(Model.)

3 Sheets—Sheet 1.

W. M. PIATT.

GRAIN BINDER.

No. 245,211. Patented Aug. 2, 1881.

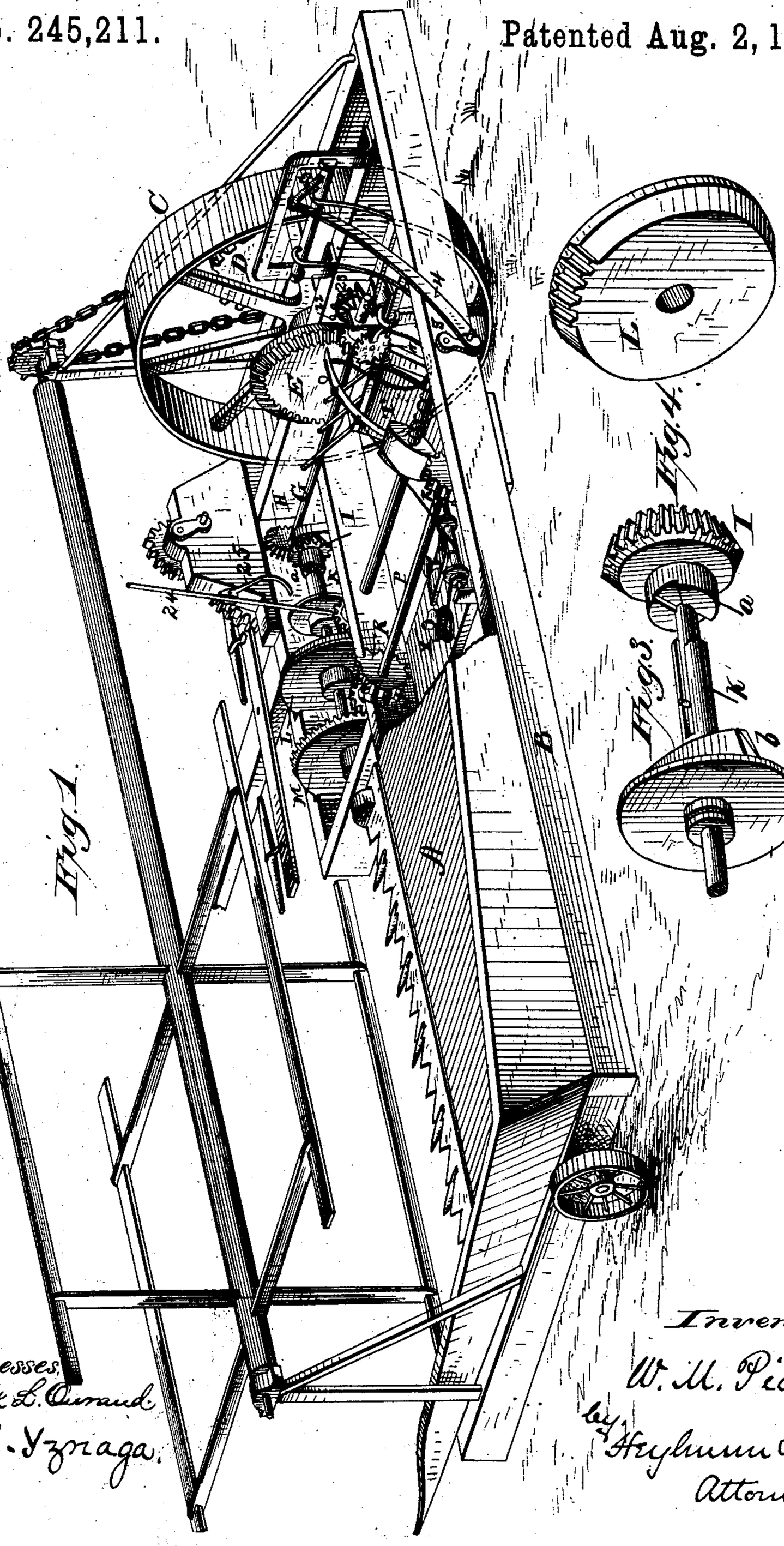

Fig. 1.

Fig. 4.

Fig. 3.

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(Model.) 3 Sheets—Sheet 2.

W. M. PIATT.

GRAIN BINDER.

No. 245,211. Patented Aug. 2, 1881.

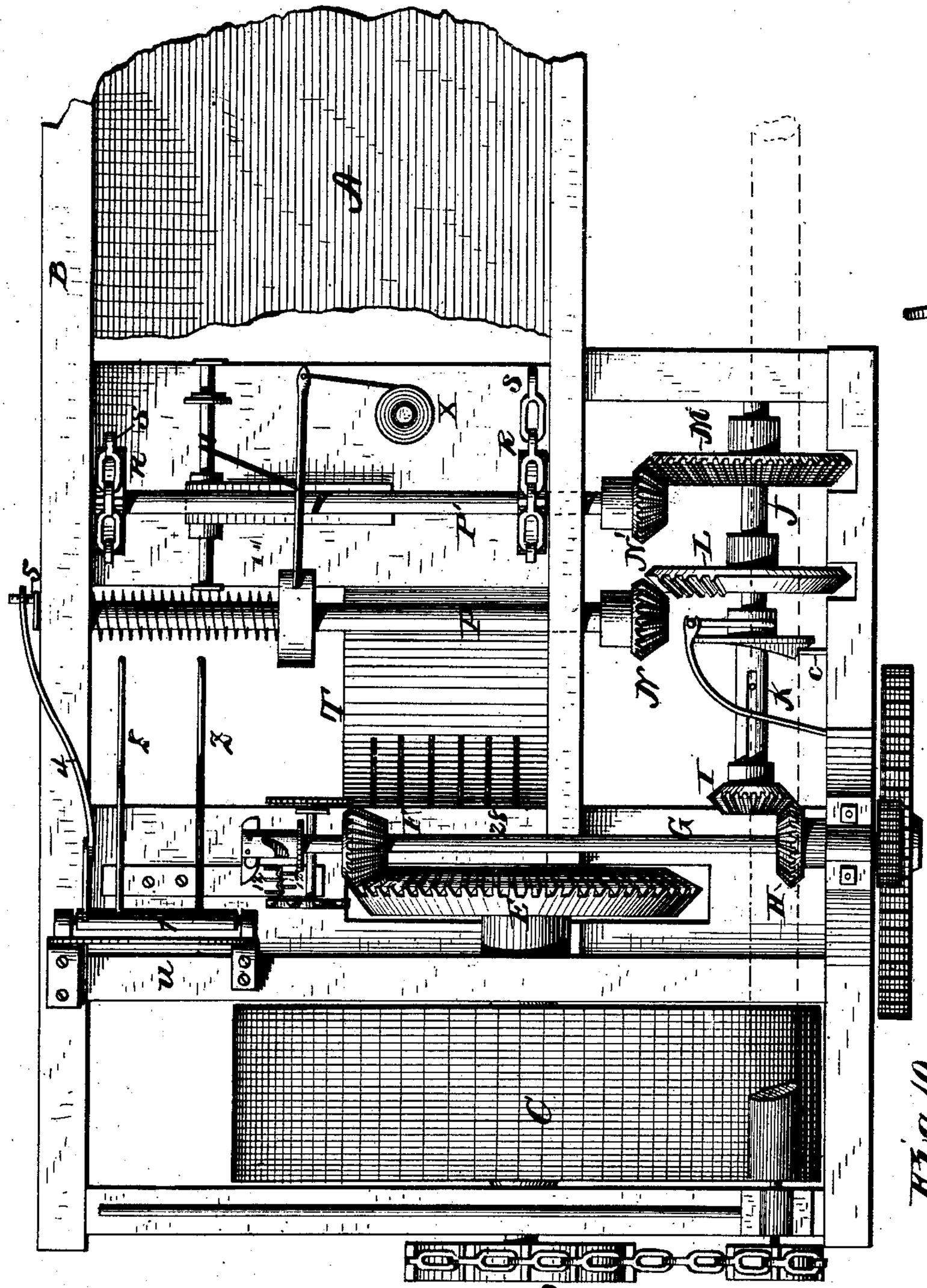

Fig. 1.

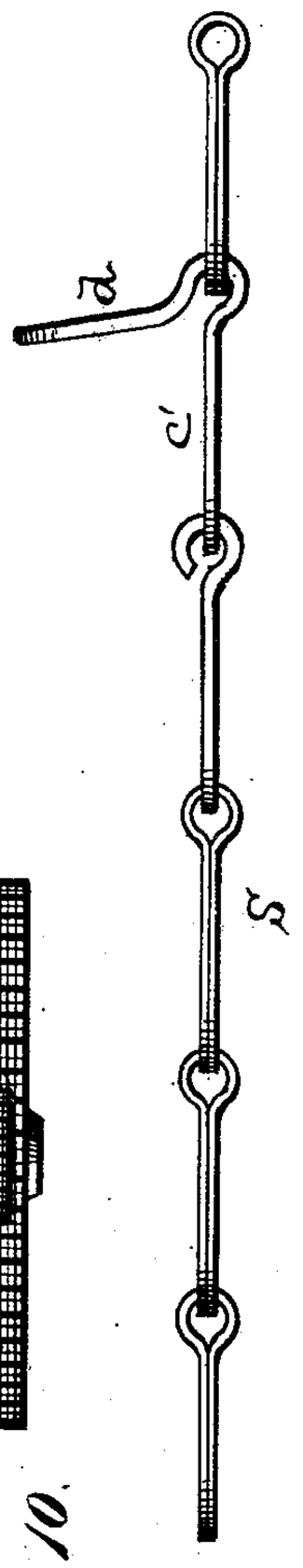

Fig. 2.

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(Model.)

3 Sheets—Sheet 3.

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GRAIN BINDER.

No. 245,211. Patented Aug. 2, 1881.

Fig. 5.

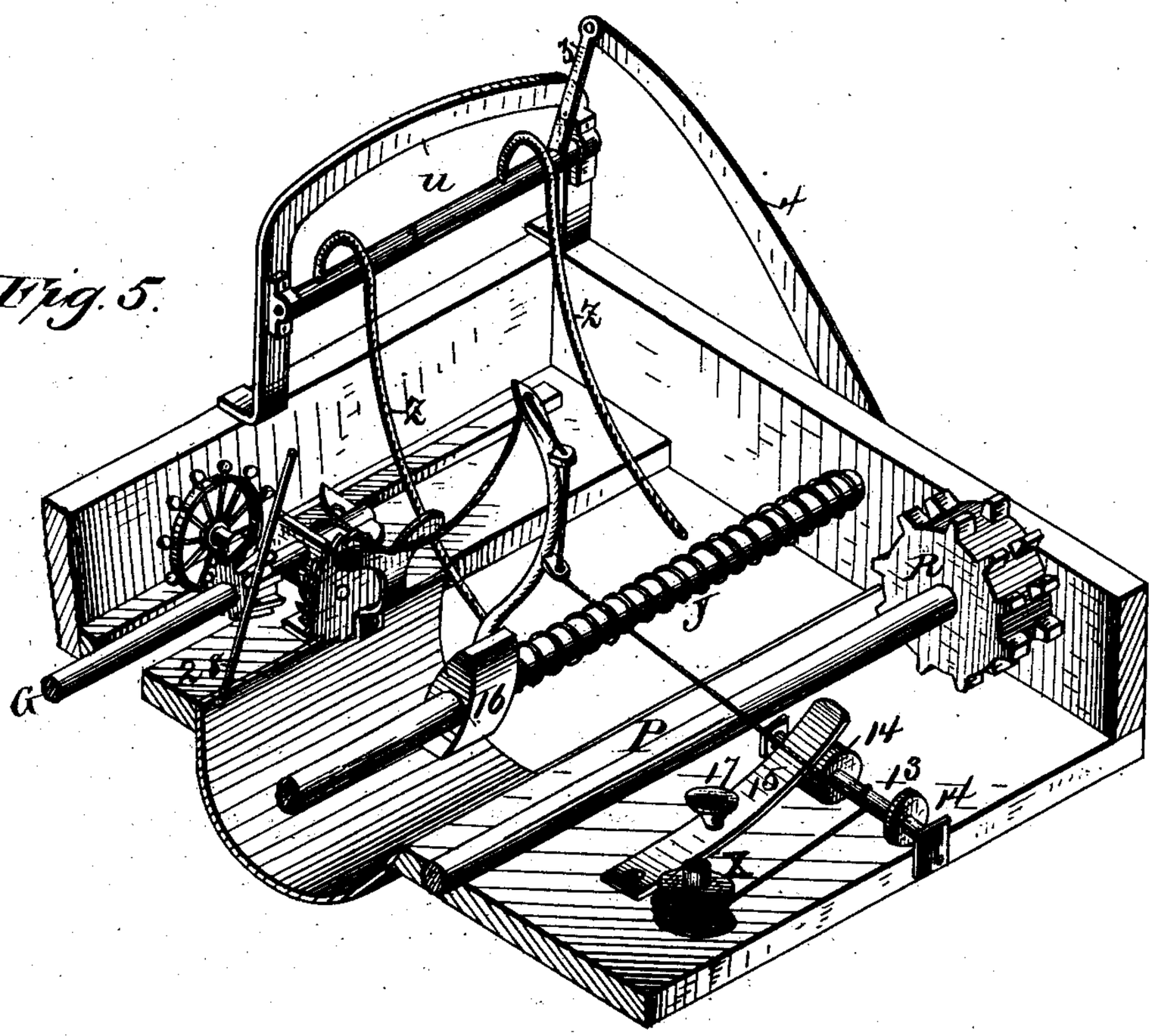

Fig. 8.

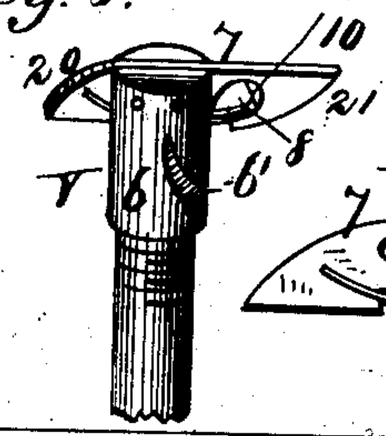

Fig. 9.

Fig. 7.

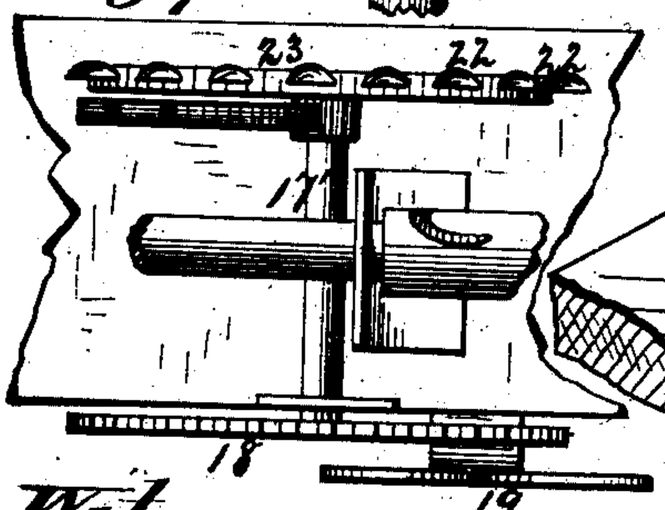

Fig. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM M. PIATT, OF WEST LIBERTY, OHIO.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 245,211, dated August 2, 1881.

Application filed November 20, 1880. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM M. PIATT, a citizen of the United States, residing at West Liberty, in the county of Logan 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 appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to grain-binders, and has for one of its objects to provide a simple, strong, and cheap grain-binder.

Another object of my invention is to carry the cut grain upon the platform to a gavel-receptacle at the inner end thereof, adapted to serve a three-fold purpose, to wit: a grain-receiver, a means to aid in pressing the gavel into a bundle, and a means for discharging the bound bundle.

Another object of my invention is to provide a shipping mechanism for communicating motion intermittently to the endless chains, and a cord-carrying arm with a grain-receiving receptacle capable of an oscillating motion.

Another object of my invention is to provide the knot-tying mechanism with a cutter for severing the band with its knot from the cord.

Another object of my invention is to provide a means for feeding the strands of the cord to the knot-tying mechanism.

With these objects in view my improvements consist in the novel construction and combination of parts, as will be hereinafter more fully described, and specifically claimed.

In the accompanying drawings, which represent so much of a harvester as is necessary to illustrate my invention, I have shown all my improvements embodied in the best way now known to me.

Figure 1 is a perspective view of a harvester, showing my improvements attached thereto. Fig. 2 is an enlarged plan view, showing the operating mechanism and the binding mechanism. Fig. 3 is a perspective view of a bevel-gear with a clutch device and the sliding tripping-wheel with a clutch device. Fig. 4 is a perspective view of the segment-wheel. Fig. 5 is a perspective view of the binding mechanism, showing the method of placing the band for the gavel and the knot. Fig. 6 is a perspective of the knot-tying mechanism. Fig. 7 is a plan view of the same. Fig. 8 is a perspective view of the knot-tyer. Fig. 9 is a view of the device for forming the loop of the knot and severing the cord. Fig. 10 is a view of a portion of the endless sprocket-chain, showing the mode of connecting the links.

The letter A represents the platform of a harvester, upon which the grain falls as it is cut by the cutter-bar. This platform is supported by a strong and substantial frame-work, B, and within the frame-work is journaled, in a suitable manner, a single driving and main supporting wheel, C, with a broad flanged tread.

To the outer end of the axle of the supporting or driving wheel is fixed a sprocket-wheel, D, over which passes a sprocket-chain for communicating motion to a smaller sprocket-wheel arranged on the end of the shaft for operating the reel.

To the inner end of the axle of the driving-wheel is keyed a bevel-gear wheel, E, meshing into a small gear-wheel, F, arranged on the outer end of the shaft G, which is arranged at right angles to the axle of the driving-wheel. At the forward end of this shaft G is also keyed a small miter-gear, H, meshing into another miter-gear, I, arranged on a second shaft, J, at right angles to shaft G, as seen in Figs. 1 and 2 of the drawings. On this shaft J (see Fig. 2) is arranged and adjusted the mechanism for operating intermittingly the cord-carrying arm and the endless chains passed over sprocket-wheels for carrying the cut grain to the gavel-receptacle arranged below the horizontal plane of the platform. This mechanism (see Fig. 3) consists of the hub portion of the bevel-gear I, having a clutch-face, *a*, a slotted sliding sleeve, K, formed on its coacting face, with projections and interdental spaces for the clutch-connection, and provided with a disk having a beveled side piece, *b*, forming a tripping device, mutilated or segmental gear L, and a gear-wheel, M. The latter are seen in Fig. 2 of the drawings. The object of the tripping device or cam *b* on the disk in connection with the fixed pin or stud *c* in the frame is to

disengage the clutch mechanism on the shaft, thereby causing the master gear-wheel to be inoperative and the sprocket-chains of the grain-platform to be inactive. During this period of time the binding mechanism, hereinafter described, is at work in forming the knot.

The segmental gear keyed to the shaft is formed with four cogs, more or less, and engages with the bevel-pinion N on the end of the shaft P that operates the cord-carrying arm, and the master bevel-gear M, fixed to the shaft, engages with the bevel-pinion N′ on the end of the shaft P′, carrying the sprocket-wheels R R, that communicate motion to the endless sprocket-chains.

The segmental pinion with the four teeth and the pinion on the end of the shaft are so constructed as to time the forward movement of the cord-carrying arm at the moment the gavel is delivered to the grain-receptacle, and cause the same to remain down while the knot is being tied.

At the other end of the platform is arranged a transverse shaft having loosely arranged thereon two sprocket-wheels, over which pass the endless sprocket-chains S S. The sprocket-chains (see Fig. 10) are formed of links coupled together in a well-known manner; but at certain points in the chain I form a link, *c′*, with a curved or elevated portion, *d*, to catch the small heaps of cut grain and deliver the same to the grain-receptacle below the horizontal plane of the grain-platform. At these portions of attachment, as above stated, the links are re-enforced, so as to furnish the necessary strength. In operation the chains pass over the platform and collect the fallen grain in heaps.

The letter T represents a gavel-supporter composed of two parts, one part, arranged at the front side of the frame, being stationary to receive the butt-ends of the grain, and the other part, arranged at the rear side of the frame, movable to receive the head-ends and aid in compressing this portion of the grain which forms the sheaves. The movable portion is journaled to a bracket, U, made fast to the platform-frame immediately in rear and inside of the driving-wheel, and consists (see Figs. 1 and 5) of a shaft, 1, with journal ends, the curved arms Z, firmly attached to the shaft 1, so as to extend upwardly a short distance above the same, thence curved over downwardly, inwardly, and then outwardly, so as to form a concave to receive the head portions of the grain. The outer end of this shaft is provided with an elevated crank-arm, 3, from which extends a pitman or rod, 4, forming a connection with a crank, 5, on the rear end of the shaft carrying the cord-carrying arm. This portion of the gavel-receiver, thus constructed and connected, including the journal-bearings, receives the head or heavy portions of the cut grain, and is capable of an oscillating motion, whereby it performs in its forward motion a yielding compression upon the under side of the gavel within the gavel-receiver, and holds the under side of the gavel during the tying process, and in its backward or return motion it, owing to the weight of the sheaf at this end, permits the tied bundle to drop automatically through an opening formed between the knot-tyer and the shaft carrying the cord-carrying arm.

The knot-tyer, represented by the letter V, (see Figs. 8 and 9) consists of the tube 6, formed with a curved slot, 6′, forming a jaw and lip, and with female-screw threads at one end for attachment, as hereinafter mentioned, and formed at the other end with a transverse bar, 7, which bar is provided with an eye, 8, snap-spring 9, and cutter 10. This knot-tyer is fastened to the outer end of the shaft G by means of screw-threads, so as to secure a rotary motion. At the side beyond the knot-tyer (see Fig. 2) are arranged the cord-holding means, which consist of the clamping-jaws 12 and an interposed rubber cushion, 12′. The office of this cord-holding means arranged behind the knot-tyer is to clasp or hold the free or new end of the cord while the cord-carrying arm is returning to its normal position, and to furnish, by means of the cord, a temporary holder at this end for the new grain that is to be fed to the gavel-supporter to form the next bundle or sheaf. Suitable provision will be made for the discharge of the small pieces of cord that collect in the holder, to obviate choking.

Under the platform is arranged a tension device and also a cord-spool, X, suitably supported upon a transverse bar or its equivalent. The tension device (see Fig. 5) consists of a shaft, 13, which has at each end a wheel, 14, supported in brackets, and a tension-spring, 15, made fast at one end, and having the other end resting upon one of the wheels. The pressure of the tension-spring is regulated by means of a set-screw, 17.

The letter Y represents a coiled spring surrounding the shaft, to which the cord-carrying arm is attached. One end of this coiled spring is attached to the collar 16 of the cord-carrying arm, and the other or opposite end is attached to the frame of the machine. The function of this coiled spring is to aid in returning quickly the cord-carrying arm to its place of rest for the next gavel, and also to return rapidly the movable part of the gavel-supporter to its normal position, and to automatically discharge the tied bundle. The cord-carrying arm or needle is formed with an eye at its point, and is attached to a collar which is properly adjusted and fixed to the shaft, as seen in Figs. 1, 2, and 5.

In Figs. 5, 6, and 7 I have represented an enlarged view of the mechanism for laying and holding the upper and lower strands of the cord in a position for the knot-tyer to act upon. This mechanism consists of a shaft, 17′, suitably journaled and arranged in rear of the forward portion of the tyer, and at right angles thereto. One end (the inner) of this

shaft is provided with a disk having its periphery formed with fingers or curved projections 18, to catch and force down the cord that has passed over the forked arm 19. By grasping the strands of the cord in this manner I am enabled to force the cord into the slot 6′ of the tyer at a slight angle, and by the rotary motion of the tyer the strands of the cord are caused to be passed over and around the outer inclined portion, 20, of the horn, and as the tyer continues to rotate the strands of the cord are forced over the inner inclined portion, 21, of the horn, thence down the said incline and into the eye, and by the continuous rotary motion of the tyer the loop of the knot is thrown out of the slot, and the tension upon the cord draws the same into a knot, after which the cutter arranged in the eye of the horn severs the formed band from the supply-cord.

Rotary motion is imparted to the disk carrying the grasping-fingers by the cord-carrying arm or needle in its forward motion coming in contact with and acting upon the cup-shaped projections 22 on the periphery of the wheel 23, located on the other end of the shaft 17′, substantially as shown in Fig. 5 of the drawings. A ratchet-wheel and spring-dog may be attached to the side of this wheel 23 to limit the downward movement of the finger-wheel and dog it against a reverse movement, thus holding it normally in position with the strands of the cord ready to be operated upon by the rotary knot-tyer.

A starting-lever, 24, is pivoted to the arm 25 of the frame, and has a connection with the sliding shipping mechanism for engaging and disengaging from the driving-power the operative parts of the cord-carrying arm and endless sprocket-chains.

A series of fingers or curved arms are attached to the bar 28 of the harvester-frame in such a manner as to prevent the grain passing into the grain-receptacle from passing on and around the gearing located in rear thereof.

It will be observed from the foregoing description that a continuous rotary motion is imparted to the shaft carrying the knot-tyer, an intermittent motion to the shaft to which the cord-carrying arm or needle is attached; also an intermittent motion is imparted to the shaft for driving the grain-carrying sprocket-chains.

Operation: The machine being in operation the standing grain is reeled to the cutter-bar, which is operated in the usual manner through the agency of gearing, cranks, and pitman. The cut grain falls upon the platform over the endless chains in heaps in sufficient amount to form a sheaf. Then the driver operates the lever which throws into gear the clutch mechanism, thereby causing the segment-gear and the larger gear-wheel to turn and engage with their respective bevel pinions. The gear-wheel communicates a forward motion to the endless chains, thus carrying forward the fallen grain to a point directly over the curved cord-carrying arm and depositing a portion of the grain in the gavel-receptacle. By this time—that is to say, when the grain has reached the mouth of the grain-receptacle, which is on a horizontal plane with the grain-platform—the segment-gear brings the cord-carrying arm into operation and the under compressing-arms of the gavel-supporter, and causes the cord-carrying arm to advance through the rotation of its shaft, and the gavel-supporter to advance to meet the advancing cord-carrying arm through the instrumentality of the crank and pitmen. These movements of the cord-carrying arm and the gavel-supporter have the desired effect to force the remaining grain at the mouth of the platform into the grain-receptacle, and to compress and encircle the grain with the cord. The cord from the spool is first passed under and around the tension device, thence through the guide-loops and the eye of the cord-carrying arm or needle, thence across the space of the gavel-receptacle over the forked arm 19, thence under a finger of the feeding-wheel, and finally over the knotter, and is clamped in the cord-holding means. The cord-carrying or binder arm in its forward movement passes the cord around the bundle of grain in the gavel-receptacle, and the point of the arm comes in contact with one of the cup-shaped projections on the wheel, which causes the same to revolve a certain predetermined distance, and so causes the wheel on the opposite end of the shaft to revolve the same distance, in which movement the upper strand of the cord is grasped by one of its fingers or projections and forced downward in its movement, so as to bring it in contact with the lower strand of the cord. In the further downward movement of the wheel the strands of the cord are presented to the knot-tyer.

The process of tying the knot to complete the band and secure the sheaf is as follows: The cord is passed into the slot of the jaw, thence over the horn around the body of the tyer, thence over the other horn, thence down the incline over the snap-spring into the eye of the tyer, and by the rotary motion of the tyer the cord is thrown from the jaw and horns to complete the knot and severed from the supply by means of the cutter arranged in the aforesaid eye. Now, the cord of the bundle being relieved, the cord-carrying arm and the compressing-arm of the gavel-supporter are permitted to return to their respective positions, in the manner hereinbefore described, for the next operation.

The gearing is properly protected by means of hoods and shields.

I wish it distinctly understood that I reserve the right to vary the construction and arrangement of parts without departing from the spirit of my invention. Wire may also be used instead of the cord.

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

1. In a grain-binder, the combination, with a grain-platform provided with end sprocket-wheels mounted on shafts, of the endless sprocket-chains S, composed of a series of coupled links, each link *c'* of said series having its connecting division re-enforced and the other division thereof bent or turned upward to form fingers *d*, to catch and forward a heap of grain, and a gavel receptacle, composed of two parts, one of said parts having an oscillating movement for compressing the under side of the gavel, substantially as described.

2. In a grain-binder, the endless sprocket-chain S, composed of a series of coupled links, the links *c'* of said series having their connecting division re-enforced and the other division thereof bent or turned, substantially as shown, and for the purpose set forth.

3. In an automatic grain-binder, the combination of the operating-gearing having a continuous rotary motion for furnishing power, the bevel-gear I, with the clutch-face *a*, slotted sliding sleeve K, with clutch-face to engage with the clutch-face of the gear I, the mutilated gear L, the bevel-gear M, and the bevel-gears N N', arranged on the ends of the shafts P P', for operating the endless sprocket-chains, the binding-arms and the movable portion of the gavel-receptacle with the cranks 3 5 and connecting-rod 4, substantially as described.

4. The rotary knot-tyer, having the slot 6' and fixed transverse horn, provided with an eye, snap-spring, and cutter, substantially as described.

5. A removable knot-tyer, having screw-threads for the attachment to a rotary shaft, consisting of the tube 6 with the slot 6', the transverse horn provided with the snap-spring, eye, and cutter, substantially as described.

6. In an automatic grain-binder, the combination, with the knot-tyer having a rotary motion, of the binder-arm, forked arm 19, and disk with grasping-fingers 18, arranged in front of the knot-tyer, and the wheel 23, with projections 22 arranged in rear of said knot-tyer, said parts operating in the manner and for the purpose set forth.

7. In an automatic grain-binder, the combination, with the operating mechanism and the knot-tying means, of the binding-arm carrying the binding-cord, forked arm 19 to receive the cord, disk with fingers 18 to grasp and hold the cord in position for the tyer, the wheel 23, with projections 22, pawl, spring, and cord-clamping device, all arranged in the manner for operation as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM M. PIATT.

Witnesses:

J. M. YZNAGA,

D. D. KANE.