correspondingly adjusted.

The emergency governor is relatively simple in structure and when used in the combination illustrated is automatically adjusted without any special act on the part of the operator, and without requiring the exercise of any special skill by the operator. It may be adjusted when the motor is running, a thing of importance in connection with mechanisms of this type.

While we have described our invention as applied to a grinder, it will be understood that this is only by way of example and that the invention may be used wherever found applicable. Broadly, the control mechanism for controlling and limiting the speed of a machine comprises in accordance with our invention a speed controlling element or speed governor and a speed limiting element or emergency governor together with means for automatically setting one of these elements in response to the setting of the other element. The invention has great utility in connection with a grinder for to obtain the most efficient operation it is desirable that the grinder wheel be operated always at the highest safe peripheral speed. This requires that as the wheel wears down the speed be correspondingly increased, the increase becoming considerable before the wheel is worn away.

In accordance with the provision of the patent statutes, we have described the principle of operation of our invention, together with the apparatus which we now consider to represent the best embodiment thereof, but we desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What we claim as new and desire to secure by Letters Patent of the United States, is:—

1. In combination, a driven machine having an adjustable part, a driving machine having adjustable means for controlling its speed and an adjustable emergency speed governor, and means connecting said adjustable part to said adjustable means and to said emergency governor for adjusting the speed of the driving machine and the setting of the emergency governor when said adjustable part is adjusted.

2. In combination, a driven machine which it is desired to operate at different maximum speeds, a driving machine, means for adjusting the speed of the driving machine, an emergency speed governor for the driving machine, means for setting the emergency governor for different speeds, and means for simultaneously adjusting said speed adjusting means and said emergency governor setting means.

3. In combination, a driven machine, a variable speed electric motor for driving it, means for adjusting the speed of the motor, an emergency speed governor for the motor, means for setting the speed at which the emergency governor operates, and means for adjusting the speed of the motor and correspondingly adjusting the setting means for the emergency governor.

4. The combination with a grinding wheel and a variable speed motor for driving it, of an adjustable emergency speed governor for the motor, and means for adjusting the speed of the motor and correspondingly adjusting the emergency governor as the grinding wheel wears down.

5. The combination with a grinder having a grinding wheel and a part which is adjusted as the grinding wheel wears down, a motor for driving the grinder, means for adjusting the speed of the motor, and an adjustable emergency speed governor for the motor, of means connecting said part to said speed adjusting means and said emergency governor for adjusting them when said part is adjusted.

6. In combination, an electric motor, a machine driven thereby, means for adjusting the speed of the motor, an emergency governor for the motor, and means for adjusting said speed adjusting means and correspondingly adjusting the setting of the emergency governor, said emergency governor comprising a contact in the motor circuit, an eccentric governor weight having a contact arm adapted to engage said contact, a governor spring which holds said weight against movement, and a member which engages the spring and is movable to vary the compression of the spring.

7. An arrangement for driving a driven machine which it is desired to operate at different maximum speeds comprising a driving machine, means for adjusting the speed of the driving machine, a speed limiting governor for the driving machine, means for adjusting the speed limiting governor, and means for simultaneously correspondingly adjusting said two first named means.

8. An arrangement for operating a driven machine having an adjustable part which is positioned in accordance with a condition of the driven machine, comprising a driving machine, means for adjusting the speed of the driving machine, a speed limiting governor for the driving machine, means for adjusting the speed limiting governor, and means adapted to be connected to the adjustable part of a driven machine for correspondingly adjusting said two first named means when the adjustable part is adjusted.

9. An arrangement for operating a grinding machine having a grinding wheel and an adjustable part associated therewith comprising a driving machine, means for adjusting the speed of the driving machine, a speed limiting governor for the driving machine, means for adjusting the speed limiting governor, and means adapted to be connected to the adjustable part of a grinding machine for correspondingly adjusting said two first named means when such adjustable part is adjusted.

10. An arrangement for operating a grinding machine having a grinding wheel to be operated at different speeds, comprising a driving machine, means for adjusting the speed of the driving machine, a speed limiting governor for the driving machine, means for adjusting the speed limiting governor, and means for simultaneously correspondingly adjusting said two first named means.

11. An arrangement for operating a grinding machine having a grinding wheel to be operated at different speeds comprising an electric motor, means for adjusting the speed of the

motor, a speed limiting governor for the motor, means for changing the setting of the speed limiting governor, and means for simultaneously correspondingly adjusting said two first named means.

12. The combination with a grinding wheel, a variable speed machine for driving it, and a speed limiting governor for the machine, of movable means for adjusting the speed of said machine movable means for adjusting the setting of the speed limiting governor, and means for simultaneously correspondingly adjusting said two movable means as the grinding wheel wears down.

13. The combination with a grinding wheel, an adjustable guard for the grinding wheel, and a variable speed driving machine for the wheel, of a speed limiting governor for the driving machine, movable means for adjusting the setting of said governor, movable means for varying the speed of the driven machine, and means connecting said two movable means to said guard for effecting adjustments of said two movable means when the guard is adjusted.

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