3 Sheets--Sheet 1.

J. F. GORDON.

Improvement in Harvesters.

No. 130,852. Patented Aug. 27, 1872.

Fig. 1

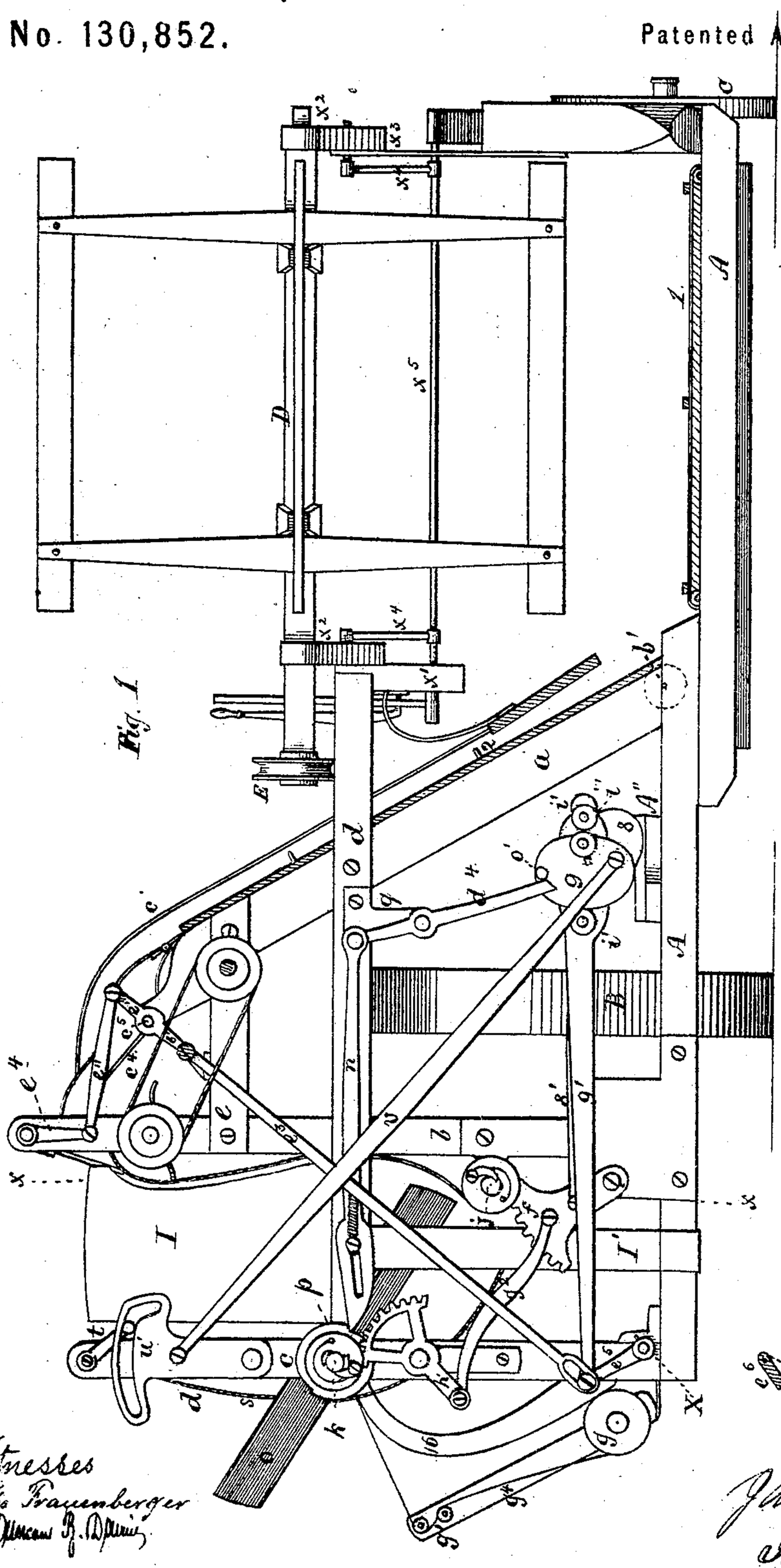
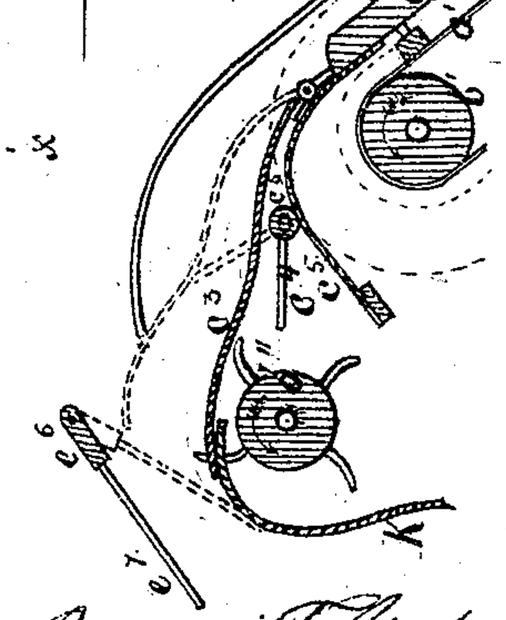


Fig. 2.



Witnesses
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J. F. GORDON.

Improvement in Harvesters.

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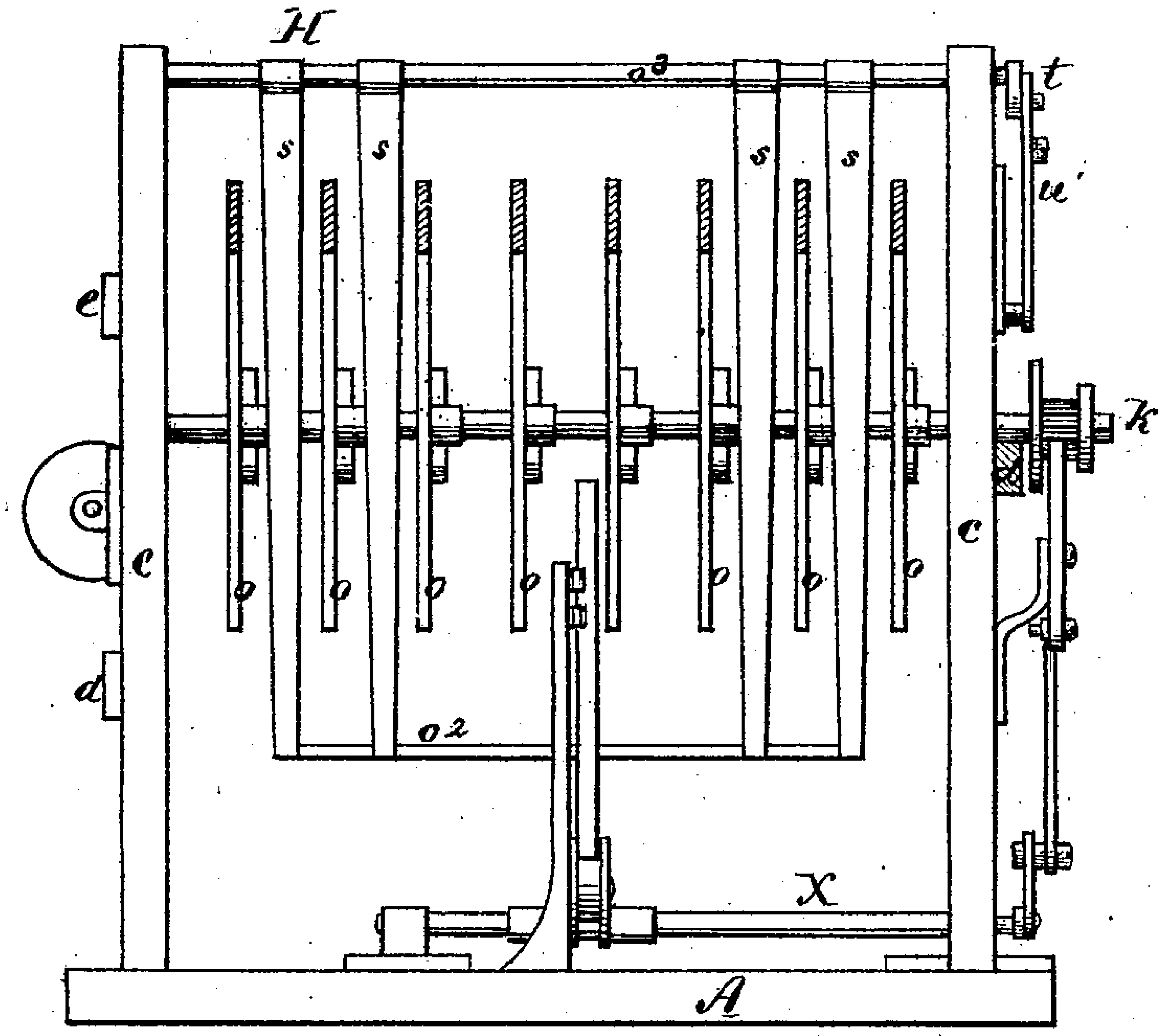
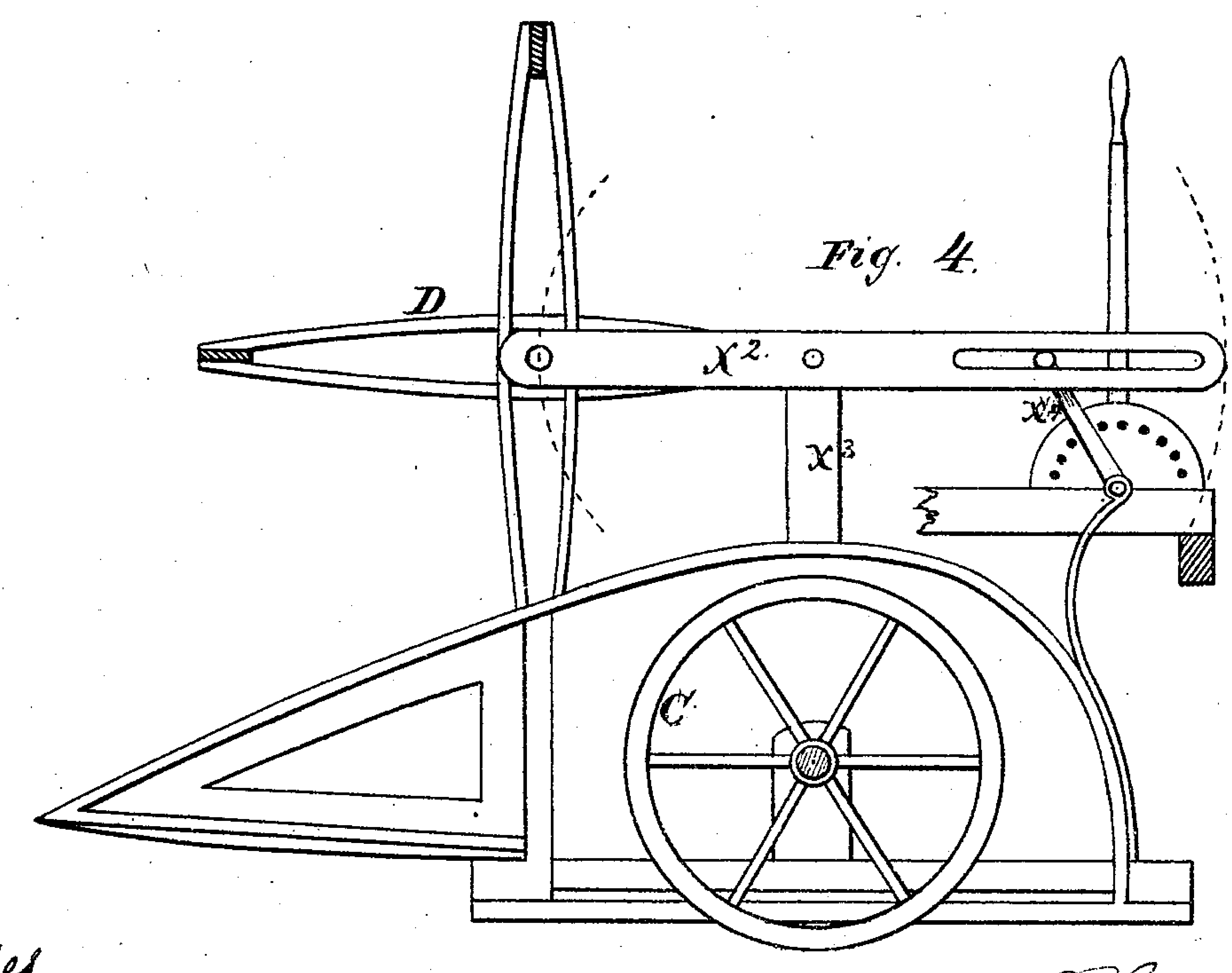


Fig. 3.

Fig. 4.



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AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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J. F. GORDON.

Improvement in Harvesters.

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Fig. 5.

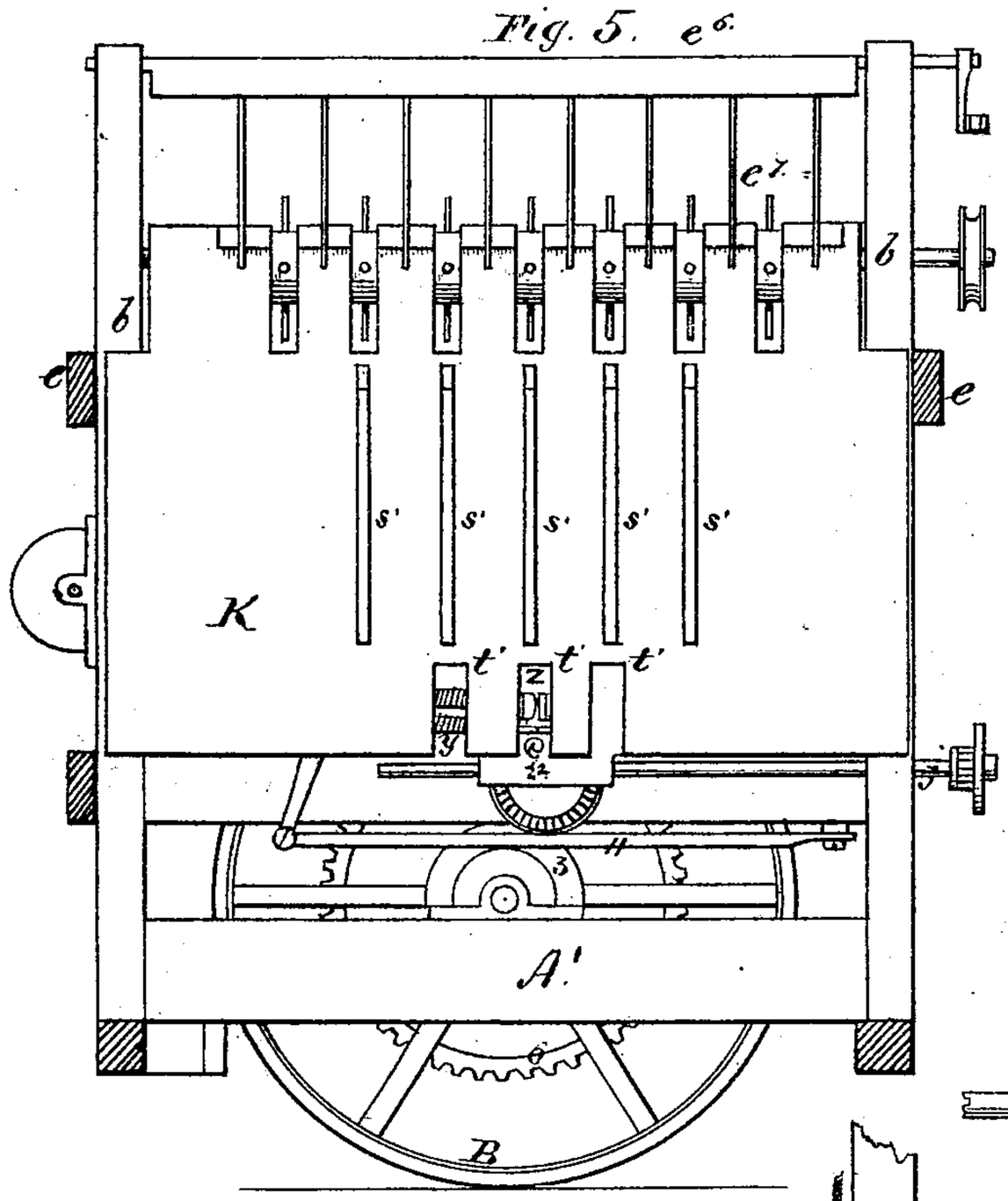
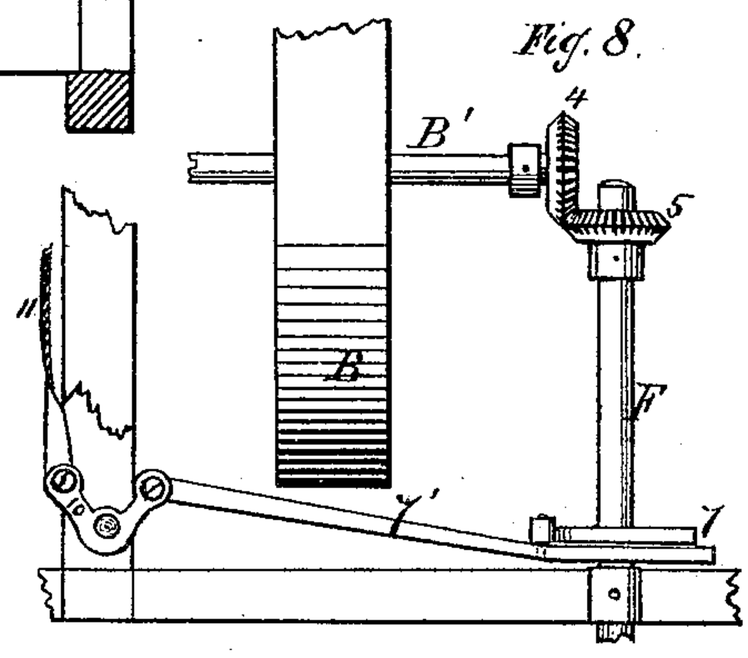


Fig. 8.



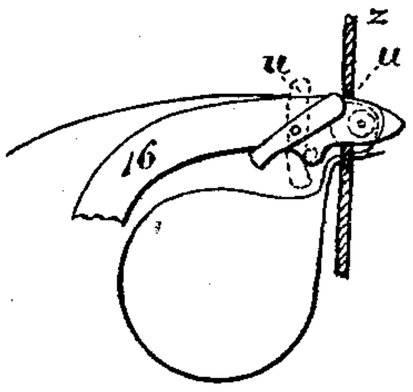
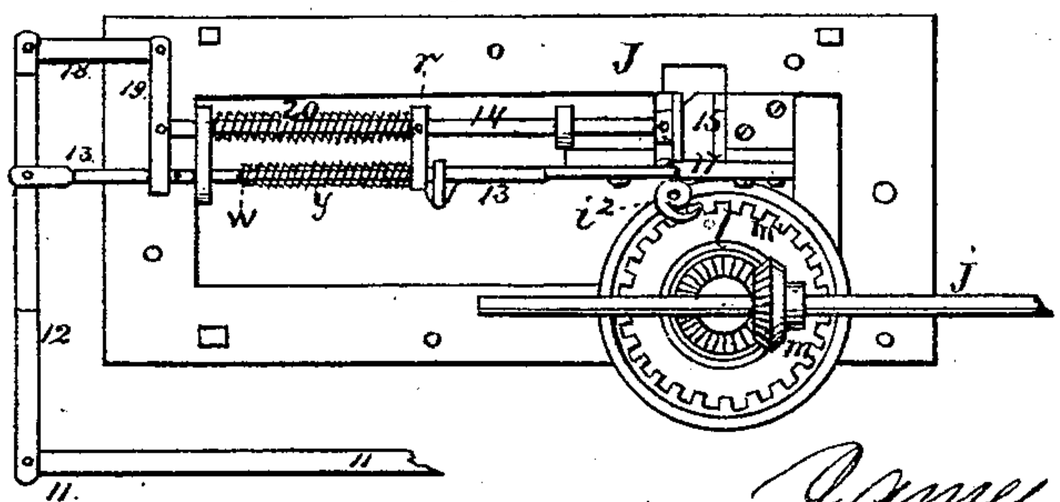


Fig. 9.

Fig. 6.



Witnesses
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James F. Gordon
Inventor

UNITED STATES PATENT OFFICE.

JAMES F. GORDON, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN HARVESTERS.

Specification forming part of Letters Patent No. **130,852**, dated August 27, 1872.

To all whom it may concern:

Be it known that I, JAMES F. GORDON, of the city of Rochester, in the county of Monroe and State of New York, have invented a new and useful Improvement in Harvesting-Machines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

Figure 1 represents a front elevation of my machine complete. Fig. 2 represents a vertical transverse section of the grain-dividing mechanism detached. Fig. 3 represents an elevation of the delivery side of the machine, including only the devices on the outer sill and two outer posts. Fig. 4 represents a side elevation of the grain side of the machine, including only such parts as are necessary to exhibit the reel and its connections. Fig. 5 represents a sectional view taken at the line *x x* of Fig. 1. Fig. 6 represents that portion of the binding mechanism employed for holding and twisting the binding-wire, which is in part shown in Fig. 5. Fig. 7 represents a sectional view of the gavel-adjuster and its actuating device detached. Fig. 8 represents a horizontal view or plan of the mechanism detached, by and through which motion is transmitted from the driving-wheel to the binding mechanism, which is represented in Fig. 6. Fig. 9 represents a side view of the end of the binding-arm with its yoke as it enters the aperture in the clamping-plate.

My present invention relates to certain improvements in the grain-binding harvesting-machine for which a patent was granted to me May 12, A. D. 1868; and my improvements consist in the construction, the arrangement, and the combination of the devices for acting upon the stalks of grain in their transmission to the binding mechanism and while being bound into sheaves, as hereinafter described.

That part of the machine provided with the reel and its bearings will be denominated the grain side, and that extremity furnished with the gaveling and binding devices the stubble side of the machine, when referred to in this specification.

The working mechanism is supported upon the base-frame A, which is rectangular, having three principal posts, *a b c*, in front and rear, which posts are connected together by suitable ties *d e* in front and rear; and ties A′ A″ support the base-frame centrally. This frame, with its mechanism, is carried upon the driving-wheel B and grain-wheel C. The driving-wheel B has its axle B′ journaled in suitable boxes secured to the ties A′ and A″, which connect with the front and rear sills of the frame A. The driving-wheel B is provided with a gear-wheel, 6, secured to its side, which meshes with a pinion on a short shaft journaled so as to stand parallel with the driving-wheel axle, and is furnished with a beveled gear-wheel working into a similar beveled gear-wheel on the inner end of a short counter-shaft carrying a pulley at the rear side of the machine. Through this connection of the driving-wheel with suitable sheaves and belts the grain-carriers 1 and 2, which convey the grain toward the binding mechanism, are propelled. The reel D is also revolved by a suitable arrangement of shafts, pulleys, and cords or belts, which connect the pulley E on the end of the reel-shaft with the pulley 3 on the driving-wheel axle. The end of the driving-wheel axle B′, that extends beyond its journal-box toward the grain side of the machine, is furnished with a bevel-gear, 4, which meshes with a similar bevel-gear, 5, upon the central shaft F, which has its bearings in boxes secured to the central tie A″. This shaft carries three cams for actuating the binding and dividing mechanism, which will now be described. Cams 7, 8, and 9 are secured rigidly to shaft F and revolve with it. Each one of these cams acts upon its respective slotted bar, denoted by the figures 7′ 8′ 9′. Each bar is made flat and provided with a longitudinal slot, through which the shaft F is inserted, and the two bars 8′ and 9′ are provided with friction-rolls i^1, between which the cams 8 and 9 work, and thus give longitudinal reciprocating motion to these bars. The slotted or forked connecting-bar 7′, acted upon by its rotary cam 7, (which also works against a friction-roll on this bar,) connects with the bent lever or bell-crank 10, pivoted to one of the frame-ties, which bell-crank is connected with the wire clamping and binding mechanism shown in Fig. 6, by means of rod 11 and lever 12. The spiral spring 20, employed in the clamping devices represented in Fig. 6, will, when

the point of the binding-arm 16 is withdrawn from between the upper jaws of the mechanism just named, force the jaws to close. The reciprocating slotted bar 8′ is pivoted to the hinged cogged sector *f*, which is in turn connected by the pivoted connecting-bar g^2 to the cogged sector *h*, which has its journal-pin connecting it to the front post *c* of the frame. Sector *f* is also connected to the frame by a pivot. These cogged sectors *f* and *h*, respectively, mesh with pinions upon the front ends of shafts *j* and *k*. The shaft *j* is that which actuates the wire-twisting hook through gearing *l m m′*, and the shaft *k* is that upon which the gaveler-arms *o o* are secured, the shaft *k* passing centrally through them so that they revolve with it, having an intermittent movement of half revolutions, as hereinafter described. The pinion on the end of shaft *j* is loosely journaled thereon, and is provided with a disk or flange which carries a spring-pawl working against a tooth formed upon the shaft, whereby the shaft may be revolved one revolution by its sector *f*, (when sector *f* moves outwardly,) and when this sector returns to its first position this pinion, into which it meshes, is moved around upon its shaft *j*, bringing its pawl in front of the teeth again, ready at the next outward movement of sector *f* to give the shaft *j* another revolution; and thus this shaft receives an intermittent rotary motion at the proper time to cause the wire-twisting hook i^2 to revolve with a like intermission of its movement. The loose pinion on the front end of shaft *k* (which with the arms *o* constitute the gaveler) operates to revolve the gaveler, and is provided with a spring-pawl which works against two detents upon said shaft, which, through the action of sector *h*, gives to this shaft half a revolution at each outward vibration of said sector. The gaveler thus has an intermission in its rotatious at each half revolution, while the loose pinion returns with its spring-pawl in front of the other detent on the shaft. The slotted and pointed bar *n* is connected, by a pivot at one end, with the pendent lever d^4, which has its fulcrum-pin on the hanger *q*. The lower end of lever d^4 is acted upon by a stud, o^1, on the cam 9 at each revolution of this cam; and bar *n* is supported against tie *d* by a screw which passes loosely through its slot and enters the tie. A spiral spring connecting bar *n* with its supporting screw will cause its pointed end to be held in contact with the circular flange or wheel *p*, secured upon shaft *k* directly behind its loose pinion, and as the wheel *p* is provided with two shoulders or projections upon its periphery, the pointed end of bar *n* will act as a stop to hold the shaft *k* with its arms *o* in a position to receive the grain to form a gavel, until the stud on cam 9 strikes the lower end of lever d^4 and withdraws the bar *n* from contact with wheel *p*. The two posts, *c*, in which shaft *k* is journaled, also support the gavel-cradle H, which consists of the journaled crank-bar o^3, the four curved slats *s*, and their connecting bottom slat o^2. The crank-pin on the crank at the front end of the journaled cradle-bar o^3 enters the cam-slot formed in the vibrating pivoted cam-sector *u′*, and through this connection the cradle H is caused to swing its curved slats at the proper time underneath the gaveler to receive the gavel when the gaveler makes a half revolution, and drops the gavel which had been lodged thereon by the carrying devices. The gavel remains upon the cradle while the binding mechanism binds it into a sheaf. The cam-sector *u′*, pivoted to post *c*, is also connected by a pivot with the bar *v*, which connects with a crank-pin on the outer face of cam 9, and receives its vibrating movements from this rotating cam. The cam-slot in sector *u′* is so formed as to act upon the crank *t* at the proper time to cause the cradle H to swing under the gaveler when the latter is making its half revolution, and to swing outwardly and drop the sheaf to the ground immediately after the binding is accomplished. The upright plate I, provided with a flexible standard, I^1, secured to the sill of the frame, is for the purpose of adjusting the gavel longitudinally upon the gaveler-arms *o;* and, for the purpose of giving to this adjusting-plate the proper vibrating motions to strike against the butts of the stalks a tappet-arm, I^2, is secured upon the inner side of bar 9′, as shown in Fig. 7, so as to act upon the flexible standard I^1, as the bar 9′ moves forward and back, as hereinbefore specified.

The mechanism I have devised for dividing off that portion of the stalks of grain which forms each gavel consists mainly of the devices represented in detached Fig. 2. In this figure *a′* denotes the upper portion of the elevating carrier of toothed slats secured to suitable endless belts passing around rollers *b′*. This carrier receives the grain from the platform-carrier 1 and carries it up between the inclined rods *c′* and the inclined slats *c″*, the teeth of which carrier project out between the slats *c″*, the rods *c′* serving to retain the stalks in a horizontal position while being elevated, and also bear them down upon the carrier-teeth. To the upper end of the inclined slats *c″* the curved metal slats c^3 are hinged, as represented in Fig. 2; but they may be made sufficiently flexible to perform their function without the hinge; and directly under each of these hinged slats c^3 an arm, c^4, extends (rearward in respect to the passage of the grain) from the shaft c^5, which is journaled at the front and rear of the machine in bearings at the upper end of the inclined posts *a*. The short double crank or lever *e′* on the end of shaft c^5, is connected by pivots with the connecting-bars *e″* e^3, the former being pivoted to the crank-arm e^4 and the latter to the crank-arm e^5. The crank e^4 is secured to the front end of rock-bar e^6, journaled in the posts *b* in front and rear of the machine. Rock-bar e^6 is provided with a series or row of teeth, e^7, and when the rock-bar e^6 is operated by the connecting devices simultaneously with the

shaft c^5, with its teeth c^4, the latter will elevate the hinged slats c^3 and the former teeth e^7 close down against apron K, thus stopping the passage of the grain to the gaveler, while the teeth of the continuously-revolving roller b'' sweep down any stalks of grain which may be detained by the teeth of the rock-bar e^6 upon the gaveler. The movements of these grain-dividing devices are derived through the reciprocating action of the bar 9^1 and the crank e^5, to which crank the lower end of connecting-rod e^3 is pivoted. The slot in the lower end of this rod, through which its pivot works, is sufficiently elongated to properly time the movements of these grain-separating devices to correspond with the interval of rest in the movement of the gaveler and binding-arm 16. The binding mechanism, represented in Fig. 6, and which is connected by rod 11 with the mechanism shown in Fig. 8, is fastened to a plate or frame, J, which is adjustably attached in an inclined position behind the ribbed apron K, between beams or ties which connect the posts *b b*. The three open slots *t*, in the bottom of the apron K, exhibit portions of this mechanism, and serve to admit the passage of the point of the binding-arm 16 between the upper pair of the jaws of this mechanism, when both the binding-arm and mechanism are adjusted accordingly. The mechanism consists of stationary jaws 15 and 17, against which movable jaws formed upon the ends of rods 13 and 14 work. The connecting-rod 11 is drawn forward by the action of cam 7 on shaft F, which thrusts outwardly bar 7′, which actuates the bell-crank 10, to which it and rod 11 are pivoted. The bell-crank is pivoted centrally to the frame. Rod 11 acts through its hinged connection upon lever 12, which has its fulcrum-pin at the end of rod 13, upon rod 14, to which it is connected by the intermediate levers 18 and 19. The action of cam 7 through the above-described connections withdraws the movable jaw on the inner end of rod 14 from stationary jaw 15, and holds the movable jaw on the inner end of rod 13 more firmly against fixed jaw 17, which latter pair of jaws clamp the end of the binding-wire. After the cam 7, in its revolution with shaft F, has released bar 7′, the end of the binding-arm 16 remains for a time between the upper pair of jaws, and, consequently, rod 13, with its jaw, being released by the lever 12, is withdrawn from stationary jaw 17 through the expanding action of spring *y*, which was contracted between collar-arm *r*, which is fastened to rod 14, and is provided with a hole through which rod 13 freely works, and the pin *w* in rod 13, between which spiral spring *y* is confined, and this movement throws back rods 11 and 7′ to their first position. It will now be seen that the opening of the upper jaws will, by the moving of arm *r*, contract the spiral spring *y* on rod 13, and when cam 7 releases bar 7′ the action of spiral spring *y* will cause the lower jaws to be thrown open (by withdrawing the movable jaw) also. But when the point of binding-arm 16 is withdrawn from between the upper jaws the spiral spring 20 expands again and suddenly closes both pairs of jaws, and the binding-wire, which is drawn by the twisting-hook i^2 between the lower jaws and below a short projecting tooth of the fixed jaw 17, will be caught between them and held until the next gavel is being bound by the twisting-hook. The arm 16 is provided with a friction-roller near its point, over which the binding-wire passes from the spool *g*, and tension-rollers g^1 on spool-arm g^4. Arm 16 is also provided with a wire-clamping yoke, *u*, pivoted astride the arm, with its two ends projecting on each side above the bar 16, and the binding-wire passes between them and over the said friction-roller. The object of this clamping-yoke *u* is to hold the two ends of the binding-wire which forms each band, when the twisting-hook comes into action, and when released from the lower jaws, between which the end of the wire was held. The two projecting ends of yoke *u* are brought against plate *z*, which is in front of the binding mechanism, and through a slot in which the end of the binding-arm enters when it passes its point between the upper jaws, which, at the time, are held apart; and when these projecting ends of the yoke strike against the plate *z* the yoke is thereby caused to turn upon its pivot, and clamps the wires between its lower suspended closed end and the plate *z*, just below the bottom of the slot in plate *z*. These movements of the binding-arm and wire-twisting hook are so timed in respect to each other and in respect to the operation of the clamping-jaws (shown in Fig. 6) that the lower jaws, which retain the end of the binding-wire after each gavel is bound, will be caused to come together at the proper time to grasp the end of the wire, after it is cut loose by the stationary knife, directly behind the wire-twisting hook, against which knife the wire is forced by the twisting-hook at the beginning of its revolution. As this part of the binding mechanism which cuts off and twists the bands is not essentially different from the devices for the same purpose used in my patented binding-machine before referred to, I do not deem it necessary to describe them more fully herein. The binding-arm 16 is secured upon shaft X, so as to be adjustable thereon, for the purpose of binding the stalks of grain centrally. The reciprocating motion of the binding-arm is produced by the operation of bar 9′, which is pivoted at its outer end to the crank-arm e^5, on the front end of the binding-arm shaft X.

Besides the vibrating plate I for evening the butts of the stalks and adjusting the gavel upon the gaveler, I have arranged a reel in the control of the driver, so that it may be caused, by the movement of a hand-lever, to carry the grain more or less rearward as it falls upon the platform-apron 1, thus governing the position in which the stalks shall be deposited in respect to the carriers and binding mechanism, and insuring the binding of the gavels centrally in respect to the length

of the sheaf. The reel is suspended in bearings at the front ends of horizontal supports X^2, which are centrally pivoted to the two short posts X^3. Slots are made horizontally through the rear ends of the reel-supports, in which two crank-pins work to adjust the reel. These crank-pins project laterally from crank-arms X^4 upon shaft X^5, which shaft is provided with a hand-lever, by which the driver may at all times vary the position of the reel in relation to the carrier 1, and thus cause the grain to be deposited upon it in the desired position whatever the length of the stalks may be. It will be understood that the binding mechanism and binder may be adjusted laterally to bind the gavels centrally, and that the vibrating plate I as well as the reel may be used to accomplish the same result substantially. It is evident that the oscillating plate I may be so connected by cords and sheaves with a lever or treadle in reach of the driver, that it may be entirely under his control to adjust the gavel. The cradle H is so constructed that the gaveler-arms *o* can revolve between the slats *s s* without coming in contact therewith. The object in making the gaveler-arms *o* wide, as represented in Fig. 1, is to provide an open space below the shaft when the gaveler is either side uppermost, through which the end of the binding-arm 16 may move back and forth, and carry its binding-wire without becoming entangled with the grain upon either the cradle H or the gaveler. Equivalent mechanical devices for elevating the hinged or flexible slats c^3, by which the grain is elevated out of reach of the carrier-teeth, and the teeth of roller b'' may be readily applied, as it is evident that a rock-bar with a longitudinal flange would effect this purpose. The ribs s' upon the front of the apron K, serve to secure an open space between them and next to the apron for the ends of the gaveler to revolve in, and insure all the stalks of grain to be carried down upon the cradle by the semi-rotations of the gaveler. By reference to Fig. 9 it will be seen that the wire (the end of which is held between the lower jaws and in position to receive the gavel when discharged upon the cradle by the gaveler) will be carried by the end of the binding-arm 16 over the gavel, while it is held by the gaveler-arms *o* to the entrance of the jaws, when the twisting-hook catches both it and the end which was retained by the lower jaws. It should not be omitted to state that I purpose using a clutch in connection with shaft F and gear-wheel 5. Instead of the cogged sectors *h* and *f*, an endless chain could be applied to effect the same purpose. The tappet I^2 may be adjusted on bar 9′ to regulate the extent of movement of plate I, by means of the slot and screw by which it is attached.

Having described the construction and operation of my improved harvester, I claim, and desire to secure by Letters Patent, as my invention—

1. The wire-clamping mechanism, consisting of the fixed and movable jaws, in combination with the binding-arm 16, and their actuating devices, substantially as described.

2. The intermittently-rotating gaveler O, constructed as shown and described, in combination with the automatically-oscillating cradle H, binding arm 16, and binding-wire, all the parts being operated as set forth, for the purposes specified.

3. The gaveler-arms, extending laterally on each side of their shaft, of sufficient width to form an unobstructed space for the passage of the binding-arm, substantially as described.

4. The combination of the binding-arm 16 and yoke *u* with the plate *z* or its equivalent, substantially as described.

5. The combination of the oscillating plate I and an adjustable tappet for determining the longitudinal position of the gavel, substantially as described.

6. The combination of the gaveler-arms *o* with the ribs s' on the apron K, substantially in the manner and for the purpose described.

7. The grain-dividing mechanism in combination with the grain-carriers, by which the grain is carried out of contact with the carriers and their traveling or rotating teeth while a gavel is being removed, substantially as described.

8. The combination of the flexible slats c^3 with the rock-bar teeth e^7 to aid in the separation of the grain, substantially as described.

9. The combination of the rock-shaft e^6 with shaft c^5, and their connections with the reciprocating bar 9′, operating conjointly, as described.

In testimony whereof I have hereunto set my hand this 25th day of December, A. D. 1871.

JAMES F. GORDON.

Witnesses:

H. R. K. PECK,

D. B. DOWNIE.