A. F. WALDOW.

STOP MOTION APPARATUS.

APPLICATION FILED SEPT. 16, 1914.

1,271,964. Patented July 9, 1918.

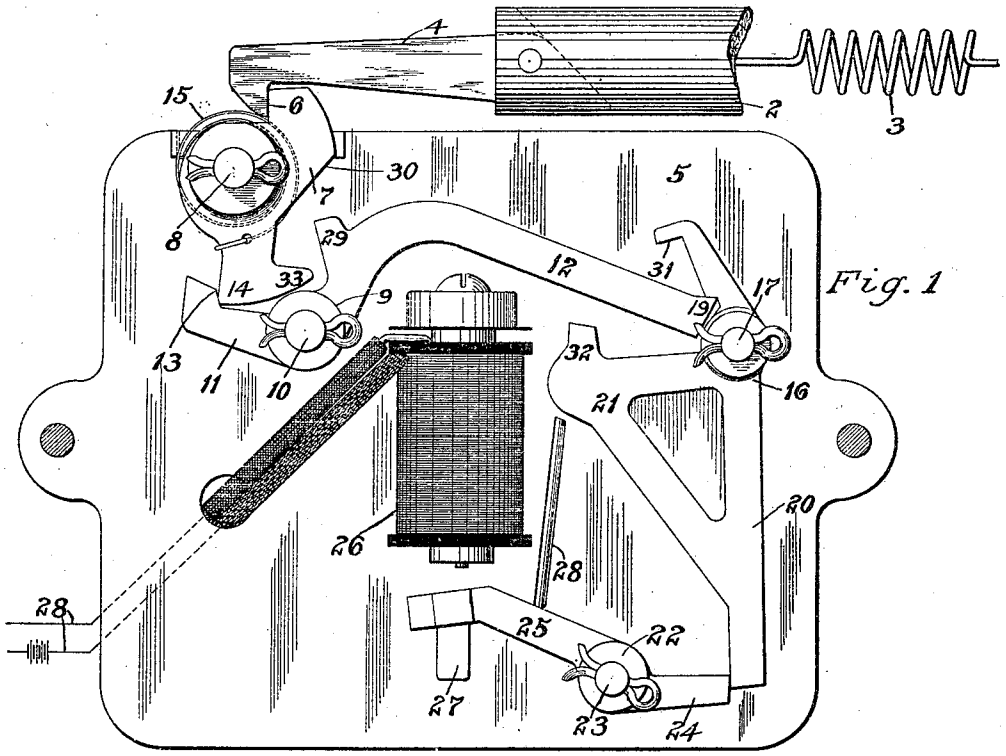


Fig. 1

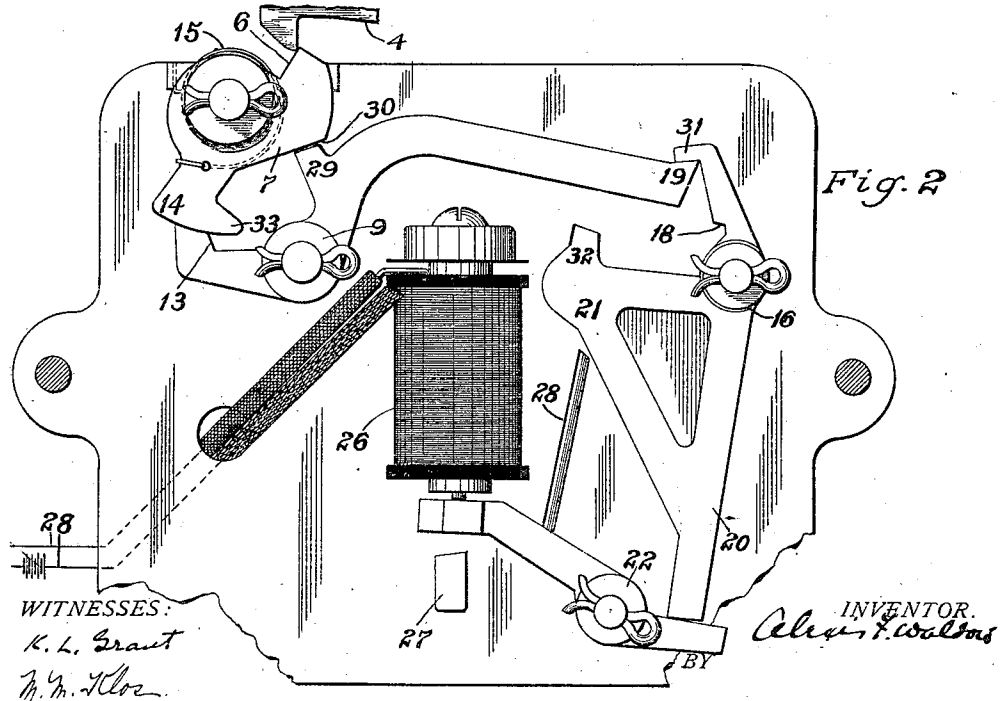


Fig. 2

WITNESSES:

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STOP-MOTION APPARATUS.

1,271,964. Specification of Letters Patent. Patented July 9, 1918.

Application filed September 16, 1914. Serial No. 862,035.

To all whom it may concern:

Be it known that I, ALEXIS F. WALDOW, a citizen of the United States, residing at Whitinsville, in the county of Worcester and State of Massachusetts, have invented the following-described new and useful Improvements in Stop-Motion Apparatus.

The invention is an improvement in power-controlling devices of the kind wherein the alteration of the condition of an electric circuit operates magnetically to trip a train of mechanism, which releases a suitable spring or weight-urged member to shift a belt or otherwise affect the application of power to the machinery to be controlled. Such devices are employed, for example, in connection with textile machinery, to stop the machine automatically in the event of breaking of the thread or other conditions rendering immediate stoppage desirable. For all such purposes it is important both that the device shall normally hold the knock-off mechanism reliably against accidental release and that it shall operate with certainty to release when the necessity arises, and that it shall restore readily. The present invention gives a maximum efficiency in respect of each of these requirements and is at the same time simple and economically produced. In my prior application Serial No. 765,983, filed May 7, 1913, I have disclosed a power-controlling device having two electro-magnets with interlocking armatures, for the purpose of guarding against tripping of the device by jarring. In the present instance I secure equal safety with even greater sensitiveness to circuit conditions by a construction which requires only a single magnet.

In the accompanying drawings showing the preferred embodiment of the invention:

Figure 1 is a side elevation of the mechanism in normal condition; and

Fig. 2 is a similar view showing the electro-magnet energized and the train of mechanism controlled thereby in the tripped condition, the catch 4 being in the act of riding off the shoulder 6.

A rod 2, representing one form of knock-off member, is connected with a belt shifter or its equivalent (not shown) and is urged to the right in the figures by a spring 3 represented diagrammatically. A hook 4 pivoted to the end of the rod affords suitable means for engaging it with the holding and releasing mechanism, the parts of which are shown mounted on a vertical plate 5 attachable to the frame of the machine with which the device is associated. It will be understood that in practice the parts are protected by a cover, which has been removed in the views.

The shoulder or bill of the hook 4 normally engages a shoulder 6 at the top of a member 7, which is pivoted at 8 to the upper part of the supporting plate. Another member 9 is pivoted at 10 below the member 7, and is formed with a short arm 11 and a long laterally-extending arm 12, the arm 11 having a beveled shoulder 13 which normally receives pressure applied by a lug or arm 14 projecting downward from the member 7. A spring 15 applied to this member 7 urges the same in the direction to restore it from the position of Fig. 2 to that of Fig. 1, but is much weaker than the spring 3, so that it is overcome by the latter when the mechanism is tripped. The parts 7 and 9 are power-reducing connections or transmission elements, that is to say, while they are not capable in themselves of holding the rod 2 against movement, they greatly minimize the pressure which they transmit from the main spring 3 to the first locking device 16, about to be described, so that the pressure applied to the locking device need be very slight, and consequently offers little resistance to the tripping thereof. This is due in part to the fact that the power arm 6 of the lever 7 is shorter than the work arm 14. Principally, however, it results from the formation and arrangement of the lever 9 and its shoulder 13, the latter being so disposed that the force applied by the lug 14 acts only a short distance out of line with the fulcrum 10, with the result that the turning moment is slight, whereas the work arm 12 is of considerable length.

The first locking device or trigger 16 is disposed in a generally vertical manner, with its pivot 17 near the top and a locking shoulder 18 (Fig. 2) above this fulcrum, to receive the upwardly acting nose 19 of the member 9. It is also provided with a long depending arm 20 and a portion 21 projecting laterally, beneath the arm 12. The trigger is capable of holding the knock-off device against movement under the action of

its spring 3. This may be effected by a formation and arrangement of the engaging surfaces 18 and 19 which results in no turning moment, or by one in which the moment is so extremely slight, with any ordinary strength of main spring, as to be incapable of swinging the trigger against the frictional resistance and the overweighting effect of the portion 21, which latter gives the trigger 16 a bias in the locking direction.

The arm 20 of the trigger is normally blocked against releasing movement by a detent lever 22, which is fulcrumed intermediate its ends on the pivot 23 and disposed in a generally horizontal manner, with the end of one arm 24 opposite the side of the extremity of the arm 20. Its other arm 25 is beneath and constitutes an armature for a substantially vertical electro-magnet 26, which is thus located in the space partially inclosed by the levers 9, 16 and 22, an arrangement which is desirable alike for its compactness and for the effective coöperation of the parts which it makes possible. The armature arm 25 overweights the blocking arm 24 and normally rests on a fixed lug 27.

An important feature of the invention is represented in concrete example by a rod 28, fixed to and projecting upward from the armature arm 25 of the detent lever toward the extremity of the laterally projecting portion 21. The upper end of the rod is normally out of contact with this portion, but the proportions are such that when the armature is pulled up by the magnet it strikes against the said portion, thereby displacing the trigger 16 sufficiently to enable the nose 19 to slip out from the shoulder 18 under the action of the main spring 3. In this manner, it will be observed, the one electromagnet is enabled to retract both of the locking devices 16 and 22. Furthermore, this is accomplished successively, the detent lever 22 being retracted first, and the trigger 16 dislodged thereafter. The trigger 16 applies no pressure to the detent lever 22, which may be tilted to such extent that its right-hand end clears the lower end of the trigger without any movement of the latter resulting; and, therefore, there is no frictional resistance from this source to the attraction of the armature by the magnet. Moreover since the armature is entirely free at the outset and since it does not strike its dislodging blow on the trigger until it has acquired momentum for the purpose, a comparatively small amount of current will suffice to trip the mechanism.

In operation, the detent 22 having been drawn by the magnet out of blocking relation to the trigger 16, and having in turn displaced the latter sufficiently to allow the nose 19 of the lever 9 to escape, the latter and the member 7 both turn under the force of the spring 3, with the result that the hook 4 rides off the shoulder 6, allowing the knock-off rod 2 to shoot to the right, thereby throwing off the power in any usual or desired manner. It will be understood that the closing of the circuit 27 of the magnet may be brought about by any suitable means whereby circuits are closed automatically or otherwise in case of need, such instrumentalities being well known and not requiring special illustration.

The positions which the parts assume at the moment when the knock-off rod is being released are shown in Fig. 2, wherein the functions of certain features not heretofore described become apparent. The arm 12 of member 9 is provided with an abutment portion 29, which is contacted by the surface 30 of the member 7, thereby limiting the movement of the latter when the mechanism is tripped; and the lug 14 has an arcuate surface which receives the portion of the extremity of the arm 11 above the shoulder 13, thus facilitating reëngagement of the lug with the said shoulder. The trigger 16 is provided above the locking shoulder 18 with another shoulder or limit stop 31 which limits the upward movement of the arm 12 and keeps the same from getting out of operative relation to the trigger. The trigger also has a contact portion 32 near the end of its lateral portion 21; and the lug 14 has a toe 33 which is adapted to strike the side of the projection 29 on the arm 12. The parts 7, 9 and 16 are restored to normal position automatically as soon as the hook 4 passes off the shoulder 6. The member 7 is then returned to normal position by its spring 15, and in so doing its toe 33 gives the member 9 an impulse back to its normal position, thus assisting the effect of gravity on the long arm 12. The latter in turn strikes the projection 32, assisting the trigger 16 to swing under the influence of gravity to its normal position. The detent or armature lever 22 is now free to drop back upon its rest 27 as soon as the magnet is deënergized.

While for the purpose of illustrating my invention I have shown and described one, preferred embodiment thereof, I wish it to be understood that I do not confine myself to the precise construction shown, and that numerous changes and modifications may be devised by those skilled in the art without departing from the principle which has now been fully explained.

What I claim as new is:

1. In a power-controlling device, the combination with suitable knock-off means, of successive locking devices, the first of said devices being capable of holding said knock-off means and the second device normally locking the first against releasing move-

ment, and a single electromagnet operative to retract both of said devices.

2. In a power-controlling device, the combination with a spring-urged knock-off member and power-transmitting and reducing connections normally engaged thereby, of a trigger normally restraining said connections, a detent normally blocking releasing movement of said trigger, an electro-magnet arranged to retract said detent, and means whereby said magnet when energized also retracts the trigger.

3. In a power-controlling device, the combination with suitable knock-off means, of successive locking devices, the first of said devices being capable of holding said knock-off means and the second device normally locking the first against releasing movement, an electro-magnet, and means whereby said electro-magnet when energized retracts said devices in succession, the second before the first.

4. In a power-controlling device, the combination with suitable knock-off means, of successive locking devices, the first of said devices being capable of holding said knock-off means and the second device normally locking the first against releasing movement, an electro-magnet controlling the second of said devices, and means whereby said second device trips the first.

5. In a power-controlling device, the combination with suitable power-changing means, of a trigger capable of holding said means, a detent normally blocking movement of the trigger, and an electro-magnet arranged to retract said detent, said detent having a portion normally spaced from and adapted to contact with and trip the trigger.

6. In a power-controlling device, the combination with a spring-urged knock-off member, of a lever normally connected therewith, a pivoted trigger engaged by said lever and having a depending arm, a lever fulcrumed intermediate its ends with one of its arms normally in blocking relation to said depending arm, and an electro-magnet arranged over the other arm of this lever and adapted to pull the same upward.

7. In a power-controlling device, the combination with a spring-urged knock-off member, of a lever normally connected therewith, an approximately vertical trigger pivoted near its upper end and normally engaged above its fulcrum by said lever, said trigger having a laterally-projecting portion, a lever pivoted intermediate its ends with one of its arms normally in blocking relation to the depending end of said trigger, an electro-magnet arranged over the other arm of this lever and adapted to pull the same upward, and a projection extending upward from this arm and adapted to strike the laterally-projecting portion of said trigger in order to trip the same.

8. In a power-controlling device, the combination with suitable power-changing means, and a circuit and electro-magnet for releasing the same, of a lever normally connected with said power-changing means and extending transversely over said electro-magnet, a trigger normally engaged by and holding said lever and having a depending arm at one side of said electro-magnet, and an armature lever below said electro-magnet and normally in blocking relation to the depending arm of said trigger.

9. In a power-controlling device, the combination with a suitable spring-urged knock-off member having a shoulder, of a pivoted element having shoulders above and below its pivot, the shoulder above the pivot being normally abutted by the shoulder on the knock-off member, a lever having a short arm normally engaging the lower shoulder of said member and a long laterally-extending arm, said element and lever being adapted to be shifted from normal position by the action of said knock-off member, a spring acting upon said pivoted element to restore the same from shifted to normal position, a trigger engaged above its pivot by the end of said long laterally-extending arm and having itself a long depending arm, an armature lever below the first-mentioned lever and normally in blocking relation to said depending arm, and an electro-magnet disposed between said levers and at one side of said trigger.

10. In a power-controlling device, the combination with spring-urged rod 2, of power-reducing transmission elements 7 and 9, trigger 16 for holding said elements against movement, armature lever 22 normally blocking movement of the trigger and having means for displacing the same, electro-magnet 26, spring 15 operative to restore element 7 to normal position, means whereby element 7 delivers a restoring blow to element 9 and means whereby the latter in turn performs the same office for the trigger.

In testimony whereof, I have signed this specification in the presence of two witnesses.

ALEXIS F. WALDOW.

Witnesses:
YELLE HOOYENGA,
OSCAR L. OWEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."