

A. HART, Jr.
HARVESTER.

No. 175,453.

Patented March 28, 1876.

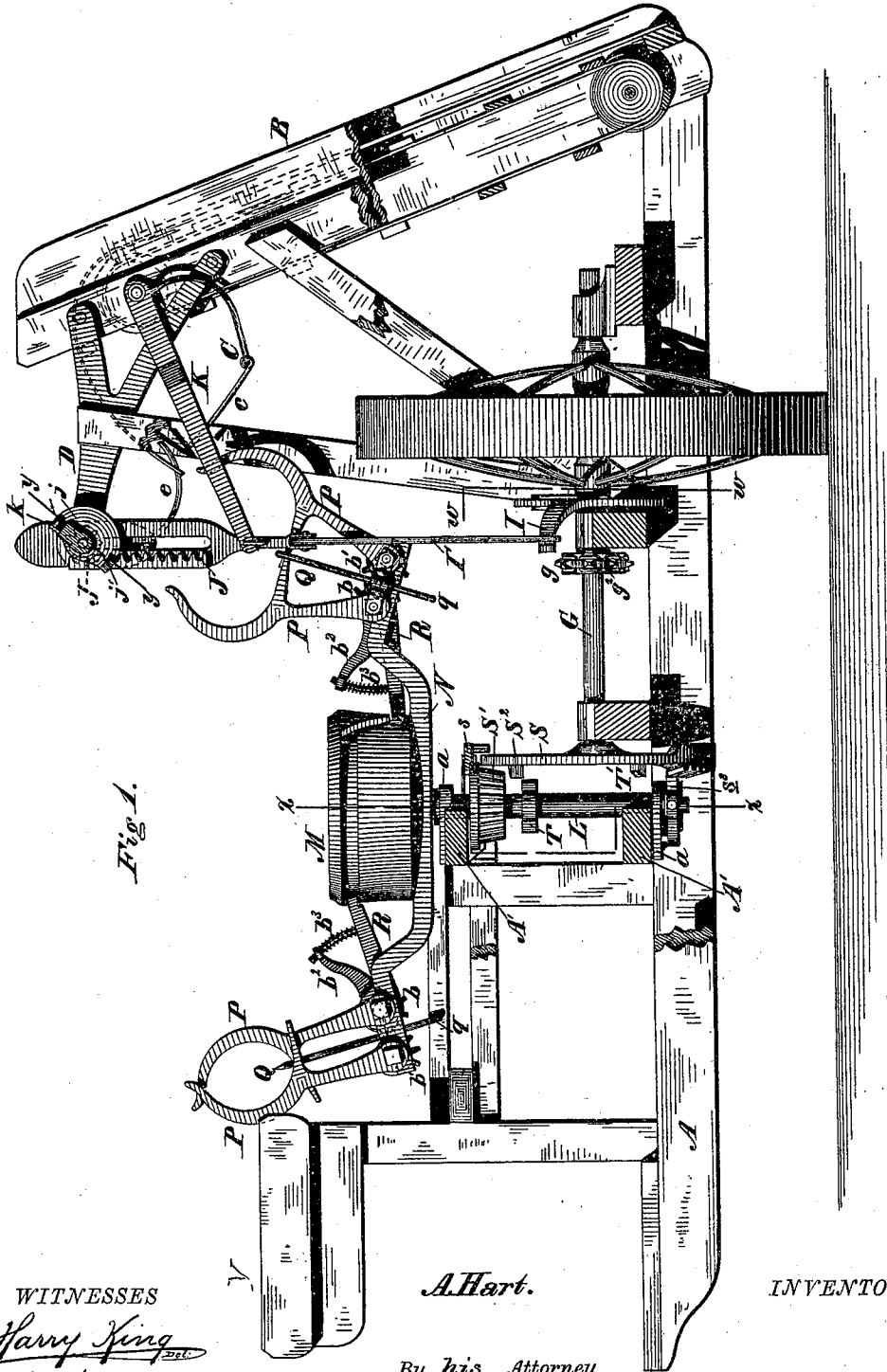


Fig. 1.

WITNESSES
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By his Attorney

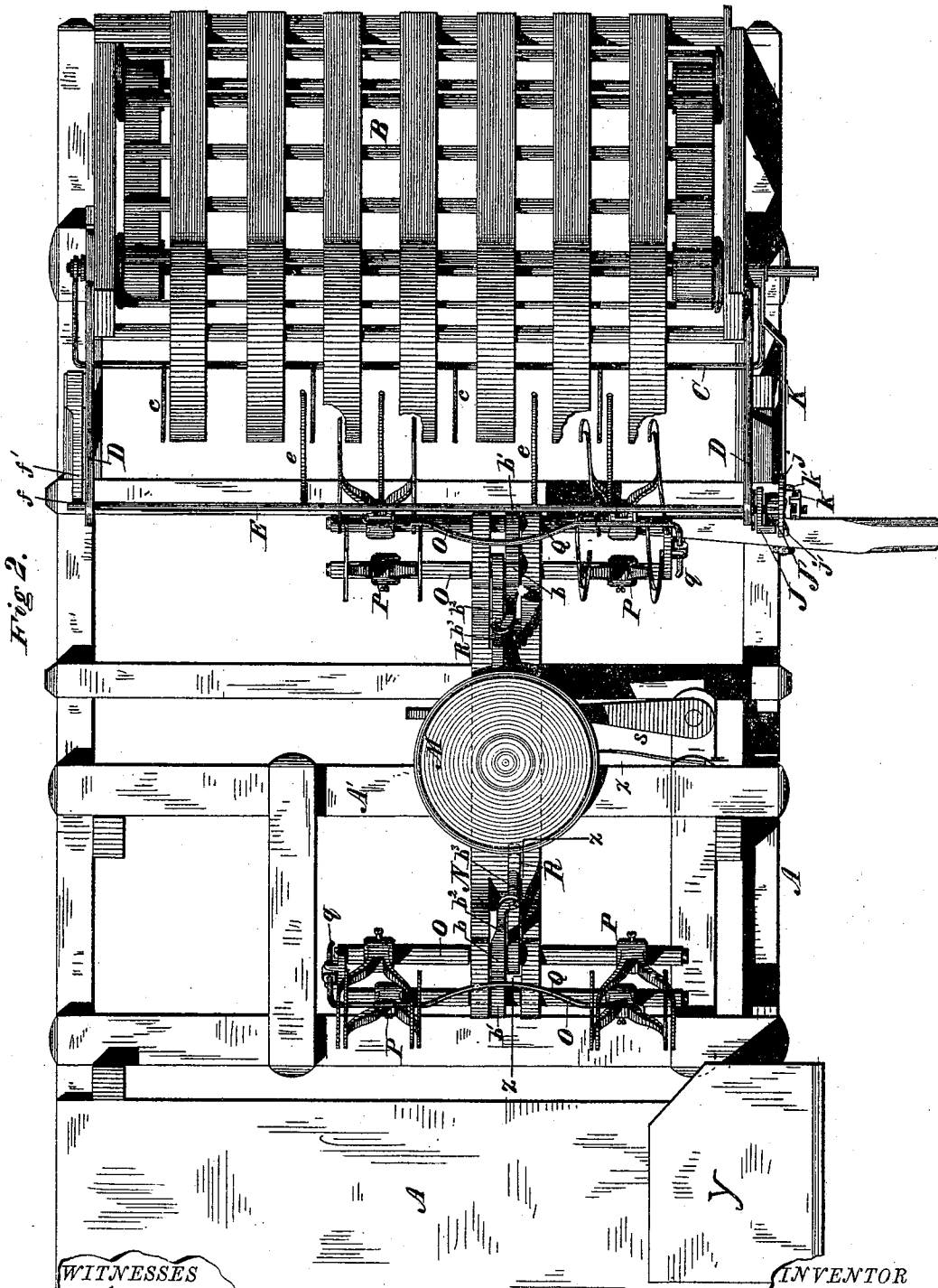
INVENTOR

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Fig 5.

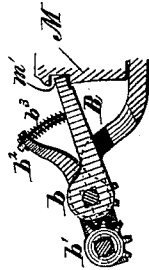


Fig 3.

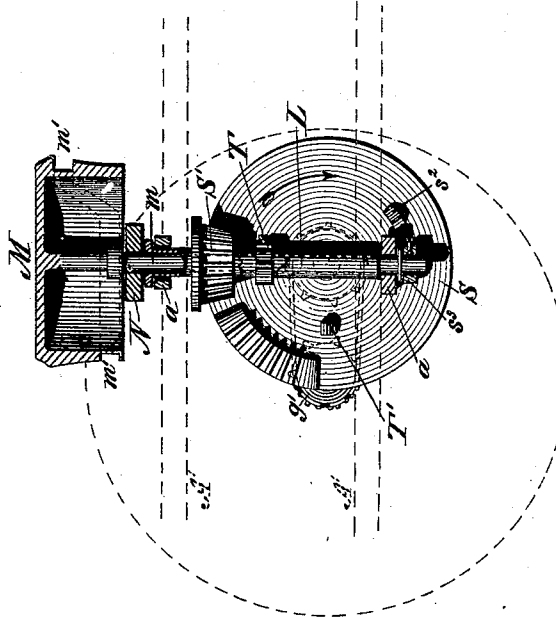
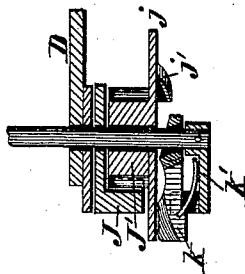


Fig 4.



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Fig 8.

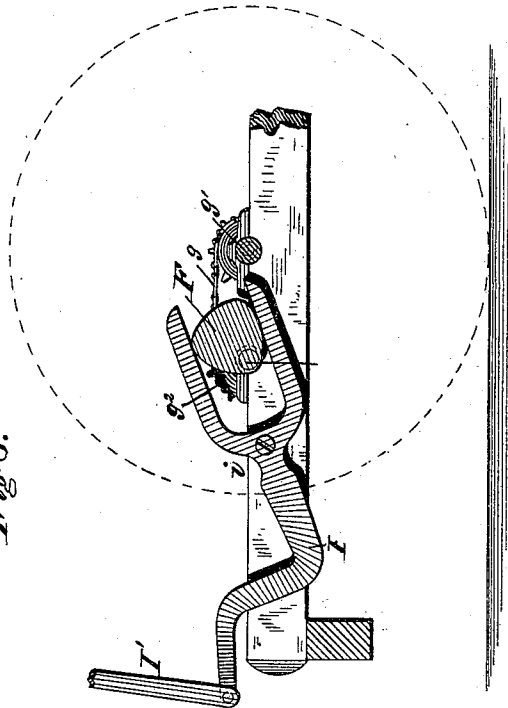


Fig 7.

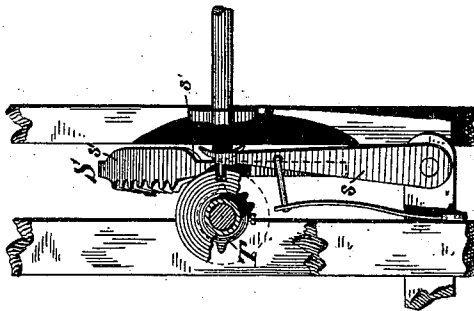
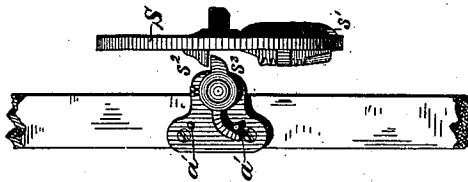


Fig 6.



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UNITED STATES PATENT OFFICE.

ALFRED HART, JR., OF ROCKFORD, ILLINOIS, ASSIGNOR OF ONE-HALF HIS
RIGHT TO EMERSON & CO., OF SAME PLACE.

IMPROVEMENT IN HARVESTERS.

Specification forming part of Letters Patent No. **175,453**, dated March 28, 1876; application filed
January 18, 1876.

To all whom it may concern:

Be it known that I, ALFRED HART, Jr., of Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Binding Attachments for Harvesters, of which the following is a specification.

My invention relates to improvements in grain-binding attachments for harvesting-machines of that class in which the cut grain is carried by an elevating apparatus to a receptacle from which it is taken to be bound. Its objects are to gather the grain as it comes from the elevator and compress it into bundles, which are conveyed to the binder, who rides upon the machine; the bound bundles, at the proper time, being automatically discharged.

The subject-matter claimed is hereinafter specifically designated.

In the accompanying drawings, Figure 1 is a front view of so much of a harvesting-machine embodying my improvements as is necessary to illustrate the subject-matter claimed herein; Fig 2, a plan or top view thereof; Fig. 3, a vertical section therethrough, on the line *xx* of Fig. 1; Fig. 4, an enlarged sectional view on the line *yy* of Fig. 1; Fig. 5, a sectional view on the line *zz* of Fig. 2; Fig. 6, a bottom-plan view of a portion of the mechanism; Fig. 7, a top-plan view of same; Fig. 8, a sectional view on the line *ww* of Fig. 1.

The operative parts of my binding attachment are mounted on the frame A of a harvester. As the machine progresses the cut grain falls upon an endless apron or carrier, not shown in the drawings, but of well-known construction, which conveys it laterally to an elevator, B, preferably composed of transverse slats, carried by endless belts passing around the usual pulleys, which carry the grain upward under a slatted grating, terminating in a suitable deflector, and delivers it into a suitable receptacle.

This receiver or holder consists, in part, of a rock-shaft C, provided at proper intervals with teeth or arms, *c*, which project sufficiently to support the grain as it comes from the elevator; the ends of this shaft C being bent or curved upward and pivoted, in this in-

stance, upon the projecting ends of the upper pulley-shaft of the elevator, so as to allow the rock-shaft to vibrate at the proper time for discharging the grain collected thereon into revolving clasps by which the grain is compressed and conveyed to the binder, the clasps being opened and closed at proper intervals, as will be explained.

From the upper end of the elevator-frame, on either side, project brackets D D, the outer ends of which support a revolving compressor, which consists of a rod or shaft, E, provided with a series of teeth or arms, *e*, bent or curved into nearly a half-circle shape, which hang over the open clasps that receive the bundle of grain from the receiver and revolve at particular times so as to press all loose straw or grain down into the clasps just before they close for conveying the grain to the binder.

The receiver is vibrated and the compressor revolved intermittently by means of a cam or eccentric, F, (see Fig. 8,) located on the end of a shaft, G, which has its bearings in cross-pieces of the frame, motion being communicated to this shaft by a chain, *g*, passing from a sprocket-wheel, *g*¹, on the axle of the main driving-wheel, over a like sprocket-wheel, *g*², keyed thereon. This cam or eccentric F works between the forked arms of a bent lever, I, which has its fulcrum at the point *i* on the frame, the cam in its revolutions raising or depressing the end of this lever, the upward and downward motions of which, through the medium of a connecting-rod, I', raise and lower a longitudinally-slotted rack-bar, J, supported and guided upon the shaft E. This rack-bar J, in its upward and downward movement, acts upon a clutch-pinion, J', loosely mounted upon shaft E of the compressor, (clearly shown in Fig. 4,) which clutch-pinion J' is provided with a flange or rim, *j*, upon the outer periphery of which is located a beveled projection, *j*'. On shaft E, next to this clutch-pinion, is mounted and firmly keyed thereon a bracket, *k*, in which works a yielding bar, *k'*, upon the back of which bar a flat spring presses, so as always to force it outward, the face of the bar being beveled on one side, so as to allow the beveled projection *j*', on the rim of the clutch-pin-

ion J' , to glide over it in its revolutions, which is the case when the rack-bar J is on its downward movement; but when the reverse or upward movement takes place the square shoulder of the projection j' on the clutch-pinion acts upon a like shoulder on the yielding bar k' , and causes a connection between the clutch-pinion J' and the shaft E . (See Fig. 4.) A revolution of the compressor consequently takes place. On the end of the compressor-shaft E opposite that which carries the clutch mechanism is attached a beveled projection or stop, f' , acted upon by a plate-spring, f'' , secured on one of the uprights of the frame, the object of which construction is to prevent backward movement of the shaft. A lever or connecting-rod, K , for vibrating the receiver, has one of its ends attached to the shaft C , in this instance at the point where it is pivoted on the pulley-shaft, its other end resting upon a projection or being pivoted to the rack-bar J . During the downward movement of this rack-bar, occasioned by the depression of the end of the lever I , to which it is connected, the receiver, holder, or cut-off is vibrated or depressed by the outer end of the lever or arm K , or that end which is attached to the rack-bar, being drawn down; this vibrating or depressing movement of the receiver being sufficient to drop or discharge the grain collected therein into the open clasps below. As soon as this depressing movement is finished the action of the cam upon the forked lever I immediately causes a reverse or upward movement of the rack-bar, which, in turn, causes a revolution of the compressor to force the loose straw into the clasp before it closes to convey the grain to the binder.

Having described the mechanism for receiving the grain from the elevating apparatus and for forcing the same into clasps for conveyance to the binder, I will now proceed to describe the clasps with their attendant mechanisms for revolving, opening, and closing them.

On cross-pieces $A' A'$ of the frame are secured looped brackets $a' a'$, which support a tubular sleeve, L , capable of turning in its bearings. This sleeve invests a turning-shaft, m , upon the upper end of which is mounted a vibrating wheel, M , provided with cam-grooves m' , through which the opening and closing movements of the clasps are regulated.

Between this sleeve L and the cam-wheel M is loosely mounted a clasp-head, it being provided with an opening through which the shaft m passes. The upper portion of the sleeve L is flanged out so as to present a firm seat for the clasp-head thereon.

This clasp-head consists of a bar, N , depressed at its center for the reception of the cam-wheel M , its ends being forked or recessed, and having a downward bend or incline, upon which inclines, at either end, two parallel rock-shafts, $O O$, are mounted, as clearly shown in Fig. 2.

On these shafts, near their ends, are mounted clasps $P P$, so that each end of each

shaft is provided with a clasp, which clasps are keyed and rendered longitudinally adjustable thereon by set-screws, or in any other equivalent well-known way, so that the clasps may be adjusted to suit the length of grain being bound, whether it be long or short.

These clasps, which are mounted upon their shafts nearly opposite each other, consist of a base or head which encircles the shaft, and two branches or arms, to the ends of which teeth, preferably of a half-circle shape, are attached in such a manner that the inner bend of one set of teeth will face the inner bend of those mounted on the opposite shaft, whereby when the shafts are rocked to close or bring the teeth together to inclose and compress a bundle of grain, the space occupied by the grain will be oval or nearly round.

By providing the base or head with two branching arms or forks, I am enabled to have two supporting and compressing surfaces or teeth on each side of the center of the rock-shaft on which they are mounted.

These shafts are rocked for opening and closing the clasps mounted thereon by means of a segment of cogs, $b b'$, keyed on the shafts between the forked or recessed inclined ends of the clasp-head N , meshing with each other, one of the segments, b , being provided with a lever, b^2 , which is connected, through the medium of a coiled spring, b^3 , which encircles a curved rod, with another lever, R , one end of which encircles the nearest rock-shaft, its free end entering the cam-groove m' on the cam-wheel M , and is so arranged in respect to the cam-grooves that it gives a positive motion, when the cam is vibrated, to open the clasps, the clasp having the benefit of the spring b^3 , when closing, so as to adapt it to a large or small bundle of grain, as the case may be.

The levers or link-connections for operating the clasps are so arranged in the cam-grooves that one set of clasps is open while the other is closed.

Lying upon the bottom of each set of clasps is a discharging-lever, Q , which has its fulcrum on the end of the rock-shafts. After the grain is bound, and during the turning movement of the clasp-head to bring the opposite clasp, with its contents, to the binder, the depending end q of this lever strikes upon a projection, or part of the frame of the machine, which throws one end of the lever quickly upward, and discharges the bundle upon the ground in rear of the machine.

To turn the clasp-head N a half-revolution to bring the open clasp in position under the receiver and compressor, and to carry the compressed bundle of grain to the binder, a movement is imparted thereto through the medium of a wheel or disk S , mounted on the end of a driven shaft, G , opposite to that upon which the cam or eccentric which operates the compressor and receiver is mounted, the disk being provided with a sector-gear, which, at the proper time, engages the teeth of a pinion-

wheel, S', on the sleeve L, which revolves intermittently the sleeve, and consequently the clasp-head N, mounted thereon, the extent of movement of the head being controlled by a spring-catch, s, the end of which enters notches formed in the rim or flange of the pinion-wheel at every half-revolution.

The disk S is also provided on its face opposite to that provided with the gear-teeth with a cam-projection, s¹, which lifts the spring-catch clear of the notch into which it projects, just before the gear-teeth engage the pinion, to revolve the clasp-head a half-revolution, to bring the clasp with the grain therein to the binder.

The cam-wheel M is vibrated, to open and close the clasps at the proper time, by means of a projection, s², on the face of the disk, coming in contact during its revolution with a cam-projection, s³, on the end of the shaft upon which the cam-wheel is mounted, the cam being controlled in its movements, at either extreme, by suitable stops, lugs, or pins a', located on the under surface of the lower-loop-bracket a that supports the sleeve. (See Fig. 6.)

To insure the arrival of the clasp-head N at the right position for the open clasp to receive the grain from the receiver, there is placed on the sleeve L, just below the pinion, a movable collar, T, held in place by a set-screw, which is acted upon by a cam-projection, T', on the face of the disk S, the cam ceasing its action on the collar when the clasp-head arrives at the right position for one of the clasps to receive the bundle of grain.

The mechanism is so arranged that when in operation the receiver is vibrated or depressed to drop its collected bundle of grain into the open clasp below just before the compressor is revolved, which presses all loose straw or grain into the clasp, the clasp then closing immediately by the driving mechanism acting on the cam M, which latter is vibrated to close the clasp under the receiver, and to open the one on the opposite end of the clasp-head, the driving mechanism then acting to revolve the clasp-head a half-revolution, to carry the open clasp to its position under the receiver, and to convey the inclosed bundle of grain to the binder, who rides upon the machine, and who passes a prepared band of straw or other material, taken from a box or table, y, around the bundle, and secures its ends, which operation is repeated as the machine is drawn along, the bound bundles being automatically discharged, as hereinbefore stated.

It will be seen from the foregoing description of my invention that but one binder is necessary to bind the entire grain cut by a harvesting-machine, and that that one need not be an experienced hand, the only function to be performed being simply to pass a band around the bundle and to secure its ends, the bundle being held a sufficient time in its compressed state for that purpose.

It is obvious that some of my improvements may be used without the others, and in machines differing somewhat in construction from the one described, and I do not limit myself to the precise construction shown, as various modifications will readily suggest themselves to those skilled in the art. For instance, more than two clasps might be used, or an apparatus for stopping the revolution of the clasps might be employed, or the mechanism might be so organized as to permit the binder to ride on the back of the machine instead of at the side.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, substantially as hereinbefore set forth, of the elevating-apron, the grating, the deflector-bars, the vibrating receiver, and the intermittently-revolving clasps.

2. The combination, substantially as hereinbefore set forth, of the intermittently-revolving compressor and the intermittently-revolving clasps, for the purposes specified.

3. The combination, substantially as hereinbefore set forth, of the receptacle, the compressor, and the intermittently-revolving clasps, for the purposes specified.

4. The combination, substantially as hereinbefore set forth, of a receiver, a binder's stand, and intermittently-revolving clasps which make one pause to receive a gavel and another to allow it to be bound.

5. The combination, substantially as hereinbefore set forth, of an intermittently-revolving clasp and its automatic discharging mechanism carried thereby.

6. The combination, substantially as hereinbefore set forth, of the two parallel rock-shafts, the forked clasp-jaws thereof at each end, their interposed segments, actuating lever and cam, for the purposes specified.

7. The combination, substantially as hereinbefore set forth, of the intermittently-revolving clasps, the intermittently-vibrating cam-wheel, and the levers connecting the clasps and cam-wheel, whereby the clasps are opened or closed at proper intervals during their revolution for the reception and discharge of the grain.

8. The combination, substantially as hereinbefore set forth, of the clasp-head, the notched pinion-wheel carried by the clasp-head, supporting-sleeve, and a spring-stop, whereby the clasp is positively locked at each half-revolution.

9. The combination, substantially as hereinbefore set forth, of the notched wheel on the clasp-head supporting-sleeve, the spring-stop, and the cam on the disk-wheel, whereby the clasp-head is released at proper intervals.

10. The combination, substantially as hereinbefore set forth, of the compressor-shaft, its spring-bar, and the clutch-pinion actuated by the rack, whereby the shaft is intermittently rotated at proper intervals.

11. The combination, substantially as here-

inbefore set forth, of the vibrating receiver, the compressor, a clutch mechanism mounted on the shaft of said compressor, a rack-bar adapted to mesh with the clutch mechanism, and a lever acted upon by a cam to raise and lower the rack-bar, whereby the receiver is vibrated and the compressor revolved intermittently in unison.

In testimony whereof I have hereunto subscribed my name.

ALFRED HART, JR.

Witnesses:

M. S. PRENTICE,
S. NORTON TALCOTT.