(No Model.) 3 Sheets—Sheet 1.

G. B. SHAFER.

GRAIN BINDER.

No. 249,263. Patented Nov. 8, 1881.

Fig. 4.

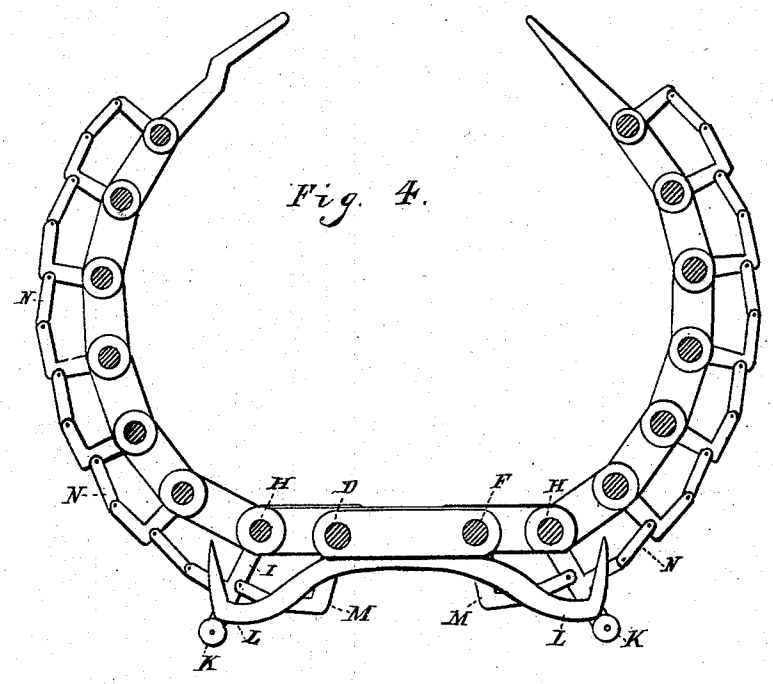
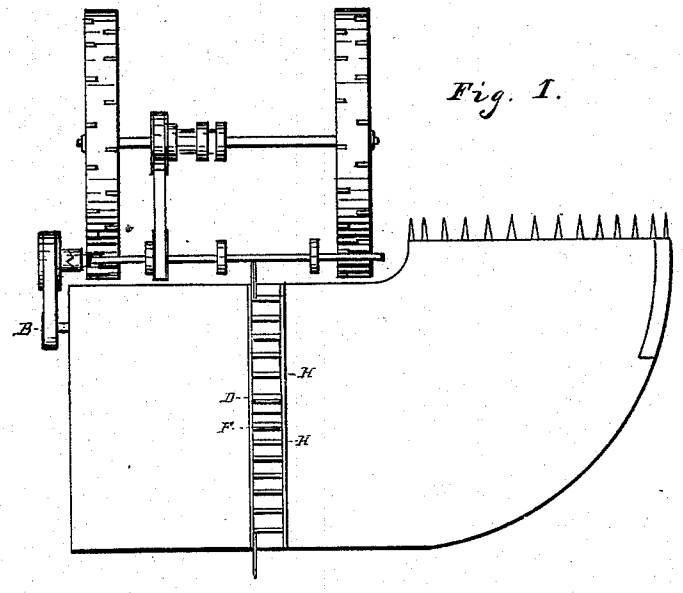


Fig. 1.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

G. B. SHAFER.

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Fig. 3.

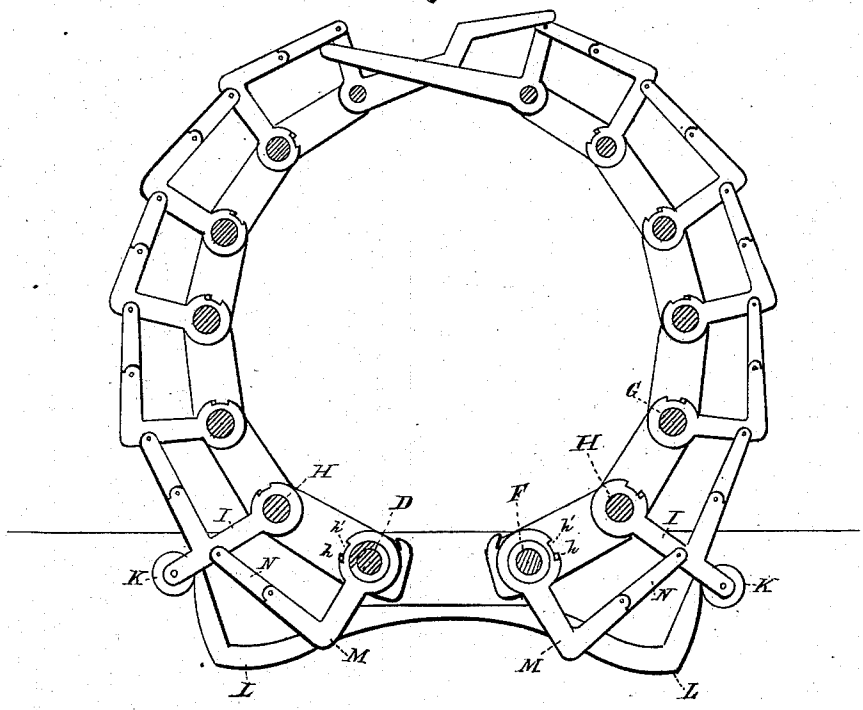
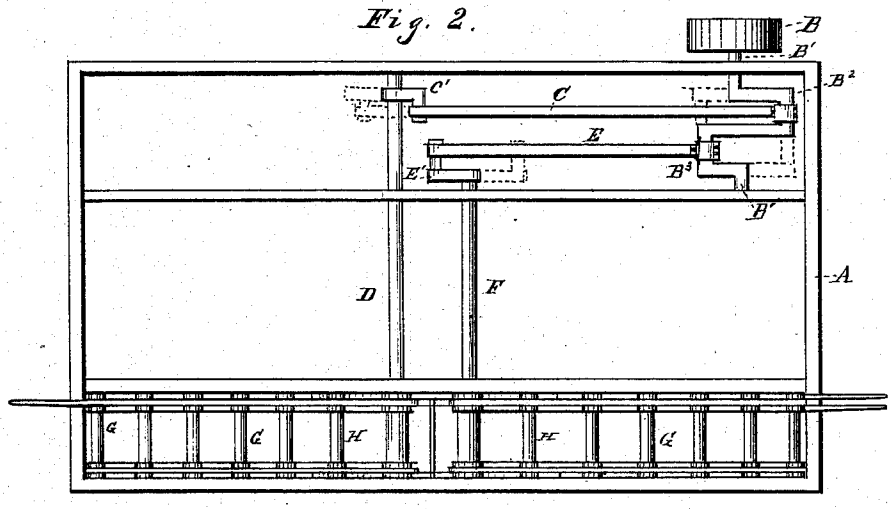


Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

G. B. SHAFER.

GRAIN BINDER.

No. 249,263. Patented Nov. 8, 1881.

Fig. 6.

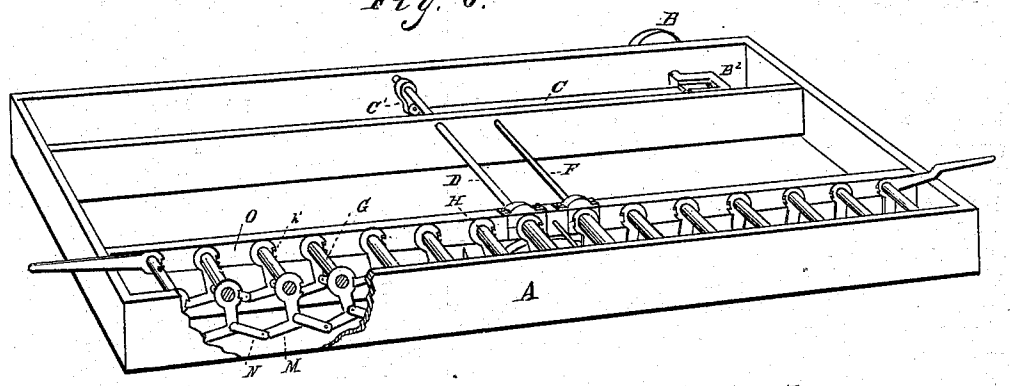


Fig. 7.

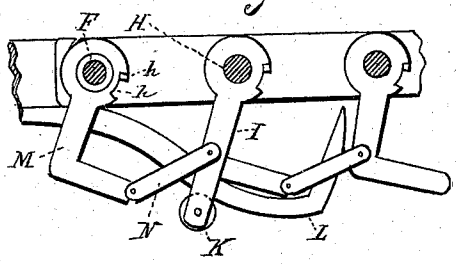


Fig. 8.

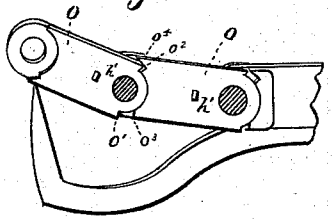


Fig. 9

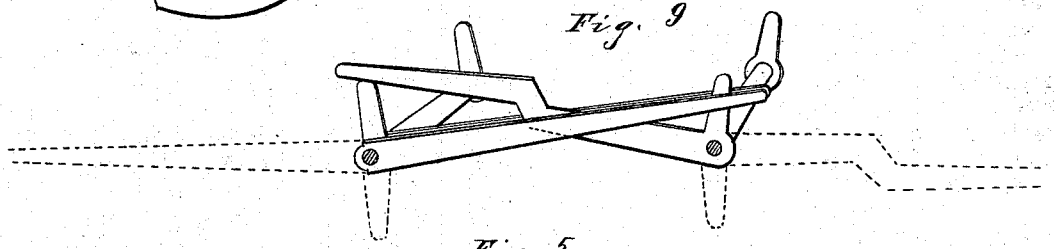
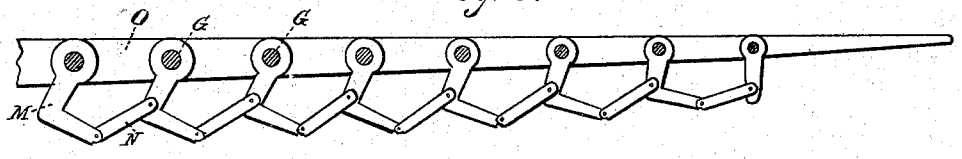


Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE B. SHAFER, OF CLEVELAND, OHIO.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 249,263, dated November 8, 1881.

Application filed July 16, 1881. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. SHAFER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Grain-Binders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to self-binders, and more particularly to that portion of a self-binder that is adapted for gathering the straw and holding it in position while the bundle is being tied; and it consists in parts and combination of parts that will more fully hereinafter be described and claimed.

Figure 1 is a plan view of a reaper having my improved binding mechanism attached, showing the manner of connecting my mechanism with the ordinary reaper, and its relative position to the cutting-bar. Fig. 2 shows a plan view of a frame adapted to hold the operative parts of my device, together with the mechanism for operating the same. Fig. 3 is a vertical view of the mechanism adapted to grasp and compress the straw, shown in a closed position. Fig. 4 is a similar view, shown in a partially-open position. Fig. 5 is a plan view of one of the presser-arms extended. Fig. 6 is an isometric view of the frame holding my device and the mechanism necessary for operating it, with a portion of the side broken away in order to show the construction and relative position of one of the jointed arms. Fig. 7 is a detached plan view of a portion of one of the arms, showing the arm in an extended position, and the relative position of the hook and the guide-wheel that operates it when in an open position. Fig. 8 is a detached plan view of a portion of one of the arms, showing in detail the locking mechanism. Fig. 9 is a detached view, in perspective, of the points or fingers of the arms, showing their manner of contact as the two arms are brought together.

In the said drawings, A is any suitable frame adapted to contain and support the operative parts of my device.

B is a pulley suitably geared with the driving mechanism of a reaper, whereby it receives a continuous rotary motion, and so connected that it may be thrown in or out of gear at the will of the operator, or may, by suitable mechanism, be geared to receive an intermittent motion. It is attached to the outer end of the shaft B′. This shaft has two cranks, B^2 and B^3. The crank B^2 is connected by means of the pitman C with the crank C′ upon the shaft D. Thus the crank B^2 communicates an oscillating motion through the crank C′ to the shaft D. The crank B^3 is connected by the pitman E with the crank E′ upon the shaft F, through which mechanism an oscillating motion is communicated to the shaft F.

To the outer ends of the shafts D and F are permanently attached the first joints of the arms which form the substantial portion of my invention. This portion of my invention consists of two double arms jointed and adapted to be extended in a horizontal position, or at the will of the operator, the extremities brought together above the frame in a circular position, as that shown in Fig. 3. These arms, as above stated, are made double or of two separate sections, each of substantially the same character, connected together by cross-pieces G. These cross-pieces may be of any suitable length, so as to present, with the arms, a sufficient bearing-surface to hold the straw rigidly in position.

At the end of the cross-pieces H, at the second joint of either arm, is attached a lever, I, which carries upon its outer extremity a pulley, K, which is adapted to run upon the outer surface of the hooks L, which serve as a track for the pulley. This lever I, which carries the pulley K, is connected with the main shafts F and D by means of the bell-crank levers M M and the connecting-links N N. Through this bell-crank M and connecting-link N motion is given by the shafts D or F to this lever I and its pulley K. When the arms are extended the pulley occupies the position upon its track upon the outer surface of the hook L. (Shown in Fig. 7.)

It will be observed that each successive joint of the arms is connected together in substantially the same manner as the first by means of a bell-crank and link connection. It therefore will be unnecessary to describe par-

ticularly each of the joints of the arm. It may consist of any desired number, so as to give the arms proper extent and motion to grasp the straw and hold it.

The extremities of the arms are provided with fingers of a different character, but adapted to engage with each other, as shown in Fig. 9, the finger of one of the arms being a single piece, while that of the other consists of two pieces sufficiently removed to admit the single finger of the opposite arm between them.

It will be apparent that the bell-cranks M, with their links, will only permit a certain curved movement to the arms—that is, they could not buckle back upon themselves. It is also necessary to construct the different sections of the arms in such a manner as to prevent them from assuming a backward position beyond the horizontal. To accomplish this, upon the lower end of each tooth is prepared a curved surface adapted to fit a like curved recess in the end of the tooth preceding it.

As shown in Fig. 8, upon the lower edge of each section is a stop, o', which comes in contact with a similar stop, o^3, upon the preceding section, which prevents the arm from opening farther than to a horizontal position. To still further strengthen the bell-crank and link supports mentioned above, and to prevent the arms, when in a circular position, from buckling or going farther than desired, a stop is also placed upon the upper edges of each of the sections of the arms, as shown in Fig. 8 at o^2 and o^4. Now it will be apparent that when the arms assume a horizontal position, or a wide open position, as shown in Figs. 2 and 6, and in detail in Fig. 8, the stops o' and o^3 will come together, and when the arms assume a circular position, as shown in Fig. 3 of the drawings, and in detail in Fig. 8, the stops o^2 and o^4 will come together and prevent any further movement in that direction.

The hooks L L are united at their extremity and permanently attached to the frame. The hooks L L are preferably made of a single piece, and are loosely attached to the shafts D and F upon their outer extremities. The function, as before stated, of these hooks is to furnish upon their outer surface a track for the passage of the pulleys K.

To still further assist in the positive opening and closing of the arms, when desired, I attach to the end of the bell-crank a disk, which may be integral with the crank itself, or permanently attached thereto. This disk is provided with a recess, h. Upon the different sections of the arms are studs h', adapted to move in the recesses h. If it is desired to close the arms to grasp the bundle of straw, one side of this opening in the disk h would strike the stud h', and when the contrary movement was desired the other side of the opening would strike upon the opposite side of the stud and force it open, so that it is adapted to operate in each movement, both the opening and closing.

As shown in Fig. 1, I prefer to attach my device to the ordinary reaper at the extremity of the table, so that the straw, after it is gathered by the revolving rake, will be delivered in proper position upon the arms of my device extended. The pulley B, through which motion is communicated to my device, may receive its motion directly from the shaft or wheel of the reaper, or it may receive it through any intermediate gearing. This is no part of my invention, as my invention can be easily adapted for use with different classes of reapers—either those which have the wheels permanently attached to the axles, thereby causing the axle to revolve with the wheel, or those whose axles are stationary and whose wheels are adapted to turn thereon.

It is also apparent that my device is peculiarly adapted for use in the combined machines known as "combined reapers and mowers"—that class of machines where the tables are detachable—as my device can be so constructed as to be as readily detached from a reaper as the ordinary grain-table, thereby using the ordinary mowing-machine for not only a mower, but also a reaper and binder. The compressing-arms being constructed to be extended in a straight line when in an inoperative position, enables the arm to be located slightly below or flush with the surface of the platform of the reaper, thereby allowing the grain to be raked over and upon the arms.

Having described the different parts of my device, its operation is as follows: The straw is delivered upon the arms, extended as shown in Figs. 1, 2, and 6. The pulley B, having a continuous rotary motion, imparts an intermittent motion to the shafts D and F. After the straw is delivered, as stated, the crank B^3 will assume the position indicated by dotted lines, when the arms themselves will assume the position shown in Fig. 3. The shaft D turning partially around carries with it the bell-crank M, which communicates motion to the lever I, upon the outer end of which is the pulley K, as shown in Fig. 7 of the drawings. As the crank turns the pulley will move forward toward the point of the hook, which motion will cause the joints between the bell-crank M and the links N to open throughout the length of the arms, thus forcing them in an upright circular position, as shown in Fig. 3. While the straw is held in this position any suitable tying mechanism may be employed for the purpose of fastening the sheaf or bundle. The pulley B continuing its rotary movement, the cranks B^2 B^3 C' E' will assume the position indicated by the unbroken lines in Fig. 2, when the bundle or sheaf is released or dropped from the machine, and the arms are ready to receive another bundle.

What I claim is—

1. In a grain-binder, the combination, with an actuating-shaft, of a compressing-arm secured at one end to the actuating-shaft, said compressing-arm being composed of a number of jointed sections, and constructed to be curved

when its free end is moved in one direction and straightened when moved in the opposite direction, substantially as set forth.

2. In a grain-binder, the combination, with two actuating-shafts, of separate and independent compressing-arms, each secured at one end to one of the actuating-shafts, both of said arms being composed of a number of jointed sections, and constructed to be curved when their free ends are moved in one direction and straightened when their free ends are moved in the opposite direction, substantially as set forth.

3. In a grain-binder, the combination, with an actuating-shaft, of a compressing-arm composed of a number of jointed sections, and bell-crank levers connecting the several sections, one of the bell-cranks being connected with the actuating-shaft, the parts being constructed so that the compressing-arm will be curved throughout its length when its free end is elevated and straightened when its free end is depressed, substantially as set forth.

4. In a grain-binder, the combination, with two actuating-shafts, of two compressing-arms, each composed of a series of jointed sections constructed with stops to limit their movement in either direction, said arms constructed to be curved throughout their length when the shafts are rotated in one direction and to be straightened when the shafts are rotated in the opposite direction, substantially as set forth.

5. In a grain-binder, the combination, with two actuating-shafts and a trackway, of two compressing-arms, each composed of a series of jointed sections, and bell-crank levers connecting said sections, and rollers connected with one or more of the bell-crank levers and adapted to travel on said trackway, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE B. SHAFER.

Witnesses:

JNO. CROWELL, Jr.,

ALBERT E. LYNCH.