No. 704,684. Patented July 15, 1902.

H. E. IRWIN.

ALARM DEVICE FOR BINDERS.

(Application filed Feb. 1, 1900.)

(No Model.) 2 Sheets—Sheet 1.

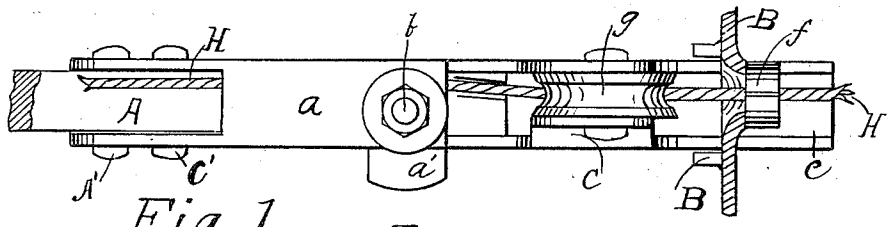


Fig. 1.

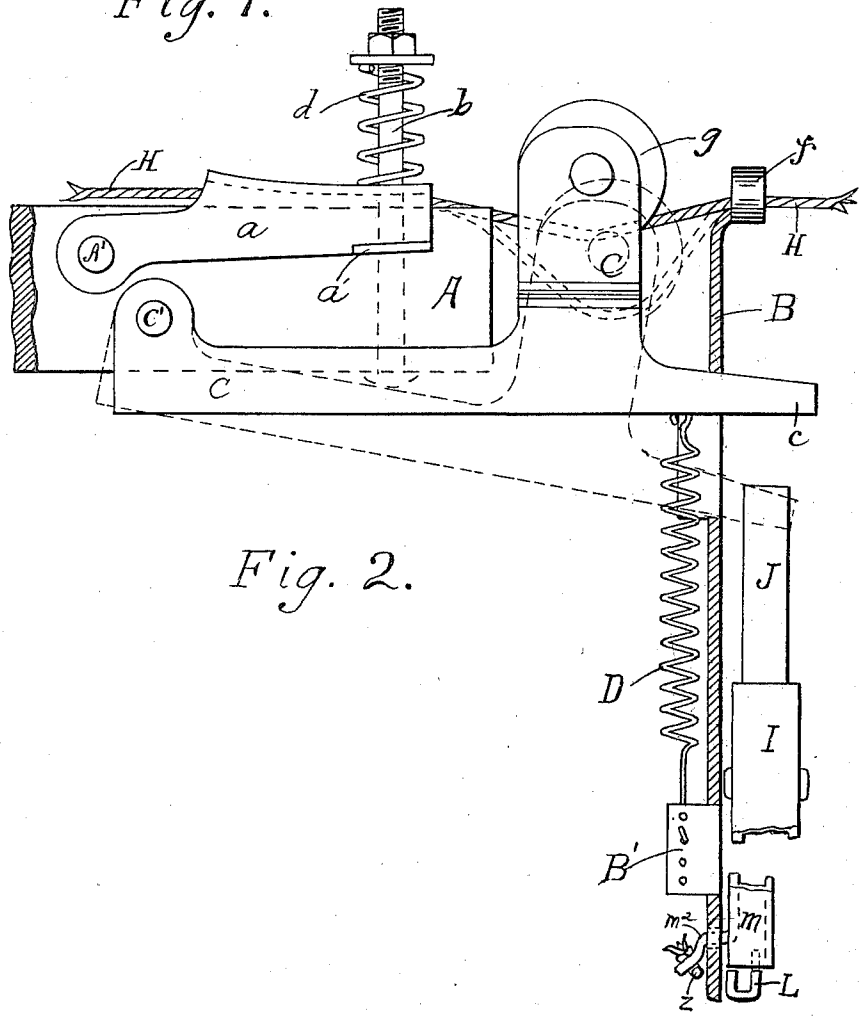


Fig. 2.

Witnesses.
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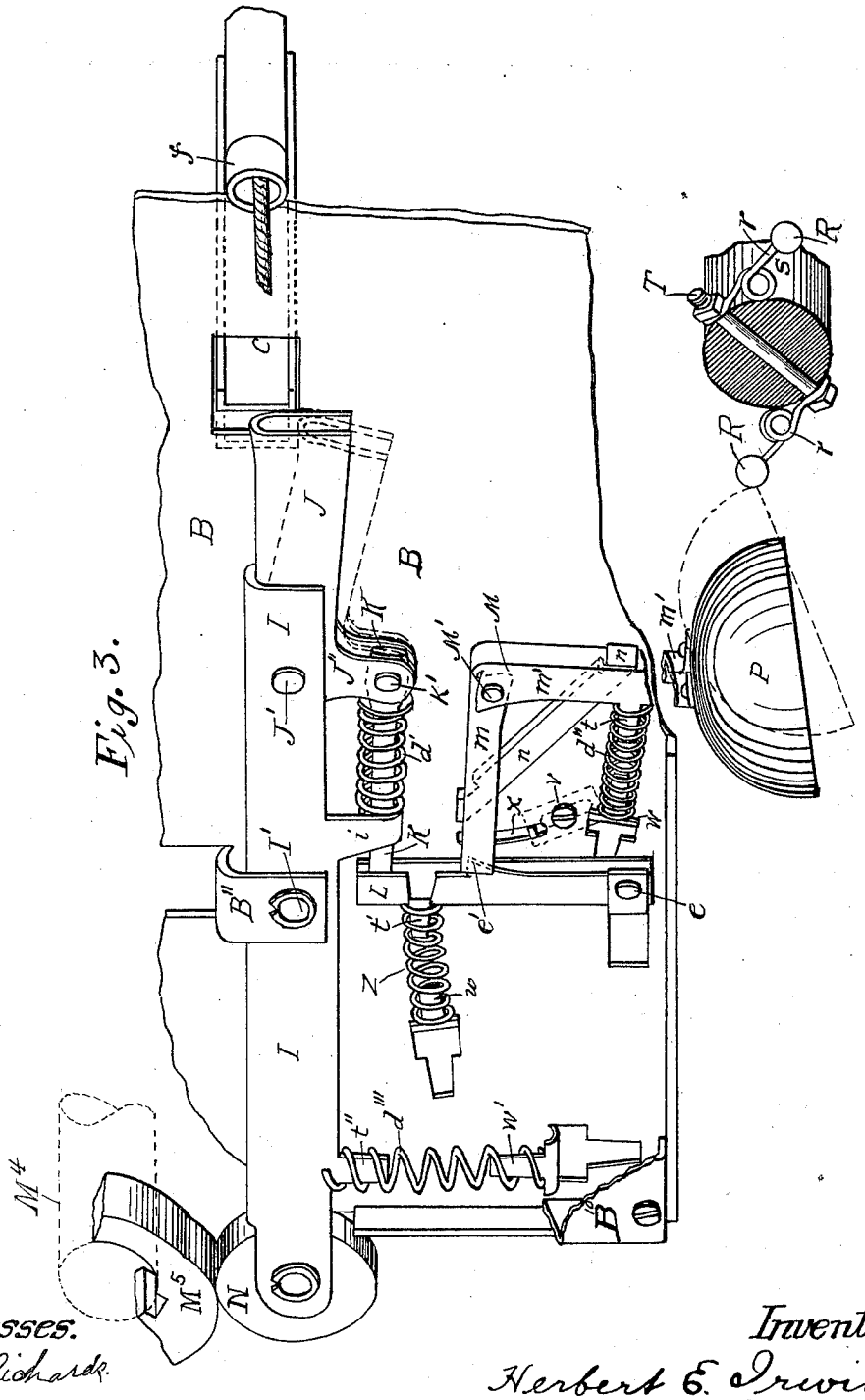
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Fig. 3.



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UNITED STATES PATENT OFFICE.

HERBERT E. IRWIN, OF GALESBURG, ILLINOIS.

ALARM DEVICE FOR BINDERS.

SPECIFICATION forming part of Letters Patent No. 704,684, dated July 15, 1902.

Application filed February 1, 1900. Serial No. 3,635. (No model.)

To all whom it may concern:

Be it known that I, HERBERT E. IRWIN, a citizen of the United States, residing at Galesburg, in the county of Knox and State of Illinois, (post-office box 373,) have invented certain new and useful Improvements in Alarm Devices for Binders, of which the following is a specification.

My present invention relates to certain new and useful improvements in alarm devices for binders, and it is particularly intended and adapted for attachment to any ordinary grain-binder for the objects hereinafter specified.

Owing to imperfections in the twine and, further, to the fact that the supply of twine frequently becomes exhausted before the operator is aware of the fact it often happens that the grain-binder will move along a considerable distance before the operator notices that the bundles of grain are not being bound. At the present time it is customary for the operator to divide his attention between driving the horses and watching the binding mechanism to see that the latter operates properly and that the grain is regularly bound. It will be apparent that if the twine is caught by reason of a knot, or broken, or becomes exhausted the operator is very likely to miss a number of bundles of grain before he notices that the bundles are not being bound. This results in considerable loss of time and additional labor, because the loose grain that has been thrown off must be bound by hand and it naturally becomes scattered instead of remaining in the form of a bundle.

The primary object of my invention is to provide an alarm device for binders which operates automatically to give an alarm whenever the twine breaks or is exhausted.

Another object of the invention is to provide an automatic alarm device normally restrained from operation and conditioned to operate by the conjoint action of a part which derives its movement directly from one of the intermittently-movable parts of the binding mechanism and a tripper which is controlled by the tension of the twine.

Among the further objects of my invention is the provision of an alarm device which will operate automatically to give an alarm at a predetermined period during the movement of the binding mechanism whenever the twine is either broken or exhausted or for any other reason is not under proper tension, which operates instantly under the conditions named and without requiring any attention on the part of the operator, and by reason of its quick automatic action admits of the use of any twine, of either good or poor quality, without danger of waste and loss incident to the failure of the binding mechanism to properly perform its functions and the consequent dropping of unbound grain; and a further object of the invention is to provide a simple construction and arrangement of parts which are combined in a novel manner and adapted to be embodied with the mechanism of a grain-binder of any known description to give an automatic alarm whenever the twine is broken or disconnected.

With these and other ends in view the invention consists in the construction and arrangement of parts hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved apparatus. Fig. 2 is a top plan view, partly in section. Fig. 3 is a perspective view showing more particularly the bell and its immediately-connected parts.

Referring to the drawings, in which like letters of reference denote corresponding parts in all the figures, A designates a part of the binder-frame, to which a tension device, preferably in the form of an arm *a*, is pivotally connected at A′ and provided with a side projection *a*′, by means of which the device may be raised in threading the apparatus. The arm *a*, as shown in Fig. 1, is stamped out of a piece of sheet metal and formed to straddle the frame A, being provided with depending sides, through which the pivot-pin A′ passes, and it is held against the twine, passing between itself and the frame, by means of a spring *d*, arranged on a bolt *b*, which is secured to the frame and projects upward through a slot in the tension-arm. A tripper device, consisting, preferably, of an arm C, is pivotally secured to the frame at C′, and it carries a pulley *g*, against which the twine operates when under tension, the forward end *c* of the tripper-arm being extended through

the frame B, which is fastened to the binder-frame A, to protect the apparatus, for a purpose hereinafter described. The twine passes from the roller *g* through a loop *f* in the frame B to the binding mechanism, only a portion of which (namely, a fragment M^4 of the needle-shaft) is shown. A spring D is connected to the tripper-arm C at one end and to a plate B′ at its other end, this plate being provided with a series of holes so that the spring can be adjusted as desired. This spring D tends to pull the tripper-arm toward the plate B′, and consequently whenever the tension on the twine H, which holds said spring extended, is removed the spring D will pull the tripper-arm and twine into the position indicated by dotted lines in Fig. 2. As above stated, the tripper device is held in its inoperative position by the tension of the twine. So long, therefore, as the twine is held taut said tripper device will remain in the position shown by full lines in Fig. 2. As is well known, however, the twine is not moving continuously, and during its periods of rest the spring D, aided by the jolting of the binder, will have a constant tendency to draw the tripper device to the position indicated by dotted lines in Fig. 2, this being the position in which it operates in connection with devices hereinafter described to trip the alarm under conditions hereinafter described. Were the movement of the tripper device alone relied upon to positively operate the alarm if the spring D should move said device to the position indicated by dotted lines in said figure during any such period of rest a false alarm would be given; but with the arrangement hereinafter described the slack thus drawn into the twine between the tension device and the binding mechanism is again taken up by the forward movement of the needle in the binding operation before other conditions necessary to the giving of an alarm are established provided the twine is not broken or exhausted. In order, therefore, that no false alarm may be given, it is necessary that the alarm device should be conditioned to operate only when there is a release of the tension due to one of the causes aforesaid, and this can be best accomplished by making the alarm device operative only during a predetermined period in the movement of the binding mechanism. For this purpose I prefer to use mechanism, including a part which derives its movement from a part of the binding mechanism (preferably one of the intermittently-operated shafts thereof) and which coöperates with the tripper when the latter is not under proper restraint due to a proper tension of the twine.

Referring particularly to Fig. 3 of the drawings, I designates an oscillating lever which is pivoted at I′ between a lip B″ and the frame B. This lever carries on one end a roller N, which is arranged in engagement with the cam M^5, keyed to the needle-shaft, also commonly called the "rocker-shaft," a fragment of which is indicated by dotted lines at M^4. The lever I carries at its other end an arm J, which is pivoted to the lever at J′ and projects outwardly therefrom in the path of movement of the end *c* of the tripper-arm C. This arm J is provided with the depending lugs J″ at its pivot, which carry the rod K, pivoted in said lugs by the pin K′ and supported in the guide *i*, between which and the lugs a spring *d*′ is located. The outer end of this rod K is connected to the upper end of a catch-plate L, which is pivoted in the frame B by a pin *e* at its lower end. This catch-plate is provided with a lip or lug *e*′, acting as a catch and with which one arm *m* of the bell-crank lever M engages, this bell-crank lever being pivoted to the frame B by a pin M′ and having its other arm *m*′ hanging downward and supporting a bell P. A brace *n* is preferably connected to the arms of the bell-crank lever to strengthen them. A spring *d*″ is held between a projection *t* on the arm *m*′ and a projection W stamped up from the frame B to bear upon the arm *m*′ and push said arm outward whenever the arm *m* is released from engagement with the catch *e*′; but the plate L is normally forced forward under the influence of a spring Z, held between the projection *w*, stamped up from the frame B, and the projection *t*′, stamped up from the plate L. The oscillating lever I is held upward, so that the roller N will engage with the cam M^5, by means of a spring *d*‴, which is held between the projection *w*′, stamped up from the frame B, and the projection *t*″, stamped up from the lever I.

The bell P is located near to the packer-shaft S, which carries the strikers R, these strikers being mounted on spring-arms *r*, which are secured to the packer-shaft by means of a bolt T. The construction and arrangement of these parts are such that the strikers R will rotate with the shaft free from the bell P under ordinary circumstances; but whenever the tension of the twine is off during the movement of the lever I under the influence of the cam M^5 the apparatus will operate to throw the bell into the path of movement of the strikers, whereupon an alarm will be sounded, which will notify the operator that the twine is broken. The apparatus is protected by means of a sheet-metal covering B^{10}, and the parts—such as the lever I, the arm J, the plate L, the bell-crank M, the tension-arm *a*, and the tripper-arm C—are struck up from pieces of sheet metal as a simple, inexpensive, and convenient method of making the same.

The operation of my improved alarm apparatus will be readily understood, it is believed, from the foregoing description. Under the usual conditions of operation the twine H will be threaded between the tension-arm *a* and the frame A and pass in engagement with the pulley *g* and through the loop *f* to the binding mechanism, the twine

being thus placed under considerable tension, so that it will overcome the tension of the spring D and hold the tripper-arm C up in the position shown in Fig. 2. Whenever the twine breaks because of a knot, tangle, or imperfection and whenever it becomes exhausted or if the tension of the twine is removed in any other way the tripper-arm will be permitted to swing under the influence of the spring D, so that its end *c* will lie in the path of the pivoted arm J, carried by the lever I, which is oscillating under the action of the cam M^5 while the binding mechanism is in motion. In its ordinary operation this lever will at every movement produced by the cam M^5 carry the arm J up into the position shown in full lines in Fig. 3, the tripper-arm being in the position shown in full lines in Fig. 2; but whenever the tension of the twine is off for any reason whatever at the time this movement takes place the end *c* of the tripper-arm will be in the path of the pivoted arm J, (having been drawn there by the spring D,) and thus prevent said arm from rising to the limit of its upward movement. Whenever the tripper-arm C engages the pivoted arm J in the manner just described it will swing said pivoted arm on its pivot and cause the rod K to push the catch-plate L until the catch *e'* is withdrawn from under the arm *m* of the bell-crank, thereby permitting the spring *d''* to push the arm *m'* of the bell-crank carrying the bell, so that the bell will be moved into the path of the revolving strikers R. The alarm will then be sounded, and the operator hearing the same will know that the binding mechanism is not operating properly and immediately stop the machine, so that no grain will be discharged unbound, and thereby save the time and labor which would ordinarily be necessary to bind by hand whatever loose grain is discharged. For the purpose of limiting the movement of the bell-crank lever M under the influence of the spring *d''* the arm *m* carries a tongue *m''*, which projects through a slot *x* in the plate B and is adapted to be engaged by a slotted stop-plate, which is indicated by dotted lines in Fig. 3, said plate being adjustably held in place by means of a screw *v*. For the purpose of resetting the bell-crank lever M, a cord *z* or other suitable device may be attached to the tongue *m''* and led to within convenient reach of the driver. It will therefore be observed that instead of the operator depending upon his own care and watchfulness to discover when the binding mechanism is not operating owing to the exhaustion of the supply of twine or a break he is notified automatically by the alarm apparatus and is therefore able to stop the machine at once before the loose grain has been discharged. It is practically impossible for the operator to watch the horses and the binding mechanism at the same time and especially in view of the fact that the binding mechanism is usually located at his side and sometimes behind, and he is very apt to drive some distance before becoming aware that the binding mechanism is not operating, thereby discharging considerable loose grain and entangling the twine in the binding mechanism.

My invention avoids all the difficulties hereinbefore mentioned and provides a simple, compact, and strong combination and arrangement of parts which will operate accurately and positively to automatically signal the operator at the proper time in order that he may lose no time in stopping the machine. The tension-arm *a* is located adjacent to the tripper device C and between said device and the twine-supply, so that it will coöperate with the knotter mechanism in maintaining the twine taut under ordinary circumstances, and thereby hold the tripper device in the position shown in Fig. 2.

I am aware that changes in the form and proportion of the parts and in the details of construction of my improved apparatus may be made without departing from the spirit or sacrificing the advantages of the invention, and I would therefore have it understood that I desire to reserve the right to make all such changes as fairly fall within the spirit and scope of the invention.

I am aware that it has been proposed to trip or operate an alarm device for binders by means of a finger pivoted to and carried by the needle, said finger being restrained by the tension of the twine during a portion of the movement of the needle; but this pivoted finger carried by the needle is not the equivalent of the tripper hereinbefore described, having a fixed support, so that it does not partake of the movement of the needle. The finger carried by the needle is open to the objection that when it is carried above the deck the grain, which is constantly falling upon the needle, will engage it and either break it or interfere with its operation. Furthermore, in the only example of such a device with which I am familiar the finger is so disposed with relation to the twine-guides that one of two results will follow—viz., either the alarm will not be sounded during the binding operation (*i. e.*, the forward movement of the needle) or else a false alarm will be sounded during the said binding operation if the alarm device is arranged to operate at all during the forward movement of the needle.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the frame and an intermittently-movable part of the binding mechanism of a grain-binder, of an alarm mechanism, means for normally restraining the alarm mechanism, and means carried by the frame and under the joint control of said intermittently-movable part and the twine for releasing said restraining mechanism and permitting the alarm mechanism to be thrown into action, at a predetermined period in the binding operation whenever the twine is

broken or the tension is removed from it, substantially as described.

2. In an alarm device for grain-binders, the combination with the frame and the needle-shaft, of an alarm mechanism supported by the frame, a movable part supported by the frame and deriving intermittent movement from the needle-shaft, a tripper independent of the needle, said tripper being supported by the frame and being under the control of the twine, and means supported by the frame and actuated by the coöperation of said movable part and tripper for conditioning the alarm to operate, substantially as described.

3. The combination with a revolving shaft of a grain-binder, of strikers carried by said shaft, a tripper device controlled by the tension of the twine, an arm having an oscillating movement, a movable support, a bell carried thereby, and a latch normally restraining said support, the said tripper device being adapted to coöperate with the oscillating arm, at a predetermined period, when the tension of the twine is removed, and cause the latch to release the bell-support and allow the bell to be moved into the path of the strikers substantially as described.

4. The combination with an intermittently-movable part of the binding mechanism of a grain-binder, of an alarm mechanism, means for normally restraining the alarm mechanism, a tripper engaged by the twine and thereby held out of operative position so long as the twine is under proper tension, means for moving the tripper into operative position when the tension of the twine is removed, and means deriving its movement from the intermittently-movable part aforesaid and coöperating with the tripper for releasing said restraining means whenever at a predetermined period in the movement of said intermittently-movable part the tripper is in operative position substantially as described.

5. The combination with an intermittently-movable part of the binding mechanism of a grain-binder, of an alarm mechanism, a tripper engaged by the twine and thereby held out of operative position so long as the twine is under proper tension, means for moving the tripper into operative position when the tension of the twine is removed and mechanism deriving its movement from the intermittently-movable part aforesaid and adapted to coöperate with said tripper when the latter is in operative position for conditioning the alarm to operate substantially as described.

6. The combination with an intermittently-movable part of the binding mechanism of a grain-binder, of an alarm mechanism, a tripper independent of the needle engaging the twine whereby it is held out of operative position when the twine is under proper tension, means for moving the tripper into operative position, and mechanism deriving its movement from the intermittently-movable part aforesaid, coöperating with the tripper, whenever, during a predetermined period in the movement of said part the tripper is in operative position, for conditioning the alarm to operate substantially as described.

7. The combination with an intermittently-movable part of the binding mechanism of a grain-binder, of an alarm mechamism, a movable part independent of the needle adapted to derive movement from said intermittently-movable part, and a tripper adapted to coöperate with the part last aforesaid for conditioning the alarm to operate whenever during a predetermined period in the movement of said part the tripper is in operative position, said tripper being under the control of the twine, substantially as described.

8. The combination with an intermittently-movable part of the binding mechanism of a grain-binder, of an alarm mechanism, a movable part independent of the needle adapted to derive movement from said intermittently-movable part and a tripper independent of the needle adapted to coöperate with the part last aforesaid for conditioning the alarm to operate whenever during a predetermined period in the movement of said part the tripper is in operative position, said tripper being under the control of the twine, substantially as described.

9. The combination with an intermittently-movable part of the binding mechanism of a grain-binder, of an alarm mechanism, a lever deriving its movement from said intermittently-movable part, a tripper independent of the needle under the control of the twine, and means actuated by the coöperation of said lever and tripper for conditioning the alarm to operate substantially as described.

10. The combination with a revolving shaft of a grain-binder, of strikers carried by said shaft, an alarm device movable into the path of said strikers, a tripper device normally restrained from operation by the tension of the twine and having an operative connection with and adapted to set the alarm device in motion, and an oscillating lever located between the alarm device and the tripper and carrying a pivoted arm adapted to engage the tripper, substantially as and for the purposes described.

11. The combination with a revolving shaft of a grain-binder, of strikers carried by said shaft, a bell normally out of the path of said strikers, a tripper device normally held in one position by the tension of the twine, a lever and means for oscillating the same, and a pivoted arm carried by said lever and adapted to be operated whenever the tension of the twine is removed to cause the bell to swing into the path of the strikers, substantially as described.

12. The combination with a revolving shaft of a grain-binder, of strikers carried by said shaft, a bell normally out of the path of said strikers, a movable support for said bell, a tripper device normally held in one position by the twine, a lever and means for oscillating the same, a pivoted arm carried by said

lever and adapted to engage the tripper device when the tension of the twine is removed to cause the bell-support to move the bell into the path of the strikers, substantially as described.

13. The combination with a revolving shaft of a grain-binder, of strikers carried by said shaft, a bell, a movable support for said bell, a tripper device normally held in one position by the twine, a latch device for holding the bell out of the path of the strikers, and devices for releasing said latch device when the tension of the twine is removed to cause the bell to move into the path of the strikers, substantially as described.

14. The combination with a revolving shaft of a grain-binder, of strikers carried by said shaft, a bell, a swinging support for said bell, a latch device normally locking said support to hold the bell out of the path of the strikers, an oscillating lever, a pivoted arm carried by said lever, a tripper normally held in one position by the twine and adapted to engage and limit the movement of the pivoted arm when the tension of the twine is removed to swing said arm on its pivot and thereby release the latch device and permit the support to swing the bell into the path of the strikers, substantially as described.

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