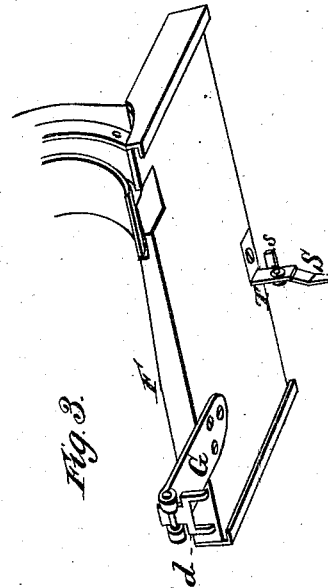
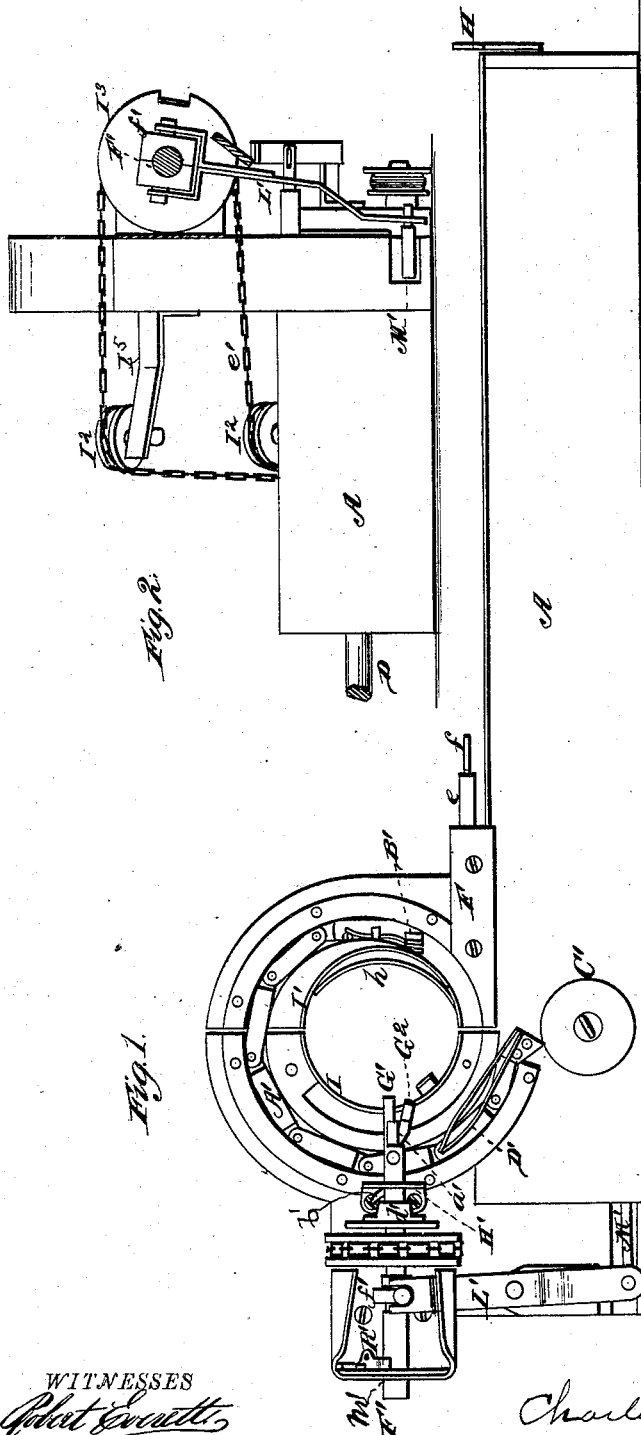


C. S. BANKER.
Grain-Binder.

No. 219,433.

Patented Sept. 9, 1879.



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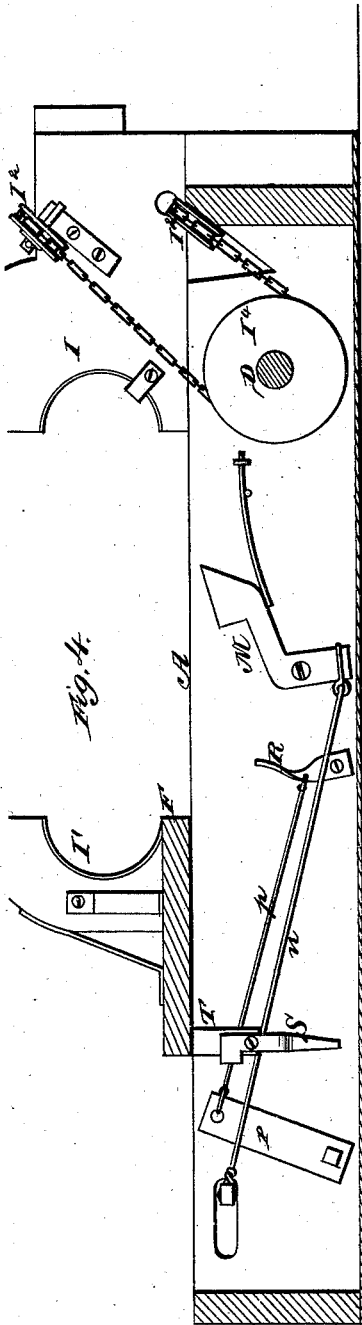
C. S. BANKER.

4 Sheets—Sheet 2.

Grain-Binder.

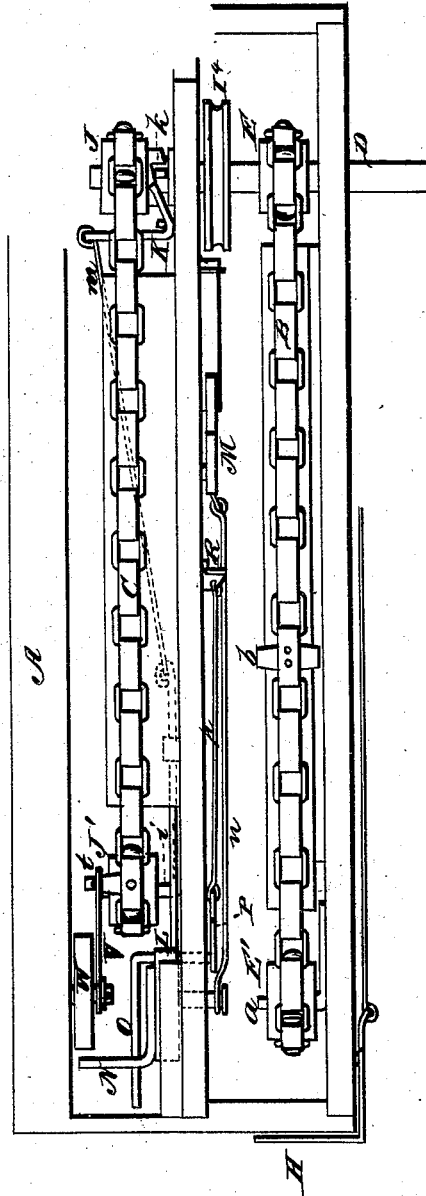
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Fig. 5.

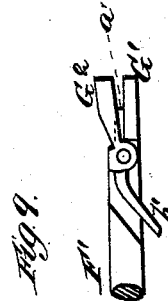
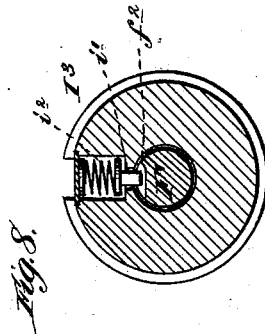
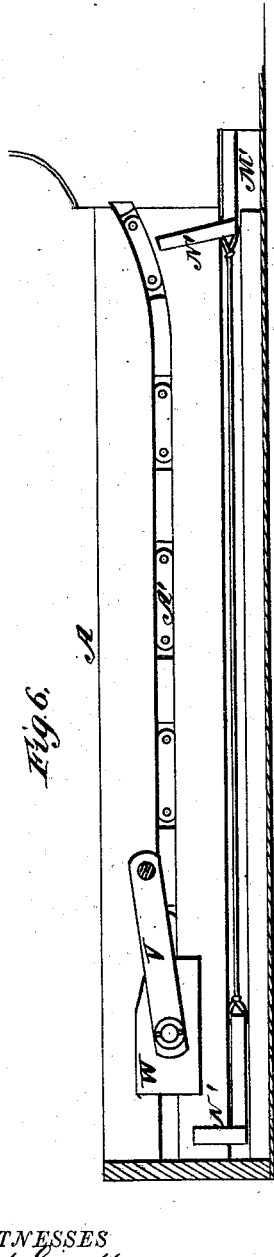


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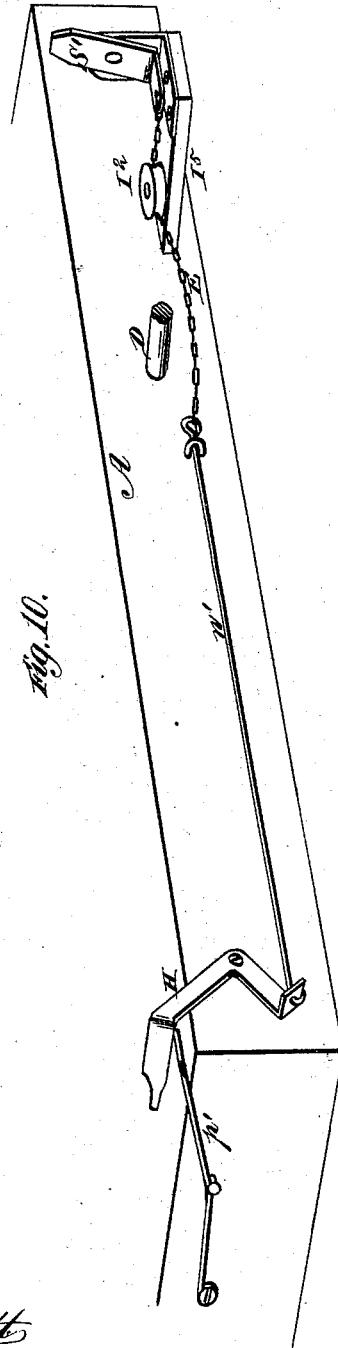


Fig. 10.

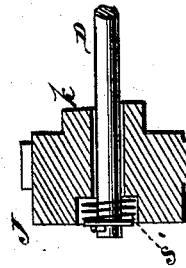


Fig. 11.

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UNITED STATES PATENT OFFICE.

CHARLES S. BANKER, OF BURDETT, NEW YORK, ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE B. STOTHOFF, OF SAME PLACE.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **219,433**, dated September 9, 1879; application filed February 1, 1879.

To all whom it may concern:

Be it known that I, CHARLES S. BANKER, of Burdett, in the county of Schuyler and State of New York, have invented certain new and useful Improvements in Harvester-Binders; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of a machine embodying the improvements of my invention. Fig. 2 is an end view, partially in section. Fig. 3 is a detail view. Fig. 4 is a vertical longitudinal sectional view, showing a portion of my improvements. Fig. 5 is a partial plan view. Fig. 6 is a detail view, showing portions of the improvements. Fig. 7 is a sectional view of the movable carriage. Fig. 8 is a sectional view of the twisting-shaft, showing the spring-pawl and projection by which the shaft is revolved at the proper time. Fig. 9 is a detail view of the shaft and jaws employed to twist and cut the wire. Fig. 10 is a side elevation of a portion of the machine, showing the mechanism by which the rake-arm trips the lever to connect the movable carriage with the endless chain which operates it; and Fig. 11 is a sectional view of the pulley J, showing its internal spring.

The nature of my invention consists in the construction and arrangement of a grain-binding apparatus for harvesters, as will be hereinafter more fully set forth, and pointed out in the claims.

The annexed drawings, to which reference is made, fully illustrates my invention.

A represents a suitable frame-work, which is to be attached to the rear of the harvester platform, and which frame-work is to be covered by a suitable slotted platform to receive the grain as it is thrown back by the usual rake of the harvester.

Within the frame-work A are two endless chains, B and C, passing longitudinally therein below the upper plane of said frame.

The chain B passes around two pulleys, E

and E'. The pulley E', being at the outer end of the frame, has cogs on its circumference, and is mounted loosely on a shaft or spindle, a, in the frame, while the pulley E is mounted on a main driving-shaft, D, which is to be connected, by gearing or otherwise, with the driving mechanism of the harvester, so as to have a continuous rotary motion. The pulley E is, on its circumference, provided with suitable cogs to take into the links of the chain B, and thus give the same a continuous movement.

F represents a carriage, movable from end to end on the frame A by means of a cross-bar, b, attached to or forming part of the chain B. To this carriage is attached an arm, G, in the inner end of which is hinged or pivoted a fork, d, that straddles the chain B, and is so arranged that the cross-bar b of said chain will come against its prongs and move the carriage from the outer to the inner end of the frame A.

Through the carriage F is passed a rod, f, having a spring, e, connected to it in such a manner as to draw the inner end of the rod away from the upper end of the fork d. When the carriage F is at the outer end of the frame A, the rod f is pressed inward by its outer end coming in contact with an angular lever, H, pivoted to the frame, and this lever is to be connected, by a wire or otherwise, with the rake of the harvester, so as to be turned out of the way at certain times.

When the rod f is thus pressed inward by the lever H, the rod turns the fork d out of the way of the cross-bar b on the chain B, allowing said chain to continue its movement without interfering with the carriage. When, however, the lever H is turned out of the way by means of its connection with the rake, the spring e draws back the rod f, so that the fork d will drop down, and as soon as the cross-bar b arrives it will take hold of the fork and move the carriage inward.

At the inner end of the frame A is a stationary semicircular jaw, I, and on the carriage is a corresponding semicircular jaw, I', between which the gavel is formed as the carriage is moved inward, the two jaws, at the completion of the inward movement of the car-

riage, forming a complete circle, inclosing the gavel.

The carriage F is held in position while the gavel is being bound by the lever M, the point of which engages with the lower surface of the carriage F, and holds it until the block W strikes the angular bar N and trips it, when it will be carried back by the cross-bar *b* on the chain B.

In the movable jaw I' is arranged a spring, *h*, to compress the gavel and compensate for any variation in the amount of grain drawn in by the rake to form the gavel.

The endless chain C passes around two cogged pulleys, J and J'. The pulley J' is mounted loosely on a shaft, *i*, while the pulley J is placed loosely on the main driving-shaft D, and connected thereto by a clutch, *k*. The pulley J is provided with an internal spring, *s'*, which throws the clutch *k* in gear as soon as the angular bar N is released.

To the slide L is pivoted an angular bar, N, below which is a lever, O, pivoted in the frame, and having an arm, P, attached to the pivot. The arm P is, by a rod or wire, *p*, connected to a lever, R, as shown.

To the under side of the carriage F is attached a hanger, T, and to the side of this hanger is pivoted a lever, S, the upper end of which has a side projection, *s*, which bears against the rear edge of the hanger, as shown.

During the inward movement of the carriage F, by means of the cross-bar *b* and fork *d*, as above described, the projecting end of the pivot or hub of the lever S strikes the lever R, and turns the same on its pivot, whereby the lever O is turned to raise the angular bar N, for a purpose hereinafter described.

When the chain C has made a revolution, the block W, connected thereto by the pitman V, strikes the angular bar N, throws the pulley J out of gear, and releases the lever S from contact with the latch M, thereby permitting the carriage F to be taken back by the cross-bar *b* on the chain B to its original position, which operation is performed by the cross-bar *b* striking the lower end of the lever S, and thus causing the carriage F to move backward, while the chain itself moves always in one direction.

To the endless chain C is secured an arm, *t*, which, by a pitman, V, is connected with a block, W, and this block is attached to one end of a chain, A', placed in a horizontal groove in the rear bar of the frame A. The other end of this chain is to pass up through a semicircular groove made in the jaw I, and carries at its extreme end a pair of nippers, B', for holding the wire and carrying the same around the gavel, said nippers projecting outward a suitable distance, as shown. The nippers B' are spring-nippers, and the jaws clamp the wire, and must be first opened for its introduction and the wire placed therein. The movable jaw I' is also formed with a semicircular groove corresponding with the one in the stationary jaw I, so that when the two jaws are closed a

convolute groove will be formed around the compressed gavel.

The block W, when at the outer end of the frame, locks the angular bar N and slide L, so that they cannot be moved until said bar is raised by the lever O underneath it, as above described. When, however, the bar N is raised, the clutch *k* can be thrown in gear by the internal spring, S, in the pulley J, so that the chain C will carry the block W forward and push the chain A' forward, causing the nippers B' to move around in the convolute groove in the two jaws I I', carrying the wire from the spool C' around the gavel. As the top of the endless chain C continues to advance, the arm *t* and block W are carried forward with it, and as said arm passes around the inner pulley, J, and goes back with the lower part of the endless chain C, the block W, chain A', and nippers B' are brought back to their original position.

The wire for binding the gavel passes from the spool C' through a spring-clamp, D', from which the nippers B' take the wire at their forward movement, the wire being first inserted between their jaws, and carry it around the gavel, said clamp holding the wire sufficiently tight to give it the proper tension to take out the kinks formed by coiling on the spool C'. After the end of the wire has been carried around the gavel by the nippers B' to the point where the wire in the nippers meets the wire in the clamp D', it is cut off and twisted by the following means: In suitable bearings attached to the frame is mounted a horizontal shaft, F', on the inner end of which is secured a jaw, G¹, provided with a knife, *a'*, and to this jaw is hinged or pivoted a second jaw, G², which is provided with an arm, *b'*. This arm extends outward through the inner bearing, H', and is curved, as shown, to bear against a conical collar, *d'*, surrounding the shaft F', and secured to the second bearing for the shaft.

The shaft F' is at the proper time moved inward, when the jaw G² is closed on the wire by the arm *b'* working in the plate H', so as to cut off the wire by the knife *a'*, the jaws retaining hold of the two ends of the wire surrounding the gavel, and, as the shaft F' is revolved, twisting them together. The shaft F' is then moved outward, when the jaw G² opens by the action of the arm *b'* against the collar *d'*, releasing the wire, and the bound gavel drops out as soon as the carriage F moves outward.

The shaft F' is rotated by means of a chain, *e'*, passing around a pulley, I¹, on the main shaft D, around idle-pulleys I², and around a pulley, I³, on the shaft F'. A portion of this shaft passing through the pulley I³ is flat, and provided with a projection, *f'*, which engages with a spring-pawl, *i'*, so as to cause the shaft to turn by the revolution of the pulley, while at the same time it can be moved lengthwise back and forth through the same. This movement of the shaft F' is ef-

fectured by means of a pivoted lever, L' , having its upper end connected to a loose collar, f^1 , placed between suitable shoulders on the shaft F' . The lower end of the lever L' is connected to a rod, M' , which is provided with two arms, $N' N'$, so that the forward and backward movement of this block W will at the proper times move the shaft F' inward and outward, as described.

The operation of the machine can be briefly stated as follows: When the rake of the harvester sweeps the grain onto the binder-platform it also releases the lever H , which allows the spring e to throw the rod f outward, so that the fork d will drop and be caught by the bar b of the chain B . The carriage F then moves inward for forming the gavel between the two jaws $I I'$. During this inward movement of the carriage the angular bar N is raised to release the block W , and the chain C is then thrown in gear, moving said block inward, whereby the chain A' is pushed with the nippers B' around the convolute groove in the jaws $I I'$, the nippers carrying the wire around the gavel. The shaft F' now moves inward, closing the twisting-jaw on the two ends of the wire, and cutting off the wire from the spool, the ends being then twisted by the revolution of the twisting-jaws. The carriage F , as well as the block W , return to their original position, and the shaft F' is moved outward, all ready for the next gavel deposited by the harvester-rake on the binder-platform.

The various devices of the binder should, of course, be timed, by means of suitable gearing, with the movements of the harvester-rake.

The shaft F' , which carries the twisting-jaws, does not rotate continuously, but only at the time when the shaft has been moved inward, as above described. To accomplish this a portion of the shaft F' is made square, as already stated, or flat on one side only for a certain distance.

In the hub of the pulley I^3 is arranged a ratchet-pawl, i^1 , operated by a spring, i^2 , to make it engage with the flat part of the shaft, having a projection, f^2 , when the shaft is moved inward, and thus cause the shaft to rotate with the pulley; but when the shaft is moved outward again the pawl bears against the round part of the shaft and allows the pulley to revolve without the shaft, said shaft being then held in a certain position by a hook, R' , engaging with an angular projection, m' , on the shaft. This position is such that the

twisting-jaws will be in exact place to grasp the wire as the jaws are closed by the inward movement of the shaft.

The trip-lever H , above described, which holds the rod f in the carriage F , is, by a wire, rope, or chain, n' , connected with the lower end of a lever, S' , pivoted to the rake-stand below the rake-arm in such a position that the rake-arm, during its movement to throw the grain onto the binder-platform, will strike the upper end of said lever and turn it on its pivot, and thus cause the lever H to be drawn out of the way. A spring, p' , returns the levers to their former position.

One of the idle-pulleys, I^2 , over which the chain e' passes, is mounted on an arm, I^5 , whereby sufficient tension is exerted on the chain to keep it sufficiently taut at all times.

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

1. The combination, with the carriage F and fork d , of the rod f , spring e , and the lever H , substantially as and for the purposes herein set forth.

2. The combination of the chain-wheel J , provided with the internal spring, i^2 , clutch k , lever K , rod m , slide L , rod n , spring-latch M , and the carriage F , with lever S , for throwing the chain C in gear, substantially as herein set forth.

3. The combination of the slide L , angular bar N , lever O , with arm P , wire p , lever R , and the carriage F , substantially as and for the purposes herein set forth.

4. The combination of the endless chain C , with arm t , pitman V , block W , chain A' , with nippers B' , and the circularly-grooved jaws $I I'$, substantially as and for the purposes herein set forth.

5. The combination of the shaft F' , having jaw G^1 , with knife a' , the pivoted jaw G^2 , with arm b' , plate H' , and collar d' , substantially as and for the purposes herein set forth.

6. In combination with the shaft F' , the collar f^1 , lever L' , rod M' , with arms N' , and the block W , substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CHARLES S. BANKER.

Witnesses:

JAMES J. SHEEHY,

THEODORE MUNGEN.