May 12, 1936. J. A. CAMERON ET AL 2,040,464

SPEED CONTROLLING AND BRAKING MEANS

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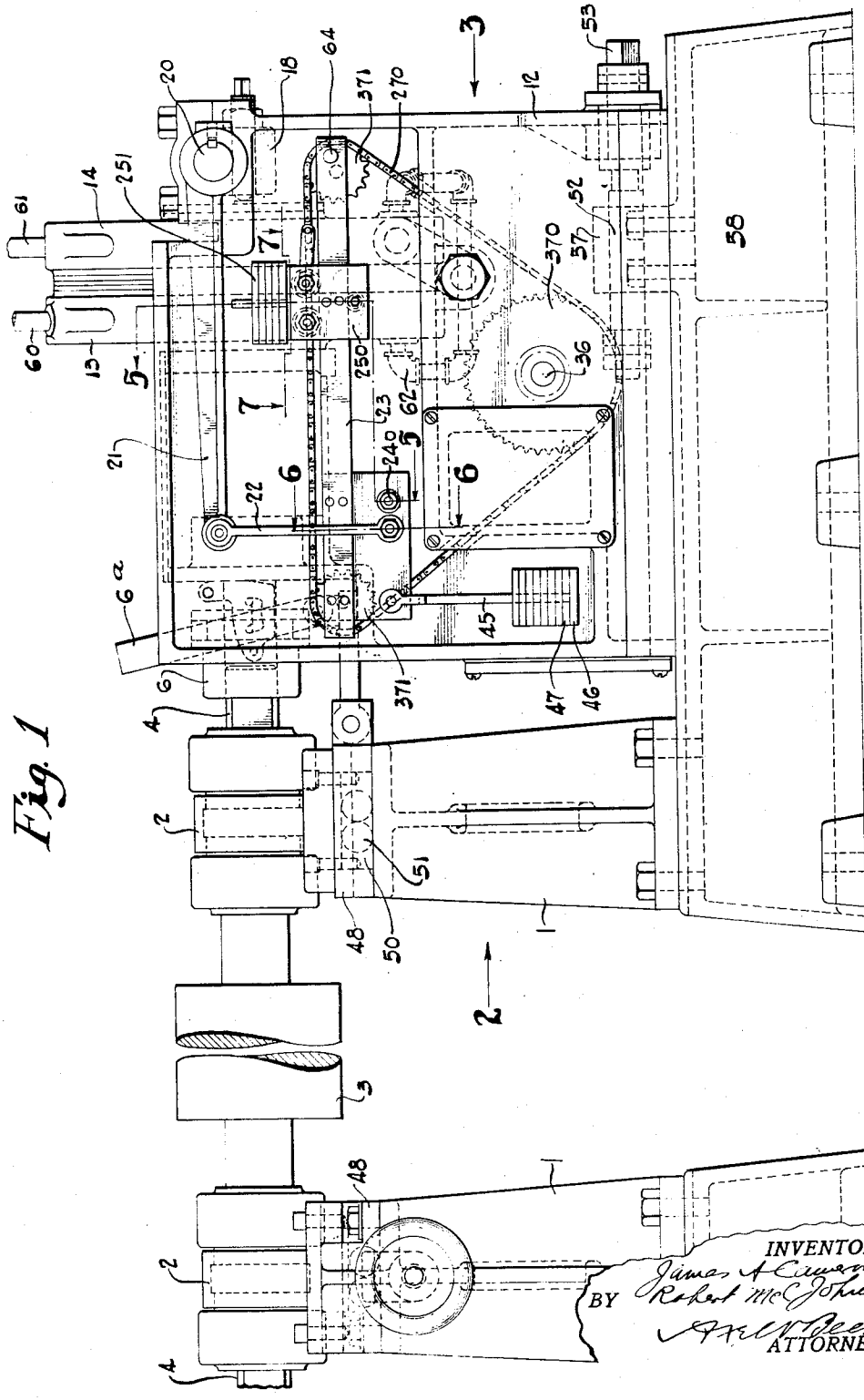


Fig. 1

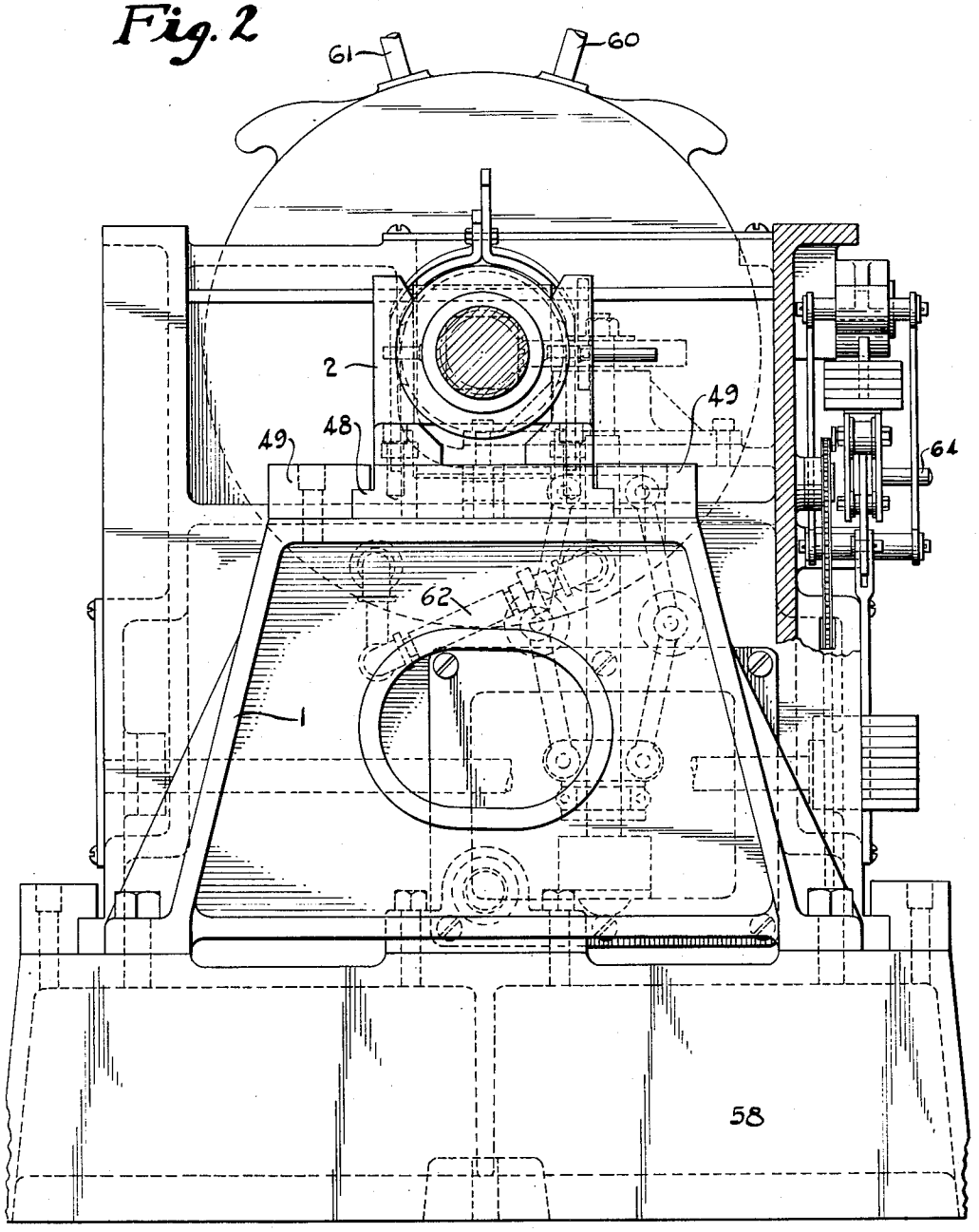
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Fig. 2



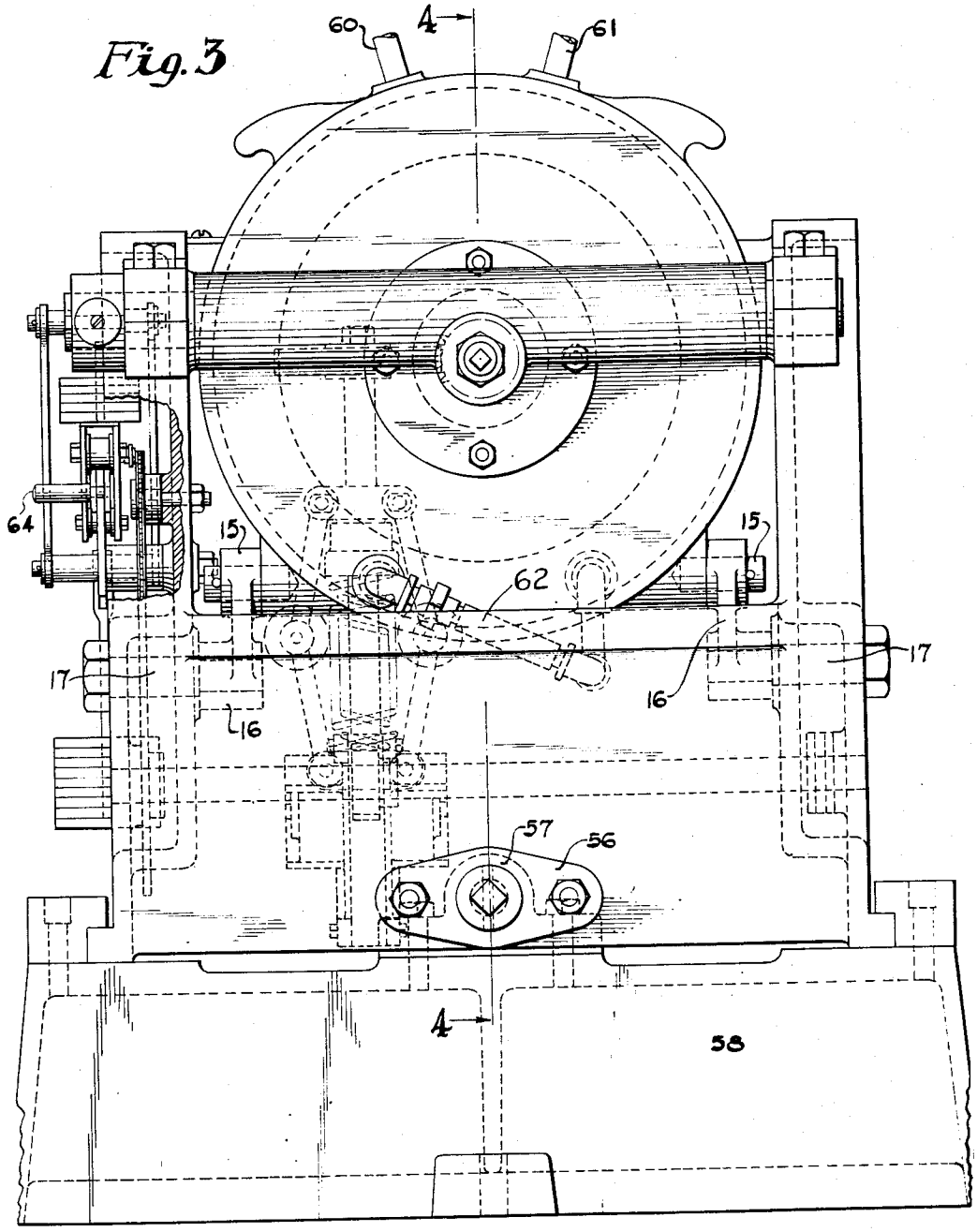
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Fig. 3



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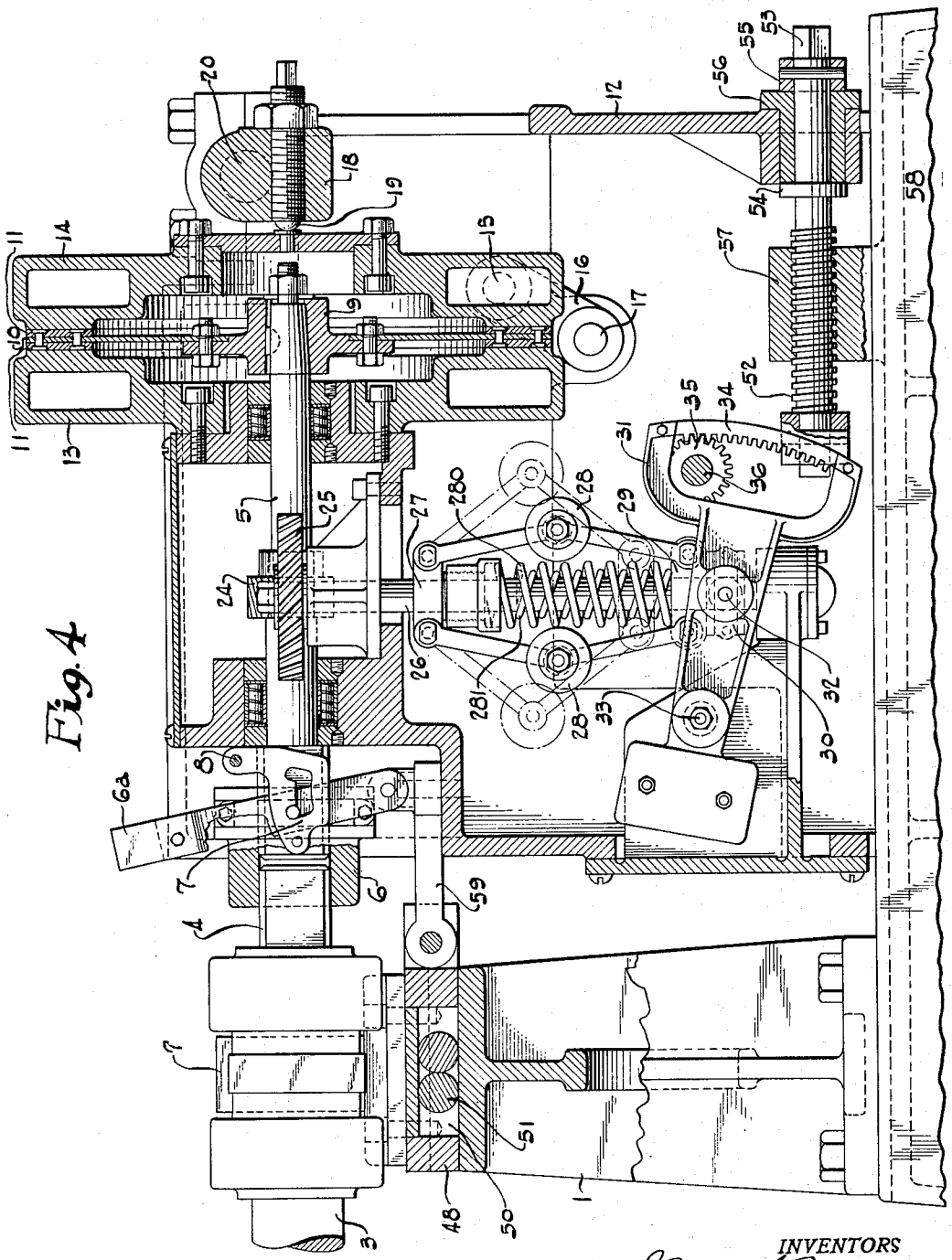


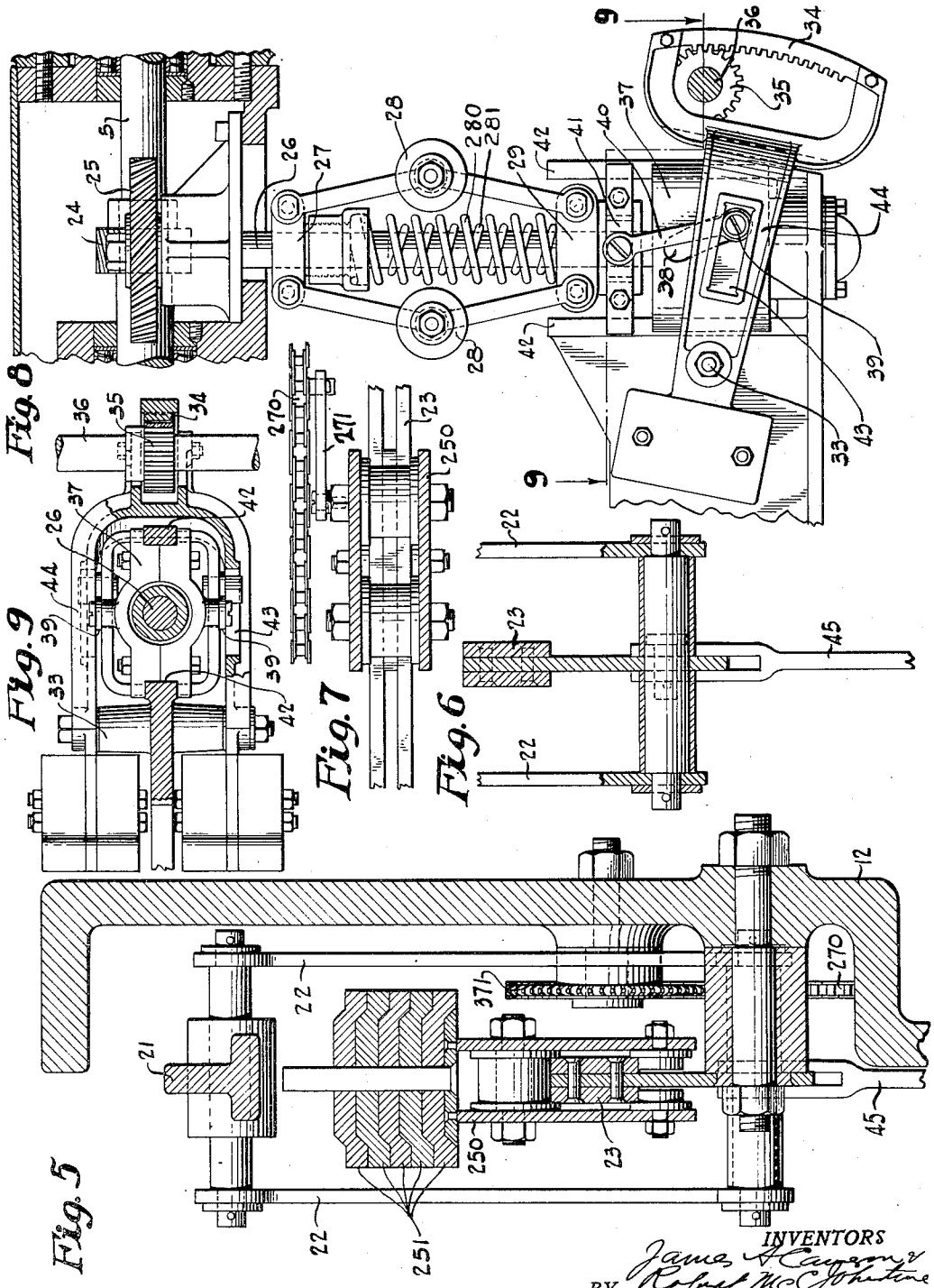
Fig. 4

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Fig. 10

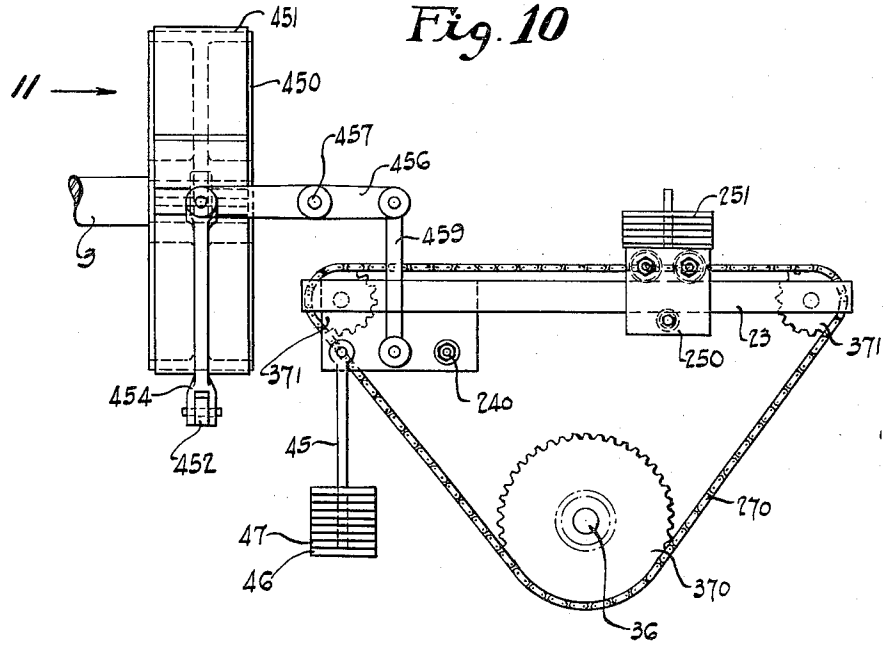
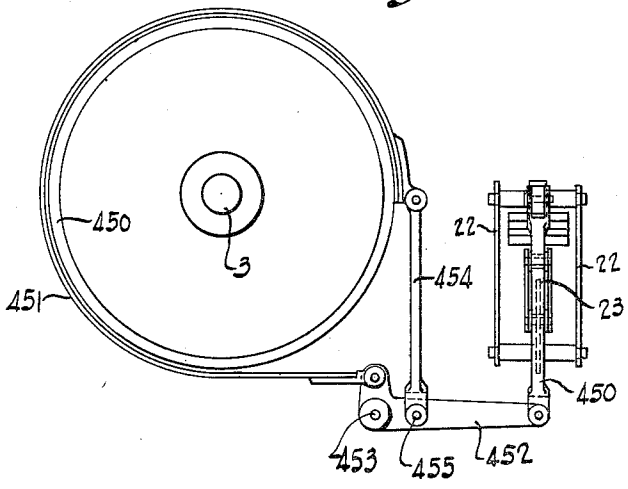


Fig. 11



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UNITED STATES PATENT OFFICE

2,040,464

SPEED CONTROLLING AND BRAKING MEANS

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Application August 11, 1932, Serial No. 628,352

2 Claims. (Cl. 188—180)

This invention relates to speed controlling and braking, and has for its main, though not sole, object and feature the control of a web being unwound as from a mill roll or reel in winding or other machines.

In the accompanying drawings the invention is disclosed in several concrete and preferred forms in which:

Fig. 1 is a general view in side elevation, partly broken away and in section, showing one form of the invention.

Fig. 2 is a view in elevation looking in the direction of arrow 2 of Fig. 1, with the mill roll shaft in section and with part of the framework broken away and in section.

Fig. 3 is a view in elevation looking in the direction of arrow 3 of Fig. 1 with part of the framework broken away and in section.

Fig. 4 is a vertical longitudinal sectional view substantially on the plane of line 4—4 of Fig. 3.

Fig. 5 is a vertical sectional detail view substantially on the planes of irregular line 5—5 of Fig. 1.

Fig. 6 is a vertical sectional detail view substantially on the plane of line 6—6 of Fig. 1.

Fig. 7 is a horizontal sectional detail view substantially on the plane of line 7—7 of Fig. 1.

Fig. 8 is a view similar to part of Fig. 4, showing a modified form of the invention.

Fig. 9 is a detail sectional view substantially on the planes of irregular line 9—9 of Fig. 8.

Fig. 10 is a more or less diagrammatic view showing a modified form of the invention in which a brake band is employed.

Fig. 11 is a view looking in the direction of arrow 11 of Fig. 10.

Considering first that form of the invention shown in Figs. 1 to 9 inclusive, it will be seen that mill roll shaft 3 is mounted in bearings 2 carried by pedestals 1. 5 indicates what may be called a brake shaft, said brake shaft being in axial alinement with the mill roll shaft and to be connected to end 4 of the latter by a coupling 6 operated by a handle 6a, there being provided a latch 7 pivoted at 8 to retain the coupling in either the connected or disconnected position. 26 indicates a governor shaft, driven from brake shaft 5 by means of spiral gears 24 and 25. Mounted upon this shaft is a speed governed device here in the form of a ball governor 28 having a fixed collar 27 and a sliding collar 29. A spring 280 serves to urge the collars apart and it will be understood that as the speed of the shaft 26, and consequently of ball governor 28, increases, the tension of the spring is overcome and sliding collar 29 moves nearer to collar 27. Sliding collar 29 is secured at 32 to oscillatable member 30 pivoted at 33, and carried by 30 is a curved rack 34 that meshes with pinion 35 on rockable member or shaft 36. The movement of shaft 36 controls the effectiveness of a brake for shaft 5 or mill roll or reel shaft 3, and thus the speed of rotation of shafts 5 or 3 determines the action of the brake for said shafts 3 or 5. Some of the various forms of brakes that may be employed will be discussed at a later point. The parts are here so arranged that, as the speed of shaft 3 increases, the effectiveness of the brake will be decreased. It may not, however, always be desirable to vary the effectiveness of the brake in exact proportion to the variation in speed, and one of the advantages of the present construction is that the action of the brake, while controlled by the speed of the shaft, is susceptible of acting at a ratio different from that produced in direct proportion to the speed of the speed governed device. Several methods and devices may be employed to bring this about. One of these consists in employing a supplemental spring 281 between collars 27 and 29, which spring is ineffective at low speeds of shaft 26 but is effective at higher speeds—due to the fact that spring 281, as shown, will not engage collar 27 until collar 29 has moved a certain distance upwardly. It will therefore be seen that at higher speeds an extra load is thrown upon the governor. Or, if desired, the construction shown in Figs. 8 and 9 may be employed in addition to or independently of supplemental spring 281. In Figs. 8 and 9, sliding collar 29 carries a slide 41 that reciprocates on guides 42, and connected to this slide are links 40 having rollers 39 that slide in cam slots 38 of member 37. Rocking member 44, which actuates shaft 36 in the manner previously described in connection with 30, is provided with slots 43 in which rollers 39 also engage so that the movement of slide 41 is transmitted in a modified form to member 44. It will now be understood that by varying the shape of cam slots 38, practically any desired ratio of movement of shaft 36 in response to variation in the speed of rotation of shaft 26 can be obtained.

In the construction shown in Figs. 1 to 9 inclusive, the movement of shaft 36 is utilized in the following manner to control the brake. Mounted on shaft 5 is an intermediate brake member 9 of disk-like formation and somewhat flexible in character. On its outer circumference 10 this intermediate brake member is provided

with oppositely disposed braking surfaces 11. Adjacent this rotating brake member 9 are two non-rotatable and relatively rigid braking members 13 and 14. Shaft 5 extends through member 13, and member 14 is pivotally supported at 17 by means of links 16 pivotally connected to member 14 at 15. 18 indicates a pressure exerting member pivoted at 20 and having a projection 19, substantially in line with the axis of shaft 5, to engage member 14 to move it on its pivot 17 and thus bring the braking elements together or apart. It will now be seen that movement of rock shaft 20 will press the braking surface of 14 against one of the braking surfaces 11 of member 9 which in turn will cause the other braking surface 11 of 9 to engage the braking surface of member 13, and thus more or less movement of 20 and 18 will control the effectiveness of the brake. Members 13 and 14 are provided with water jackets, the intake for which is shown at 60 and the outlet at 61, there being a communicating pipe 62 extending between the two water jackets. By these means not only are the braking surfaces of members 13 and 14 cooled, but braking surfaces 11 of the intermediate member are also cooled by reason of this arrangement. Mounted fast on rockshaft 20 is a brake beam 21, the outer end of which is connected by means of link 22 to a tiltable member 23 pivoted at 240. 250 is a movable carriage or weight mounted to travel on member 23 and counterweighted by weight 46 suspended by means of link 45 on the other side of pivot 240. Obviously, movement of carriage 250 will tilt member 23 more or less and will actuate rockshaft 20 by means of link 22 and brake beam 21. It will now be understood that, if movement of carriage 250 is controlled by the rocking of shaft 36, the brakes will be controlled by the speed of shafts 3 and 5. In the present instance, this control is effected as follows: mounted on shaft 36 is a sprocket 370 and mounted adjacent member 23, but independently thereof, are two smaller sprockets 371. Passing over these sprockets is a sprocket chain 270 connected to carriage 250 as shown, so that the turning movement of shaft 36 will shift carriage 250 and thereby apply the brakes more or less. Additional weight 251 in connection with carriage 250 or additional weight 47 in connection with weight 46 can be employed to obtain the desired balance between the elements. Also, if desired, a handle 6^a, mounted on member 23, may be provided whereby the braking action can be controlled manually should it be desired to do so. The entire braking apparatus is carried by a housing 12 adjustable on base 58, and adjustment can be accomplished by any suitable means such as member 53 idly rotatable, but not slidable, in bushing 56 and in threaded engagement with internally threaded bushing 57 mounted on base 58. The adjustment of housing 12 may also be used for side registering mill roll shaft 3 so as to bring the mill roll into alinement with the winding or other machine. This is accomplished in the following manner: 1 indicates pedestals fixed to base 58, and 2 indicates bearings for the mill roll shaft, said bearings being mounted on carriages 48. Interposed between carriage 48 and top 50 of a pedestal are rollers 51 that support said carriages when at rest or in motion. A connection 59 extends between one of the carriages and housing 12 so that when the latter is adjusted the mill roll shaft or reel shaft is likewise adjusted: or, to put it differently, when the mill roll shaft is side registered, the brake mechanism is adjusted with it.

It will be clear from the foregoing that, as the diameter of the mill roll is diminished, the mill roll shaft will increase its speed and will act through the speed control device (Fig. 4 for instance) to lift curved rack 34, thereby rotating shaft 36 counter-clockwise, the motion of the latter being transmitted (Fig. 1) through sprocket 370 and chain 270 to weight 250 bringing the latter nearer pivotal point 240. The effect of this is to cause weight 46 to become more effective and to exert a pull on link 22 thereby lowering brake beam 21 and effecting a turning movement of rockshaft 20 in a counter-clockwise direction thereby bringing pressure exerting member 18 (Fig. 4) and its projection 19 away from brake member 14, thus lessening the brake pressure. It will be understood that a lessening of the speed of the mill roll shaft will, through the connections described, have the opposite effect.

Turning now to other exemplifications of embodiments of the invention, let us first consider Figs. 10 and 11. As there shown, shaft 36 is controlled from mill roll shaft 3 in a manner similar to that previously described, and so likewise carriage 250 on member 23 is controlled by the oscillation of shaft 36. 450 indicates a brake drum mounted on shaft 3 or on a shaft associated therewith, and around this drum passes a brake band 451, one end of which is connected to bell crank 452 pivoted at 453, and the other end of which is connected to member 454 pivotally supported at 455 on bell crank 452. 456 indicates a lever pivoted at 457, and one end of this lever is connected by means of link 450 to bell crank 452, while the other end of said lever is connected by link 459 to member 23. The tilting of member 23 on its pivot 240 therefore acts to tighten or loosen the brake band with respect to the brake drum, and so the same effect as is obtained in connection with the construction of Figs. 1 to 9 is obtained here.

We claim:

1. In a braking device: two non-rotating brake members; a pivotal support for one of said members; a rotating shaft extending through the other of said members; a third brake member carried by the shaft intermediate the non-rotating brake members; a pressure-exerting member to engage the pivotally supported member at a point substantially in line with the axis of the shaft; a rockshaft carrying the pressure-exerting member; and means controlled by the speed of the rotating shaft to actuate the rockshaft.

2. In a speed control device for a rotating member: brake elements to control said rotating member; a pivotally supported member adapted to control, by its tilting movement, the brake elements; a movable weight carried by the pivotally supported member to effect tilting thereof; a plurality of transmission elements carried independently of the pivotally supported member; a flexible connection passing over and controlled by the transmission elements and secured to the weight; and a speed governed device, controlled by the rotating member, to effect movement, through the transmission elements, of the flexible connection.

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