(No Model.)

I. H. FARNHAM.

ELECTRIC ALARM SIGNAL.

No. 305,747. Patented Sept. 30, 1884.

Fig. 1.

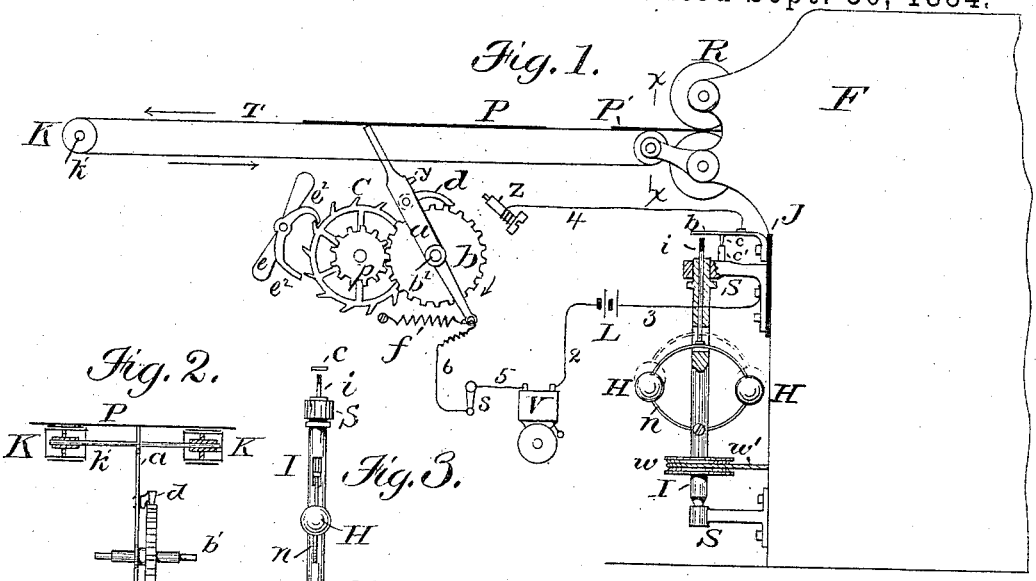


Fig. 2.

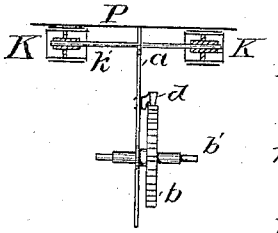


Fig. 3.

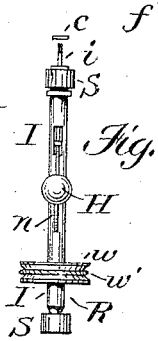


Fig. 4.

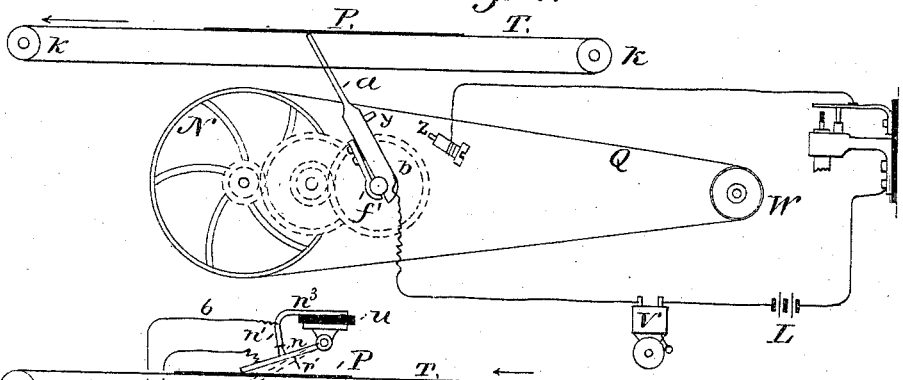
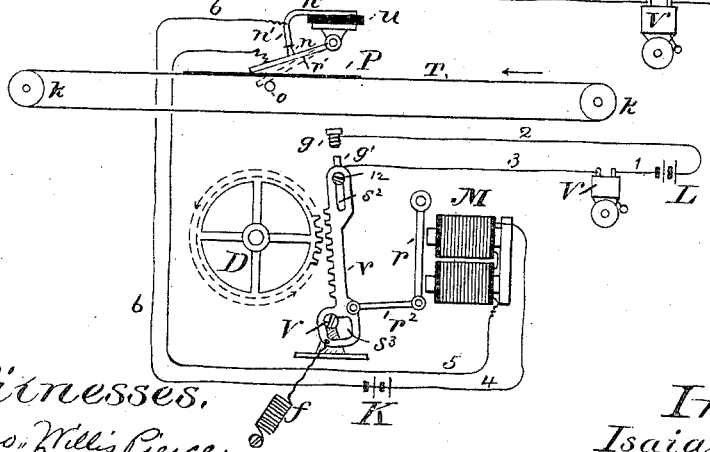


Fig. 5.



Witnesses.
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UNITED STATES PATENT OFFICE.

ISAIAH H. FARNHAM, OF PORTLAND, MAINE.

ELECTRIC ALARM-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 305,747, dated September 30, 1884.

Application filed March 17, 1884. (No model.)

To all whom it may concern:

Be it known that I, ISAIAH H. FARNHAM, of Portland, in the State of Maine, have invented certain Improvements in Electrical Alarm-Signals, of which the following is a specification.

The object of my present invention is to provide an electrical alarm attachment for printing-presses and folders, whereby the failure of a paper to be delivered from the folder or from the press in due season is instantly and automatically announced to the pressman or person in charge.

My invention consists in applying to the machine a clock-work attachment which constantly tends to change the normal condition of an electric circuit, and which is adapted, if said tendency remains unchecked for a definite period of time, to accomplish the said change and actuate an alarm, but which, so long as the machinery is performing its due functions correctly, is constantly checked at a point short of the point of change, the alarm consequently not being given.

This device is applicable not only to printing-presses and to folding-machines attached thereto, but may be adapted to other kinds of machinery for manufacturing purposes. It may readily, for example, be attached to the well-known Fourdrinier paper-machine, and be arranged in conjunction therewith in such a manner as to give an alarm when at any time the continuous web of paper proceeding therefrom breaks or fails in continuity.

I have shown several forms in which my invention may be embodied. In one form the alarm-circuit is shown as being normally open, and adapted to be closed and ring a bell upon the failure of the machinery to fulfill its proper function, and in connection with this form I have also shown a regulator, whereby when the machinery is brought to a complete stand still, the circuit is automatically opened at a second point, preventing an unnecessary alarm. In another arrangement an electrical circuit is normally closed, and upon the failure of the machinery to work properly is opened, and by the act of opening operates to close a second and local circuit, and thereby give the alarm.

In the drawings which form a part of this specification, Figure 1 shows one embodiment of my invention, partly in diagram, and fitted with regulating attachment. Fig. 2 is a detail thereof, taken in section on the line x x, Fig. 1, and shows an end view looking from the folder. Fig. 3 is a side view of the regulating device. Fig. 4 is a modification of Fig. 1, driven by outside power instead of clock-work; and Fig. 5 shows a second modification of Fig. 1, in which a normally-closed circuit is used.

In the first arrangement a simple and ordinary clock-movement, driven in a well-known manner by a weight or spring-motor, (not shown,) may consist of two wheels—one, C, being an escape-wheel engaging with a pair of pallets, e^2, which are, as shown, provided with a weighted arm, e, whereby the speed of rotation of the wheels may be controlled and properly regulated. The second wheel, b, which engages with the pinion p on the arbor of the escape-wheel, is toothed regularly round its periphery. An arm, a, carrying a pawl, d, is pivoted upon the axis or arbor b' of the toothed wheel b, and when the wheel rotates in the direction indicated by the arrow, the arm, being under the constant tension of the spring f, tends also to move in the same direction. It is, however, prevented from moving rapidly in that direction by the pawl d, which is adapted to fall into the spaces between the teeth of the wheel, this locking the arm and maintaining its rate of motion uniform with that of the wheel b. There is no obstacle in the way of the backward movement of the arm, inasmuch as when any force greater than that of the spring acts to force it backward the pawl d, by virtue of its conformation, slides from between and over the crown of the several teeth. The arm a is metallic, and is furnished with an electrical contact-point, y, adapted to make electrical and mechanical contact with the pin z when it is permitted in the regular rotation of the wheel b to advance forward so far.

The entire apparatus, suitably mounted, is attached to the machine F in such a way as to lie directly in the path of the manufactured articles as they are delivered.

I have shown the apparatus as fixed in front of the folder F of a printing-press, the last folding-rollers of which are represented by the letter R. A pair of endless tapes or ribbons

are stretched parallel one to another, as indicated in end view in Fig. 2, over the small rollers K, which are at each of the said tapes mounted on shafts *k'*. The end of the arm *a* extends upward between the said parallel tapes, and is thus directly in the path of any article which may be at any time borne forward and away from the machine on the upper surface of the endless tapes. In the drawings one paper, P, is shown as being in the act of moving forward in the direction of the arrow, and thus pressing the arm *a* backward, while a second is leaving the rolls R.

For a purpose which will be hereinafter described, I arrange a governor or regulator at any convenient point, and operate the same by a pulley, *w*, and belt *w'*, driven by the power which drives the press. In the drawings this is shown as attached directly to the front of the folder F, and the shaft I is adapted to rotate in the standards S S. Two heavy balls, H, are fitted upon a flexible but strong hoop, *n*, the lower part of which is fixed, while to the upper part is attached a vertical rod, *i*, which slides easily in the upper end of the shaft I, which is for the purpose made hollow. The upper standard S is insulated by means of the plate J, and supports a contact-point, *c'*, the complementary point *c* being carried on a spring-arm, *b*, which is also insulated.

When the machinery is at rest, the balls and hoop are in the position indicated by the dotted lines, and the rod *i*, (the end of which is tipped with insulting substance) attached to the said hoop, is forced upward, pressing against the spring-arm *b* and separating the contact-points *c* and *c'*. When, on the contrary, the machinery is set in motion, the balls H swing apart by centrifugal force, the hoop *h* and rod *i* are drawn down, and the spring-arm *b* is permitted to descend, thus closing an electric circuit at the points *c c'*. The said electric circuit starting from the battery L continues by wire 3 to standard S and point *c'*; thence, when closed, to upper point, *c*, spring-arm *b*, wire 4, and contact-point *z*. From the other pole of the battery the circuit runs by wire 2 to alarm-bell V, wire 5, switch *s*, wire 6, arm *a*, and contact *y*.

It will be observed that the circuit has two points at which it may be opened—*i. e.*, between *c* and *c'*, and between the arm-contact *y* and the stationary pin *z*.

In the operation of this device, the machinery being in motion, the paper P, leaving the rolls R, is conducted out on the endless tape T in the direction of the arrows. The arm *a*, slowly working in an opposite direction in conformity with the direction and velocity of the wheel *b*, and under the influence of the spring *f*, being directly in the path of the advancing paper between the two parallel tapes, is of course met by the said paper and forced backward, the pawl *d* sliding over the teeth of the wheel *b*, the arm *a* being thus pushed by the paper until the said paper has completely passed over it, when it is released, and commences again to travel with the wheel *b*. Its speed is, however, so regulated that before it reaches its forward limit it is again met and pushed back by the next paper, P', and so on *ad libitum*, provided the papers issue regularly from the folder. If, from any cause, the papers should fail to follow one another in due succession—if, for example, they clog at any point, or if any undue interval should elapse between the passage of sheets—the arm *a* would reach the limit of its path, the circuit would be closed between *y* and *z*, and the alarm given. I may of course use a weight instead of the spring *f*, which retracts the arm *a*, notifying the attendant.

It is evident that when the machine, press, or folder is stopped, the alarm will sound unnecessarily unless some steps are taken to prevent. To this end I introduce the governor or regulator which I have described, which acts automatically to open the circuit between the points *c* and *c'* before it is closed between the points *y* and *z*, the circuit being maintained open at the governor, so long as the machinery is in motion, by the balls, which fly apart in a manner well understood.

Although I prefer the automatic governor, I may in lieu thereof use a hand-switch, *s*, to open the circuit manually.

Although I have described the clock mechanism as being operated by a motor, a motor is not indispensable, as the spring *f* may be constructed to draw the bar *a* forward. The pawl *d* drops into the wheel *b*, so that the movement of the spring is regulated by the escapement, the apparatus being thus much simplified. The power by which the clock-work is driven may also, as shown in Fig. 2, be derived from an external source instead of being, as described in Fig. 1, derived from a spring or weight. In this case the pulley W represents the outside power, which is transmitted to the wheel-work by the belt Q and pulley N. The source of power may be the same as that working the folder, to which the pulley W may be attached. The last wheel of the train carries the lever-arm, which works similarly to the one described in Fig. 1. In this plan the lever is attached to the shaft of the wheel by a friction-clutch, *f'*, so that the movement of the train tends to bring the lever down, closing the electric circuit. The due passage of a paper prevents this closing of the circuit by forcing the lever back against the motion of the wheels, there being only a light friction made at the junction of lever and shaft on the side of the wheels. In some respects the latter plan is preferable, as being an easier device to regulate, so that the time required by the arm *a* to travel to its extreme limit shall be uniform. The governor-circuit-opening device may in this case be entirely eliminated from the alarm-circuit by connecting the driving-pulley W directly with the rollers R of the folder, as will be seen.

In the modification I show in Fig. 5 two

circuits are employed, one of which is kept normally closed so long as the papers are being duly delivered. The paper P, carried on the tapes T, which revolve on the pulleys *k*, in its passage impinges against the circuit-closing arm *r'*, pressing it upward, and bring its contact-point *n* into connection with the complementary point *n'*, which, by means of the plate n^2, is insulated from the arm *r'* by the non-conductor *u*. The circuit of the battery K, which must be of the gravity or some other constant type, is thus closed through the magnet M. The path of the said circuit may now be traced from the battery by wire 4, electro-magnet M, wire 5, arm *r'*, contacts *n* and *n'*, and by wire 6 back to battery. The electro-magnet M is thus energized and attracts its armature *r*. This, by a connecting-link, r^2, pulls the rack-bar *v* away from the toothed wheel D, which is supposed to be constantly rotating in the direction indicated by the arrow. The rack-bar *v* is pulled away from the wheel D by the electro-magnet M, and at the same time pulled down by the retracting-spring *f*. The lower part of the rack-bar is maintained in place by the square slot s^3, which works on the bolt V. The upper end is prevented from making undesirable movements by the slot s^2, which works vertically on the pin I^2. A normally-open circuit leads from contact-point *g via* wire 2, through battery L, alarm-bell V, and wire 3 to the point *g'* on the end of the rack-bar. So long as the mechanism is working properly and the finished article is being duly delivered the main circuit is kept closed between the points *n* and *n'*, the magnet M consequently attracting its armature, and thus holding the rack-bar away from the wheel. After the article P has passed, the arm *r'* falls onto the limit *o*, as indicated by the dotted lines, and opens the main circuit. The magnet M is then demagnetized and allows the armature *r* to fall back. The rack-bar is then drawn back by the spring *f*, and its teeth thereupon engage with the teeth of the rotating spur-wheel D. By reason of this engagement the rack-bar is lifted vertically toward the contact *g*. If, now, a second article is delivered in the regular time, the operation is again reversed before the contact between the points *g* and *g'* is effected, and the alarm is not sounded. If, on the contrary, from any cause, the delivery of the second article is delayed, the rack-bar will continue to ascend until the point *g'* comes in contact with the point *g*, completing the circuit and giving the alarm.

Another way in which my invention may be operated is to cause the movement of the arm shown in Fig. 1 to remove a detent, and thus allow a mechanical instead of an electric bell-ringer to operate.

It is of course obvious that I am not restricted to the use of an electro-magnetic bell, since an annunciator, or a buzzer, or, in fact, any suitable testing device, may be equally well employed.

I have thus produced an apparatus depending on movements occurring in regular times, and adapted to announce the failure of a paper to come out from the folder or from the press in due season, which is also well adapted to apply to other manufactured articles, so as to give notice when such articles fail to be delivered or to pass a certain point at a certain time; and

I claim—

1. An electro-magnetic alarm attachment for printing-press folders or other like machinery, consisting of an alarm-bell in an electric circuit, means, as indicated, whereby the circuit may be closed and the alarm given when the machinery fails to work properly, said means comprising a normally-open circuit-closer, a clock-train for actuating the same, and a retarding device adapted to prevent the premature closure thereof, and other means comprising a normally-closed circuit-closer and an automatic governor therefor, whereby the alarm-circuit may be opened and a continuous alarm thus prevented upon the complete stoppage of said machinery, substantially as described.

2. In combination with the folder of a printing-press, a time device adapted to close an electric circuit upon the occurrence of an undue interval between the passage of sheets, and an electro-magnetic alarm instrument included in the said circuit, substantially as hereinbefore described.

3. The combination, with the folder of a printing-press, of a time device adapted to close an electric circuit in the manner hereinbefore described, an electro-magnet-alarm instrument included in the said circuit, and a governing or regulating device adapted to maintain the circuit open at a point independent of that controlled by the time device when the folding mechanism is in motion, and to close the said circuit at the same point when the said mechanism is stopped, for the purposes described.

4. In an electro-magnetic alarm apparatus substantially as hereinbefore described, the combination of a time device adapted, unless checked, to close an electric circuit after a definite interval of time, an electro-magnetic alarm included in the said circuit, and means, as indicated, for opening the said circuit at a second point, for the purposes described.

5. In an electro-magnetic alarm apparatus substantially of the character hereinbefore described, the combination of an electric circuit, an electric bell included in the said circuit, a time device adapted, unless mechanically prevented, to operate one of the said circuit-closers after a definite interval of time and to give the alarm, and means, as indicated, for automatically operating the second circuit-closer to prevent unnecessary alarms.

6. In an electric alarm device for printing-press folders for giving an alarm-signal when the sheets fail to be delivered in due season, the combination of a clock-train, actuated by a spring, weight, or by an external motor, a

normally-open electric alarm-circuit, an electric bell included therein, and a pivoted circuit-closing arm actuated by a constant force in a forward direction to close the alarm-circuit, but controlled and retarded by the said clock-train, and adapted to be constantly forced backward by the regular delivery of sheets, whereby the circuit is maintained open so long as the said delivery proceeds regularly, and whereby the circuit may be closed and the alarm given when the said delivery is impeded, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 14th day of March 1881.

ISAIAH H. FARNHAM.

Witnesses:
FRED J. F. SCHWARTZ,
GEO. WILLIS PIERCE.