J. T. WATSON.

MEANS FOR CONTROLLING ELECTRIC MOTORS.

APPLICATION FILED OCT. 19, 1911.

1,044,609. **Patented Nov. 19, 1912.**

2 SHEETS—SHEET 1.

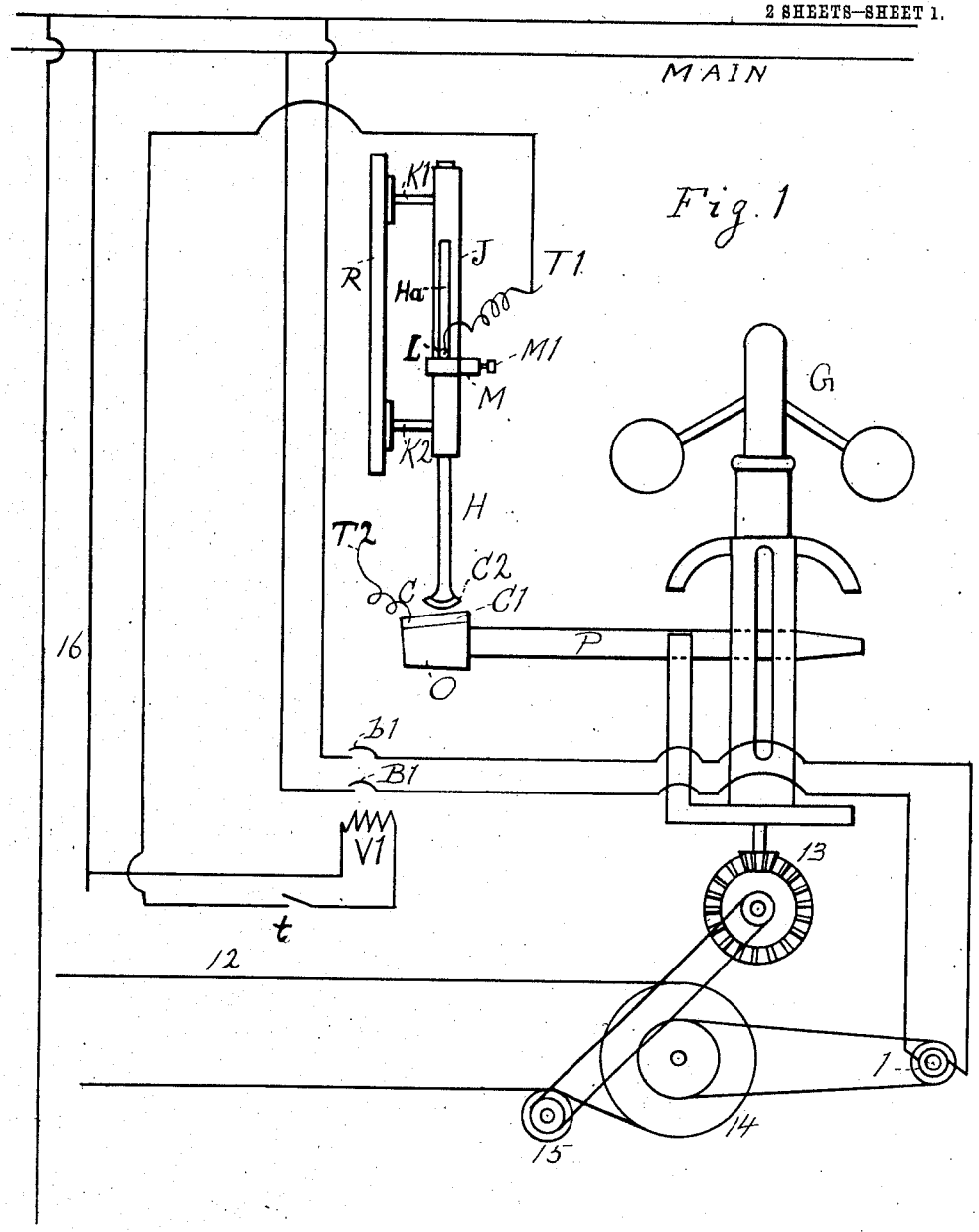

Fig. 1

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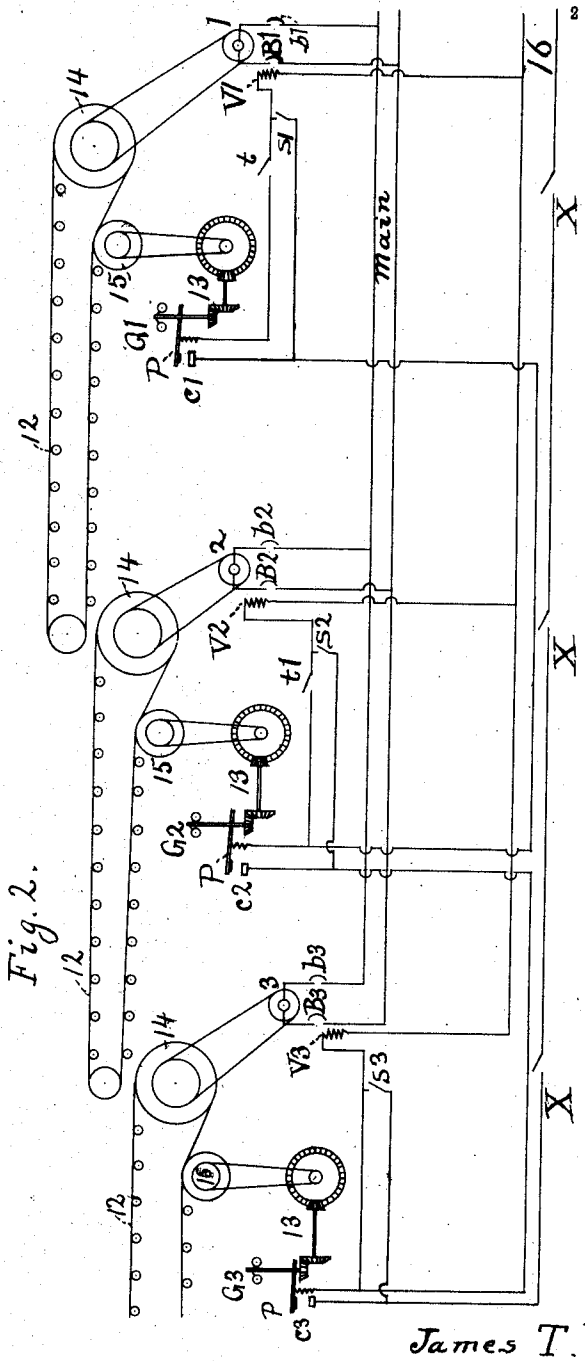

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

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MEANS FOR CONTROLLING ELECTRIC MOTORS.

1,044,609. Specification of Letters Patent. Patented Nov. 19, 1912.

Application filed October 19, 1911. Serial No. 655,465.

To all whom it may concern:

Be it known that I, JAMES T. WATSON, a citizen of the United States of America, and resident of Copperhill, in the county of Polk and State of Tennessee, have invented certain new and useful Improvements in Means for Controlling Electric Motors, of which the following is a specification.

My invention relates to means for automatically stopping electric motors under certain conditions, hereinafter explained.

The invention is described with reference to its application to a series of conveyer belts which are operated individually by electric motors, but I do not limit myself to such application.

The particular object of the invention is to prevent the material, which is being carried over successive conveyer belts, from piling unduly upon any belt when a belt ahead of it breaks down, or stops inadvertently.

Without regard to the exact scope of the invention, which is attended to in the claims hereinafter annexed, the general nature of the organization comprises a plurality of electric motors, conveyer belts respectively operated thereby and delivering material to each other in succession, centrifugal governors driven by said conveyer belts, and controlling elements, whereby, when any belt stops accidentally, the preceding belts are also stopped, automatically.

The accompanying drawing shows the complete system.

Figure 1 is an elevation of the devices used for each conveyer belt, some of the circuits being shown also. Fig. 2 is a diagram of the complete system comprising a succession of conveyer belts, which are to be considered as typical of machines for doing useful work.

Like letters and numerals refer to like parts.

G is a centrifugal governor especially arranged for tilting the lever P when the system is in operation.

C represents two copper contacts forming a part of a circuit closer, the lower one, C^1 being carried by the lever P, and the other, C^2 being supported by the copper rod H. The copper contact C^1 is insulated from the lever by a piece of fiber O. The contact C^1 has a wire connected to it for the purpose of making an electric connection. The rod H may slide up and down through a cylinder or tube J, open at both ends, the said tube having a slot H^a extending completely through the same and running longitudinally thereof.

L is a pin passing through and fastened to the rod H, but free to move in the slot H^a, and to this pin is fastened another wire T^1 for the purpose of making electrical connection through the contacts C and the other wire, which is indicated by T^2.

M is a collar fitted around the tube J and having a set screw M^1 so that it may be adjusted to support the pin L at any point along the slot H^a, and thus regulate the distance between the contacts C, when the governor G is at rest.

K^1 and K^2 are supports for the tube J and they are fastened to the insulating block R, which is the base of the device.

Only one of the motors is shown in conjunction with a conveyer belt and governor, in Fig. 1. The motors 1, 2, 3, are respectively connected to as many conveyer belts, only one of which, as stated, is shown in Fig. 1, and is numbered 12. Referring to Fig. 2 the belt operated by the motor 1, conveys material which is delivered to the belt operated by motor 2, and this motor causes the belt operated thereby to deliver the material to the belt belonging to motor 3. By my invention, it is desired to so control the motors automatically, that should the belt operated by motor 3 break or for any reason stop, the other two motors would also be immediately stopped; otherwise, the material being conveyed by the belts would pile up where it is delivered to the belt operated by motor 3. In like manner, if the belt operated by motor 2 should stop, the belt operated by motor 1 should immediately be stopped; but the belt operated by motor 3 could continue to run without causing any damage. If the belt operated by motor 1 should stop, the other belts could continue to run, as no damage could occur.

G^1, G^2 and G^3 represent for simplicity, modified outlines of the main parts of three governors corresponding to the governor G, while, c^1, c^2, and c^3 represent typically three circuit closers corresponding to the circuit closer C in Fig. 1. The governor G must not be driven directly by the motor 1, nor even by the driving pulley 14 of the belt 12. The governor G must stop if the belt 12

breaks and therefore said governor is driven conveniently by the idler 15 which is operated by the belt 12. Similar connections exist between the other motors and governors.

When the governors are in operation, the electrical contacts at C are in a closed condition, but when at rest, these contacts are open. By adjusting the collar M, the contacts at C may be made to open the electrical circuit at almost any desired speed of the governors, so that should a conveyer belt slow down a little, the motor will be automatically stopped; or, if desired, it can be allowed to run until the belt has practically stopped and then be cut out by the device.

S^1, S^2, S^3, are switches so connected that by closing them manually, the circuit closers c^1, c^2, c^3, are respectively short circuited so as to enable the operator to start the motors. After the motors are started, these switches S^1, S^2, and S^3, are opened.

At b^1, b^2, and b^3, are ordinary overload circuit breakers connected in the usual manner in one side of the motor circuit, but they have nothing to do with the control of the motors by the arrangement herein described.

B^1, B^2, and B^3 are circuit breakers of the overload and no-voltage release type, and they are connected respectively in the other side of the motor circuits. Their no-voltage release coils V^1, V^2, and V^3, are connected in the automatic control circuit 16.

Assume the motors and other movable parts of the system to be at rest. To start the system, the operator goes to motor 3, closes the switch S^3, thereby energizing the coil V^3, closes the circuit breakers b^3 and B^3, and therefore the motor 3 starts. After it has attained full speed and is thereby operating the conveyer belt and governor belonging to it, the operator opens switch S^3, as the circuit through the coil V^3 is now completed through the circuit closer c^3. He then proceeds to motors 2 and 1 in succession and starts them in a similar manner. When the whole system is in operation, suppose that the conveyer belt driven by motor 3 breaks. The governor G^3 immediately stops, thereby opening the circuit closer c^3, which opens the control circuit 16, that passes through the coils V^1, V^2, and V^3, which therefore release the circuit breakers of all the motors, which consequently stop. Or, assume that all the motors are in operation once more, and that the belt being driven by motor 2 breaks, or stops accidentally. The governor G^2 immediately stops, thereby opening the circuit closer c^2, which opens the control circuit 16 which passes through the coils V^1, and V^2, allowing them to release the circuit breakers to which they belong, and stopping the motors 2 and 1, but allowing motor 3 to continue to run. Similarly, if the belt driven by motor 1 should stop, the motor driving it would be stopped immediately, but the other two motors would continue to run, as no damage could result from their continued operation.

The invention may be modified. For example, by placing circuit closers X in the control circuit 16, the three motors may be stopped by opening any one of the switches X. Also, by placing circuit closers at the various points between any governor switch and coil, the motors may be controlled, except the motor 3, which could be so controlled, but it is not necessary, as any one of the switches X will perform the same service in this instance. By placing a switch or circuit closer t between the switch c^1 and coil V^1 the motor 1 may be stopped by opening said circuit closer t. By providing a switch t^1 between the switch c^2 and coil V^2, and opening it, the motors 2 and 1 may be stopped.

It is understood that I do not limit myself to the above elements which I herein describe, but I intend to cover by the patent all modifications thereof in so far as they are answered by the claims herein.

I claim as my invention;—

1. The combination of machines for doing useful work, a governor driven by each machine, an electric motor driving each machine, a main feeder line for the motors which are connected in parallel therewith, a cut-out for each motor, a controlling circuit, a coil for each cut-out included in said circuit, circuit closers controlled by said governors and in series with said coils, and manual switches for short circuiting said circuit closers and for closing the control circuit through said coils.

2. The combination of a series of machines for doing useful work, individual motors for driving the same, and means driven by said machines for causing all the machines preceding a particular machine to stop, when said particular machine stops accidentally.

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Witnesses:
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