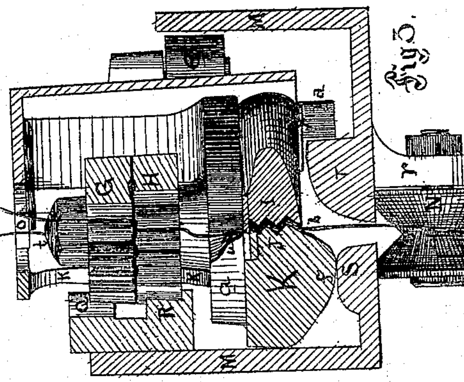
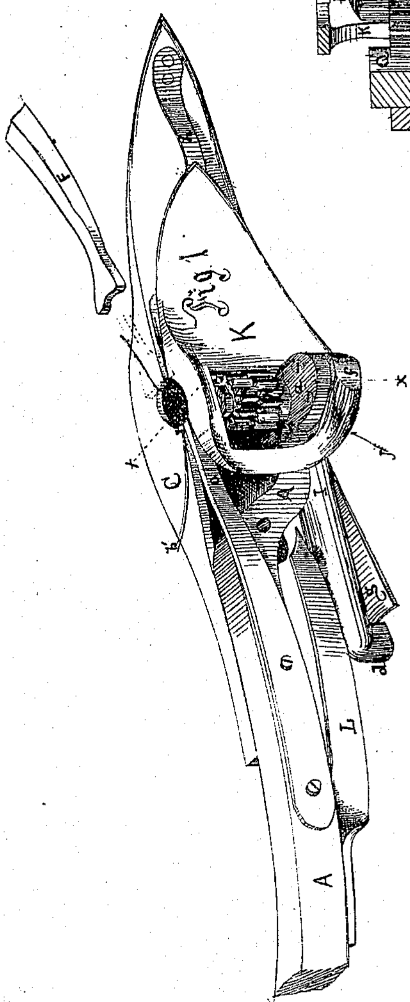
2 Sheets—Sheet 1.

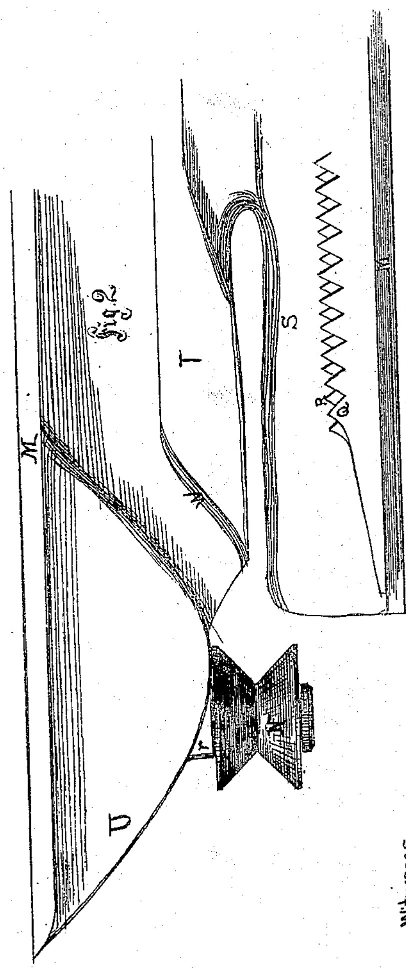
S. D. LOCKE.

GRAIN BINDER.

No. 111,069. Patented Jan. 17, 1871.







S. D. Locke
By his Atty
R. D. Smith

Witnesses

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

2 Sheets—Sheet 2.

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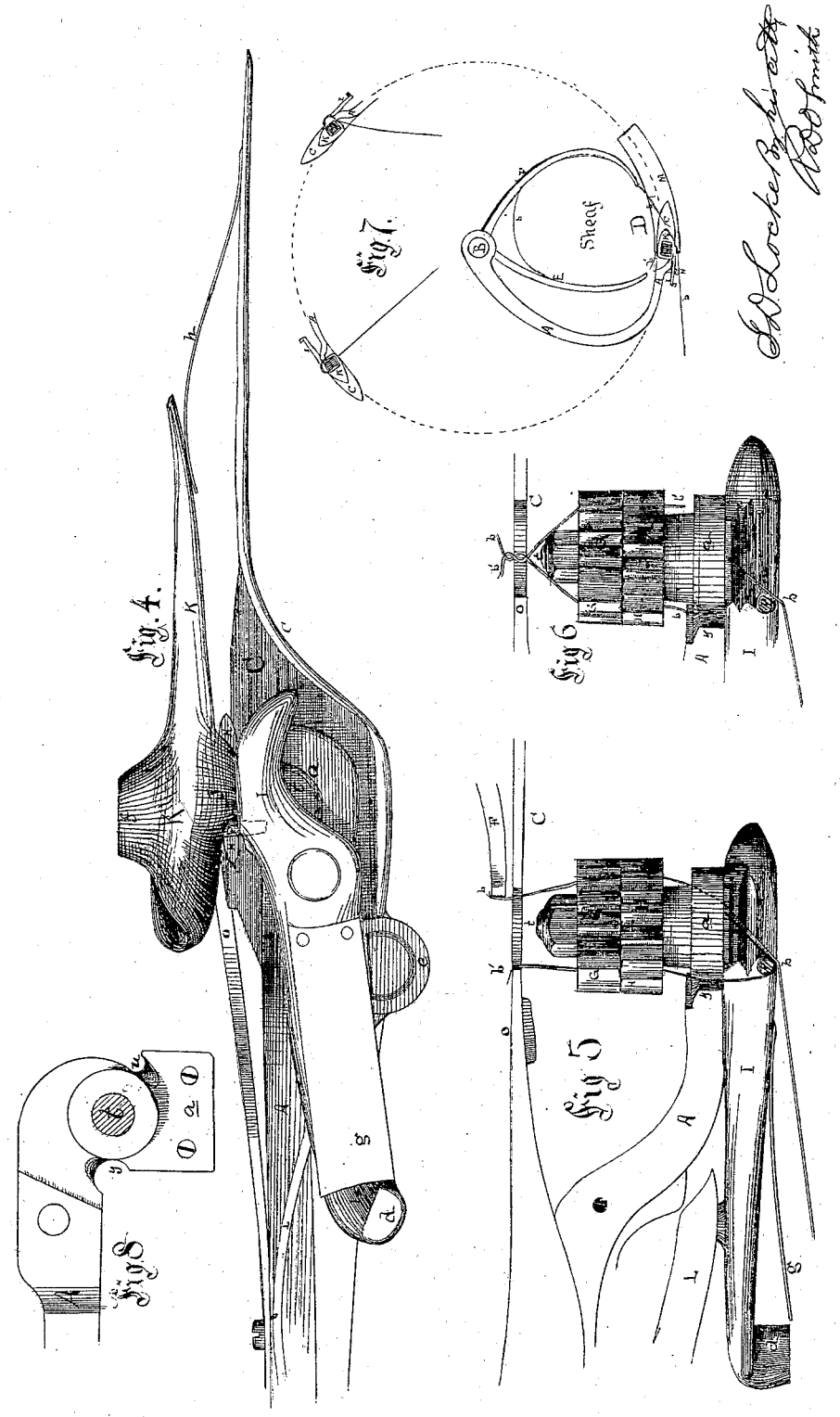

UNITED STATES PATENT OFFICE.

SYLVANUS D. LOCKE, OF JANESVILLE, WISCONSIN.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **111,069**, dated January 17, 1871.

To all whom it may concern:

Be it known that I, SYLVANUS D. LOCKE, of Janesville, in the county of Rock and State of Wisconsin, have invented a new and useful Improvement in Grain-Binders; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a binding-head. Fig. 2 is a plan of the entrance end of the guide-box. Fig. 3 is a transverse section on line *x x* of Fig. 1, including the guide-box. Fig. 4 is a bottom plan of binding-head. Fig. 5 is a side elevation of the twisting mechanism, including one jaw of the cutter and griper at the moment when the twisters commence to move. Fig. 6 is a side elevation of the twisting mechanism, including one jaw of the cutter and griper at the time when the twisters are revolving. Fig. 7 is a diagram to show the general connection of the devices herein described with the operating machinery. Fig. 8 is a plan of the table end of the binding-arm.

My invention relates to that class of grain-binders which have a rotating arm to carry the binding material; and it consists, first, in the holding and twisting device, composed of two pinions independently rotated on the same axis, and holding the ends of the wire or cord between them; second, in the outer shield to cover and protect the twisters, and conduct the binding material properly thereto; third, in the arrangement and construction of the cutting and griping jaws; fourth, the arrangement of the camways, by means of which the cutter is operated; fifth, the guard-spring to prevent the lever of the cutter from entangling the grain; sixth, the guard-spring to prevent grain from entangling in the twisters; seventh, the retaining spring-latch, which receives and retains one end of the binding material in proper contact with the twisters; eighth, the guide-roller at the end of the rack-box arranged to conduct the binding-material properly into the machine.

The binding apparatus herein described is located at the delivery side of a reaping-machine, and the cut grain may be moved thereto by a rake, which separates the grain into gavels, by an endless apron, or by other suitable mechanism. The plan which I prefer, however, is represented and described in my patent dated 30th August, 1870. The general plan and method of moving the devices which carry the binding material and secure the sheaf are also shown and described in my said patent, to which reference is hereby made for the purpose of explaining the general manner of connecting the devices herein described with the harvesting-machine and its prime motors.

The objects to be attained by my invention are, first, to carry the binding-wire around the gavel; second, to unite the ends of said wire by twisting; third, to sever the wire between the twist and a point where it is seized and held by the mechanism, so that a fresh portion may be drawn out and carried around another gavel at the next revolution of the machine. The second and third motions must be nearly or quite simultaneous.

That others may fully understand this invention I will particularly describe it.

The general connection of the devices herein described, with the harvesting-machine are shown in Fig. 7, wherein the arm A rotates about the axis B, and carries in its rotation the head C, which contains the mechanism for seizing, holding, cutting, and twisting the binding-wire. D represents the gavel-tray, in which the grain is deposited by the endless apron, or other moving mechanism. E is a compressor, and F is an arm, which acts as a compressor in connection with the arm E, and also serves to force the binding-wire on one side into the twisting mechanism. These several parts with their arrangement and joint action are fully shown and described in my patent hereinbefore referred to, and, therefore, no further description of them is required in this place. The head C in its general form resembles a shuttle. At its rear end it is rigidly secured to the arm A. The end of the arm A is bent downward, and flattened at *a*, to form a table, upon which to mount the twisting-pinions G H and the cuttting and holding jaws I J. The shield K, which covers and protects the outer side of the twisting mechanism, is also attached to the table *a*, and in practice the part J of the holding-jaws is

formed with, and a part of, said shield, though cutting and griping jaw J may be separately constructed and attached to the shield, or to the table *a*, as preferred. The spring L closes and holds the jaw I when the same has been opened by the operating-cam U, and again released therefrom.

Beneath the gavel-tray D guide-box M is located, to guide the head C in that part of its revolution, and to insure the proper meeting of the ends of the binding-wire. It also serves as a convenient attachment for the cams U W, which operate the cutter, the guide-roller N for the binding-wire, and for toothed rack, which rotates the twisters.

The binding-wire is coiled upon a reel located at any convenient place upon the machine; but preferably just below the elevated part of the endless apron, upon which the grain is conveyed to the binder.

When the head C is commencing its revolution the binding-wire *b* from the reel passes under the guide-roller N, and is griped between the jaws I J, as shown in Figs. 2 and 6. The forward motion of the head C draws the wire *b* out from the reel, and, as shown in Fig. 7, carries it around the gavel. If there were no obstruction in the gavel-tray the wire *b* would, during the first half of its revolution, describe a straight line from the roller N to the head C; but the presence of grain in the gavel-tray will cause the wire to assume a curved line. When the head C has passed over about three-fourths of its revolution from the roller N the wire *b* will have been gradually drawn over the head C, and behind the rear edge of the shield K, until it assumes the position shown at *b'*, Figs. 1, 2, 5, 7, and the latch-spring O will then retain it in that position as the head C descends toward its starting-point.

When the jaws I J are opened to receive the wire the end which was griped at first is released; but it is, for a moment, held in place by the hook formed around the pin P, as shown in Fig. 5. The pin P is set in the jaw J, and projects into a cavity made for that purpose in the jaw I, so that the end of said pin is not uncovered when the jaws are opened.

When the head C has completed its circuit the wire *b*, as shown in Fig. 5, passes around the pin P upward between the rear teeth of the pinions G H, over the latch-spring O, and thence around the gavel, and again downward between the front teeth of said pinions, and between the cutting and griping jaws I J. The further forward motion of the head C causes the jaws I J to close and sever the wire *b* and the pinions G H at the same instant to rotate and twist the ends together, as shown in Fig. 6. The sheaf is then thrown out by the continued movement of the head C and action of the compressors E F. The pinions G H are arranged to engage with the alternating teeth of the racks Q R, so that when they come fully in mesh with said racks their teeth will alternate, as shown in Figs. 1, 2, 5, 6, and the wire is therefore bent and crimped between the two pinions, as shown in Fig. 2. By this means the twisting-pinions are caused to hold the ends of the wire after the griping-jaws have released it, and while the twist is being made.

The contiguous surfaces of the pinions G H are grooved, or set so as to be slightly separated, as shown in Figs. 2, 5, 6, and the forward edges of the leaves of the pinions are rounded, so that the wire will not be cut or broken.

The racks Q R are made sufficiently long to give the required number of turns to the twist, and when the pinions G H have passed out of engagement with said racks the wire will be released, and the sheaf will be discharged.

The above comprises a general description of the mechanism and results accomplished by this invention, and it only remains to describe some accessories which are convenient to secure the regular and uniform action of the several parts.

The racks Q R are secured to the side of the box M, which is curved in the arc described by the head C in its revolution. At the bottom of the box M there are parallel ribs S T, the former of which serves as a guide for the head C as it passes under the gavel-tray, and the cam V is placed at the end of the box to open the jaw I at the moment when the end of the wire is to be released, and the reel part to be received, griped, and severed. The jaw I is prolonged backward, and the extreme end is turned downward to form a stud, *d*, which engages with the cam U at the proper moment. When the stud *d* passes the cam U the spring L will cause the jaws to close again, but the cam W is placed at the end of the cam-rib T, to force the jaws together by a positive motion. The rib T and spring L will hold the jaws closed during the remainder of the revolution of the head C. While the head C is passing through the box M the lateral friction will be received by the twisting-pinions G H on the one side, and by the friction-roller *e* on the other side, while the projection *f* of the shield K will slide upon the guide-rib S. The spring-guard *g* is placed on the jaw-lever I to prevent the grain from entangling with the stud *d*. This spring is only strong enough to resist the pressure of the grain, and yields readily to the rib T when the head C enters the guide-box M. For the same purpose a guard-spring, *h*, is placed to close the space between the point of the head C and the shield K. This spring will yield readily to permit the wire *b* to pass, but has sufficient strength to prevent the admission of grain into the twisting mechanism.

It is evident that the mechanism for producing the several movements described above must be so adjusted as to secure the proper timing of those movements. Supposing the head C to have carried the binding-wire

nearly around the guide-box M, the point of the head C will first pass the binding-wire near the guide-roller N, and said wire will press back the spring *h* and enter between the head C and the shield K. The arms E F will, at the same time, descend and compress the gavel, and the arm F will, at the same time, press the wire back into the forward teeth of the twisting-pinions, as shown in Fig. 5. This may be termed the first stage.

The stud *d* engages with the cam U, and the jaws are thereby opened to release the end of the binding-wire, and receive the part to be severed and griped. While the stud *d* is in engagement with the cam U the pinions G H engage with the teeth of the racks Q R, and the teeth of the pinions are thereby caused to assume the positions shown in Figs. 1, 2, 5, 6, with the teeth of one opposite to the space of the other, and with the wire crimped between them. The further movement of the head C rotates the pinions and withdraws the wire end around the pin P, and from between the jaws I J, and into the notches *u y*. This may be termed the second stage.

An instant subsequent to the engagement of the pinions and racks, and as soon as the end of the wire is withdrawn around the pin P, the stud *d* engages with the cam W, and the wire is griped between the jaws I J, and severed at the same instant. This may be termed the third stage.

As the head C continues to move forward the pinions G H are revolved, and the binding-wire is twisted, as shown in Fig. 6. This may be termed the fourth stage.

When the head C passes out of the box M the arm F will recede, the pinions will assume their first positions, with their teeth opposite each other, and the sheaf will be discharged.

It is obvious that, to secure and maintain the necessary accurate adjustment of the several parts, they must all be rigidly secured in proper position at the place of manufacture. Hence the necessity of securing the several cams, the racks, and the guide-roller to the same foundation, and the guide-box M serves that purpose.

The racks Q R are secured to its side; the cams U W and the lug *r*, for attachment of the guide-roller, to its bottom, so that the relative positions of these parts cannot be changed during the process of attaching the apparatus to the harvesting-machine, and the proper timing of the several movements will not be disturbed.

The pinions G H are shown as centered upon the bolt *t;* but it is evident that the same results would be attained if they were mounted in a shell, so that the bearing would be upon the ends of the teeth, though that arrangement is considered less perfect than the one shown.

Having described my invention, what I claim as new is—

1. The twisting-pinions G H, operated independently, and arranged to clamp and hold the ends of the binding-wire between them during the process of twisting, substantially in the manner set forth.

2. In combination with the clamping and twisting pinions G H, the racks Q R, arranged with alternating teeth, in the manner and for the purpose set forth.

3. The shield K, constructed as described, in combination with the twisting mechanism, to guide the binding-wire both to the front and rear teeth of the twisting mechanism, and to guard said twisting mechanism from entanglement with the grain, substantially as set forth.

4. The combination of the shield K and stationary jaw J with the wire holder and cutter, arranged and operating as described.

5. The movable jaw I of the wire holder and cutter, provided with a stud, *d*, combined with the cam U, located at the end of the guide-box M, as described.

6. In combination with the jaws I and J of the wire holder and cutter, the pin P, substantially as and for the purpose set forth.

7. The combination of the cam W and spring L with the movable jaw I, in the manner described, whereby the binding-wire will be griped, severed, and securely held, as set forth.

8. In combination with the head C and the twisting mechanism, the latch-spring O, locating and operating as described, to hold the binding-wire in engagement with the rear teeth of the twisting mechanism.

9. The arrangement of the guard-spring *g* in connection with the stud *d*, for the purpose set forth.

10. The arrangement of the spring *h* in connection with the head C, shield K, and twisting mechanism, as set forth.

11. The guide-box M, when provided with the racks for operating the twisting mechanism, cams U W, for operating the cutting and griping jaws, and the lug *r*, for a permanent attachment of the guide-roller N, as set forth.

S. D. LOCKE.

Witnesses:
R. D. O. SMITH,
C. F. HARKNESS.