(Model.)

3 Sheets—Sheet 1.

J. E. BUXTON.

GRAIN BINDER.

No. 377,062. Patented Jan. 31, 1888.

FIG. 1.

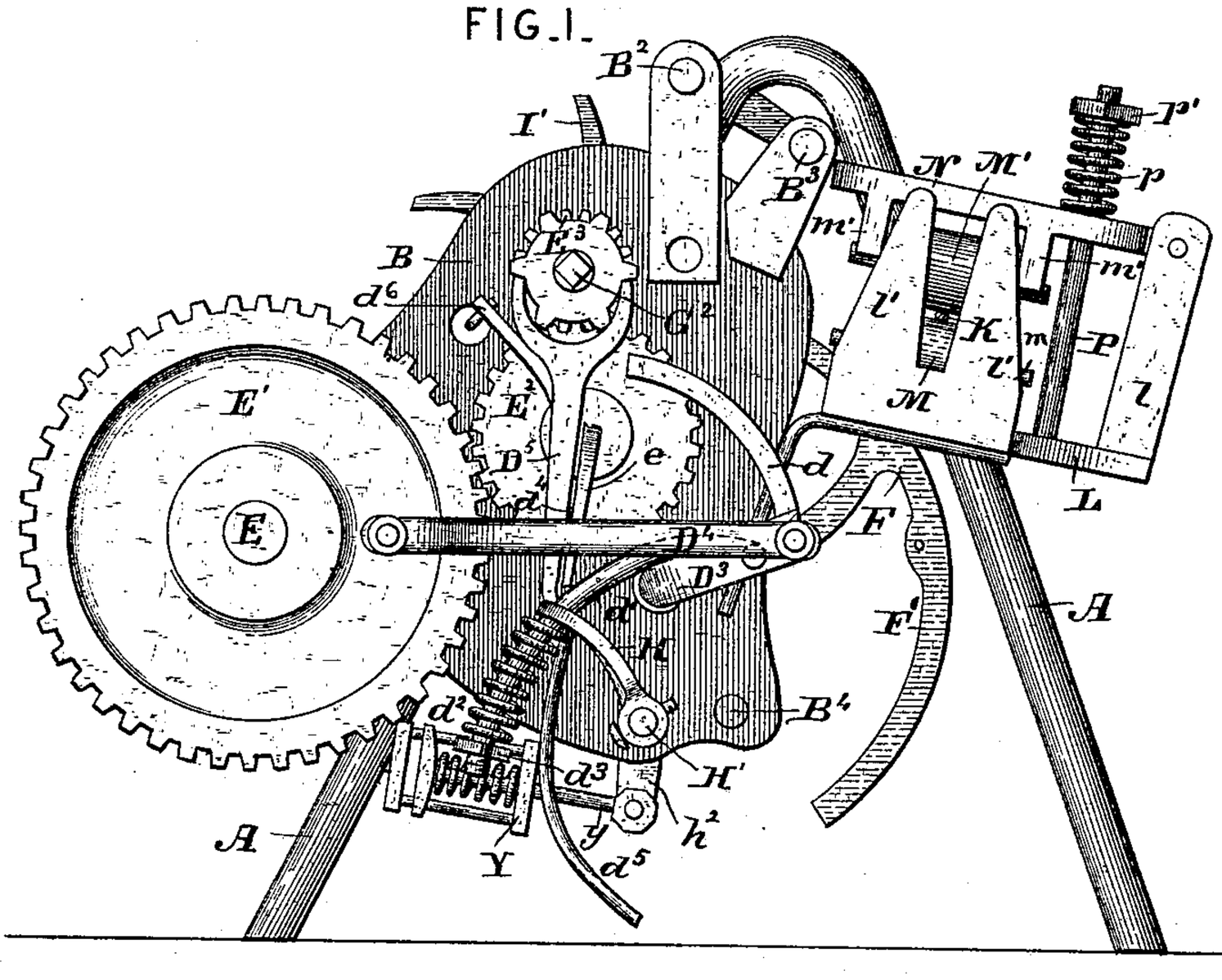
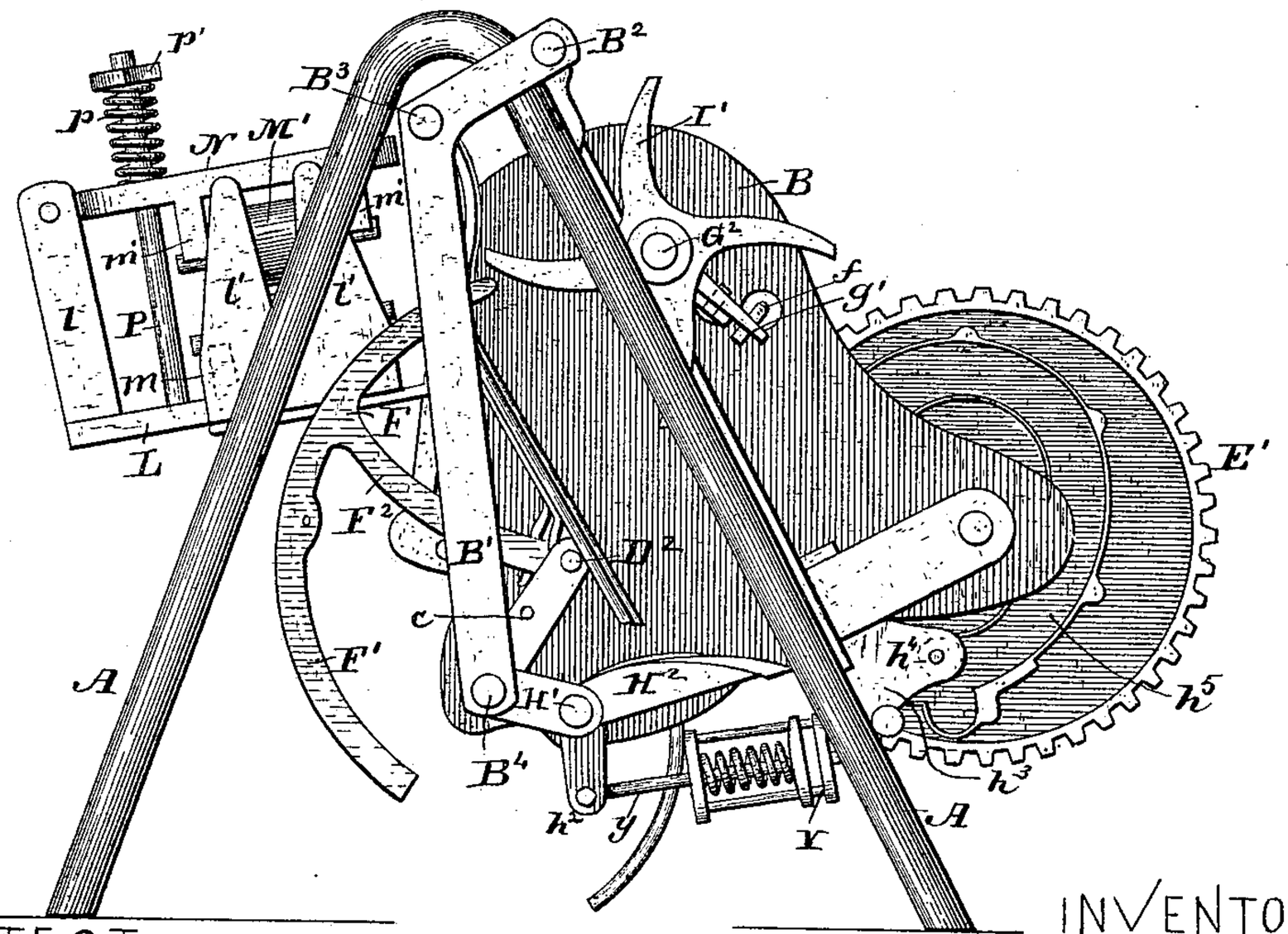


FIG. 2.



ATTEST.
J. Henry Kaiser.
Harry L. Amer,

INVENTOR.
John E. Buxton
by Deane
his attorney

(Model.)

3 Sheets—Sheet 2.

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FIG. 3.

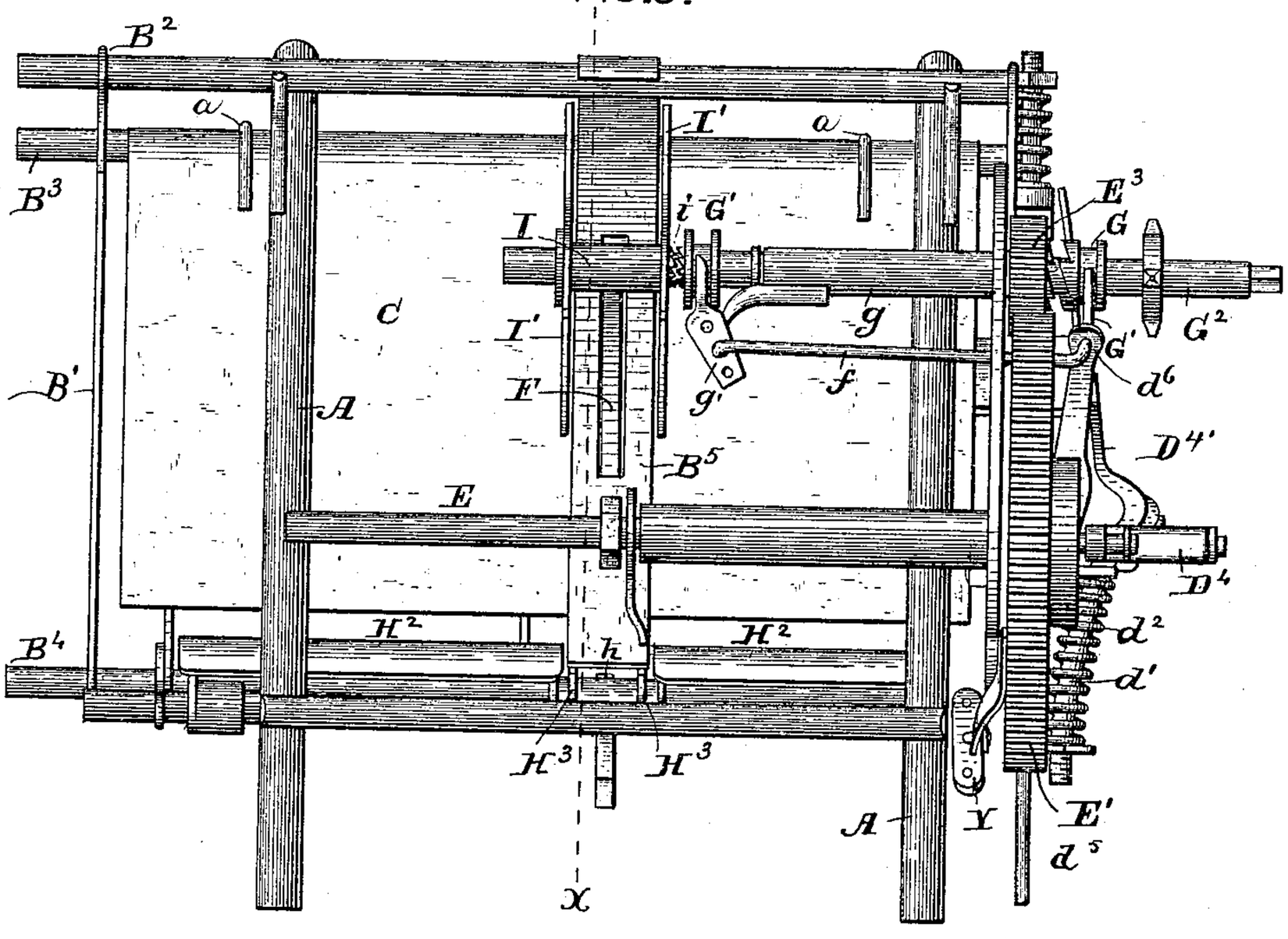

FIG. 4.

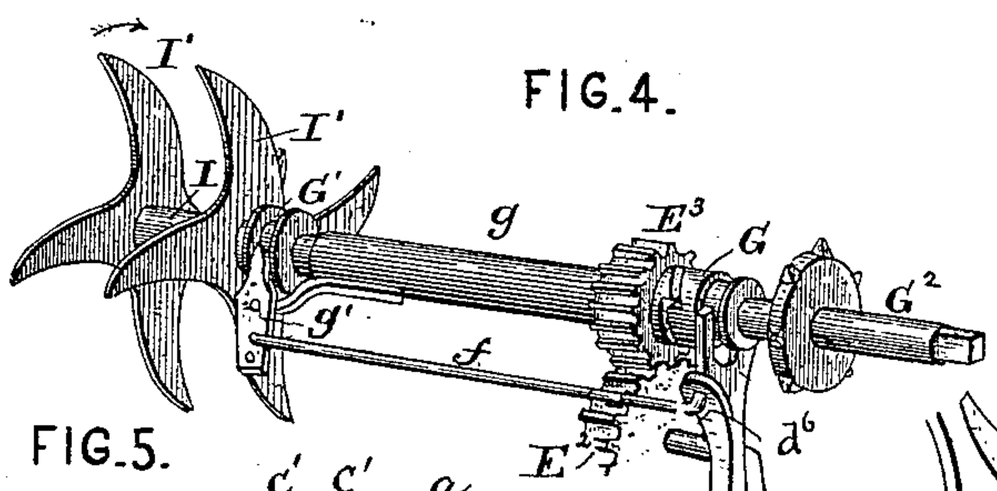

FIG. 5.

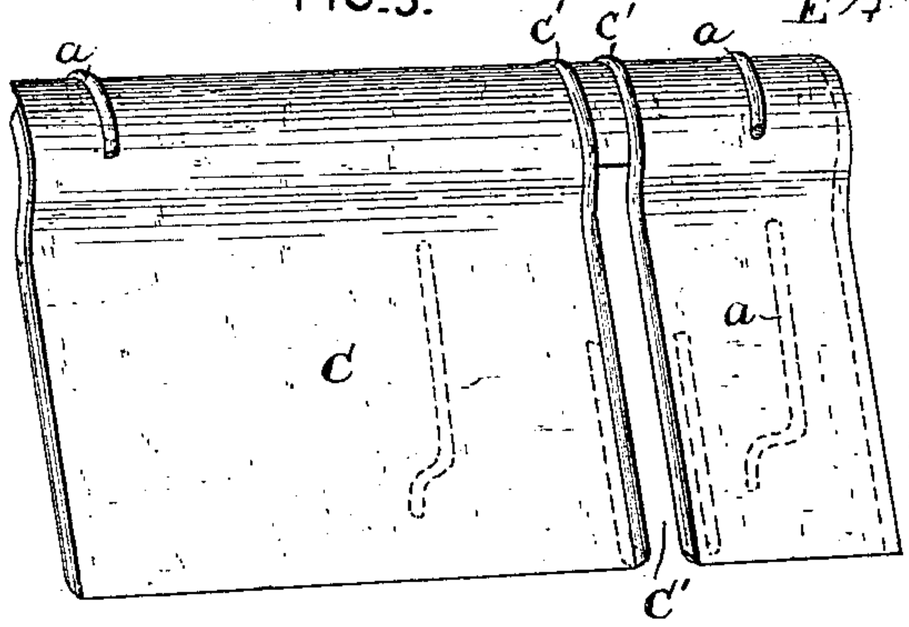

FIG. 6.

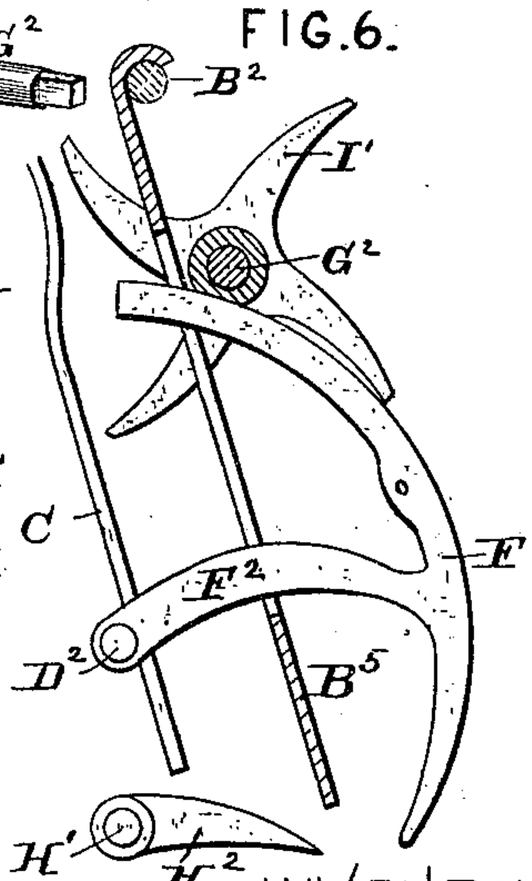

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FIG. 7.

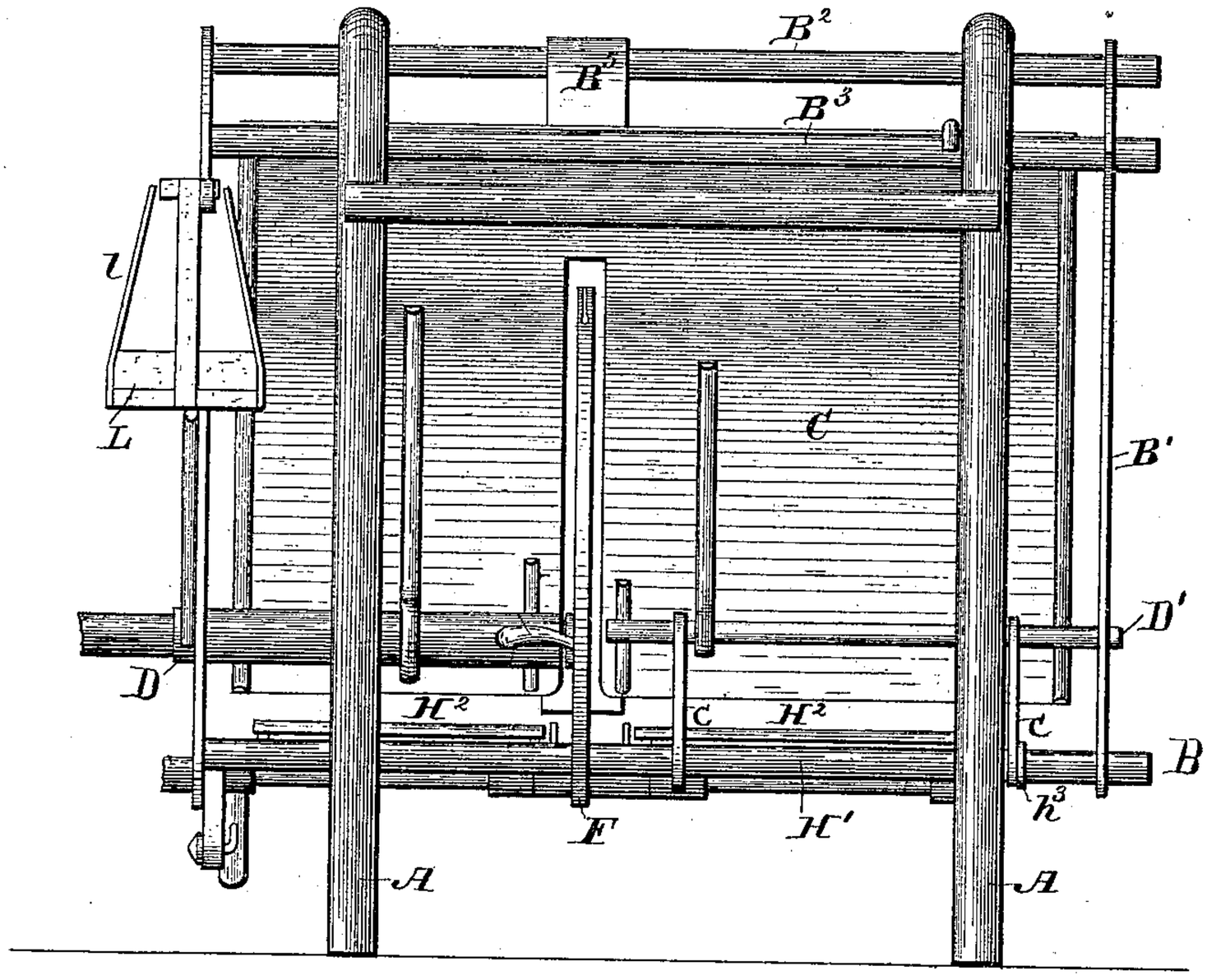
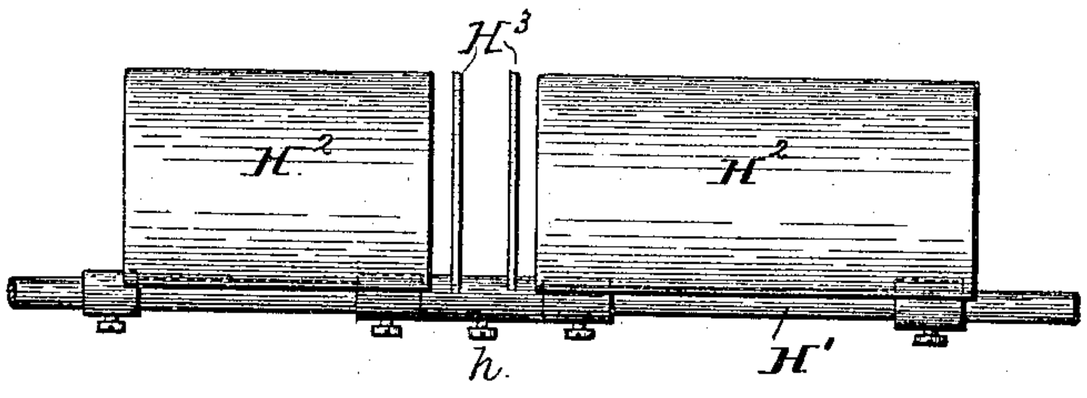


FIG. 8.



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INVENTOR-
John E. Buxton
by L. Deane
his Attorney.

UNITED STATES PATENT OFFICE.

JOHN E. BUXTON, OF OWATONNA, MINNESOTA.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 377,062, dated January 31, 1888.

Application filed April 25, 1885. Serial No. 163,378. (Model.)

To all whom it may concern:

Be it known that I, JOHN E. BUXTON, a citizen of the United States, residing at Owatonna, in the county of Steele and State of Minnesota, have invented certain new and useful Improvements in Grain-Binders, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is an elevation of one end of my improved grain-binder mounted in a frame. Fig. 2 is an elevation of the opposite end of the binder. Fig. 3 is a plan view. Fig. 4 is a detail of the clutching mechanism. Fig. 5 is a plan view of the binder-table. Fig. 6 is a cross-section on the line *x x*, Fig. 3. Fig. 7 is an elevation from the grain side of the machine. Fig. 8 is a detail showing the tripping-fingers and shields adjustable on their shaft.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to certain novel improvements in mechanism for binding grain wherein a curved vertically-vibrating cord-carrying needle is employed, in combination with compressing devices, a curved binding-table, movable shields or grain supports at the lower end of the latter, tripping-fingers, and a tension device for the binding-cord, said devices being actuated automatically, and adapted for application to well-known harvesting-machines.

The following description, when taken in connection with the annexed drawings and claims, will enable others skilled in the art to fully understand my invention.

Before describing my invention, I will state that I do not show a knotter for the binding-cord, as any suitable well-known knotter may be employed.

A designates a triangular frame, which is to be suitably secured to a harvesting-machine, and which is adapted for supporting the gathering and compressing devices.

B designates a vertical plate at one end of the machine; B′, a vertical standard at the opposite end of the machine, and B^2 B^3 B^4 are horizontal cross-bars rigidly connecting said end plate and standard together at a suitable distance apart.

C designates the binding-table, which is sustained in a fixed position by means of hooks *a*, sustained on the cross-bar B^3, a rock or needle shaft bearing, D, and a bar, D′, which is on the upper ends of arms *c*, fixed to the rigid cross-bar B^4. This table C is suitably strengthened at its ends, and it has a slot, C′, on each side of which, in front, are re-enforcing ribs *c′ c′*, the chief object of which is to diminish the bearing or impingement of the grain on the surface of the said table, and thereby greatly reduce friction and allow the grain to fall into its binding-receptacle freely. The upper part of the table C is curved, as shown in Fig. 5, and below this curve the said table is inclined. Directly over the slot C′ is an inclined slotted breast-plate, B^5, between which and the table C a space of sufficient size is left for receiving the bunches of grain to be bound. The upper end of this slotted breast-plate B^5 is rigidly secured to the cross-bar B^2, and at the lower end has a standard secured to it, through which the shaft E of a large spur-wheel, E′, passes, which shaft has its bearing in the end plate, B, and in a long tubular bearing secured to the latter.

F designates the cord-carrying needle, which, with its rear guard-extension, F′, forms an arc that is concentric to its rock-shaft D^2, and which is rigidly connected thereto by means of a curved grain-compressing arm, F^2. This needle and its arm vibrates in the plane of and through the slots made through the table C and breast-plate B^5, and it is suitably perforated for receiving and carrying the binding-cord. On the outer end of the rock-shaft D^2 is keyed a crank-arm, D^3, which receives motion from the spur-wheel E′ by means of a connecting-rod, D^4. To the said crank-arm D^3 a curved cam or thrusting arm, *d*, is rigidly secured and a curved arm, *d′*, is pivoted, the latter carrying a helical spring, d^2, and an adjusting-nut, d^3, for regulating the tension of said spring. The curved cam or thrusting-arm *d* is for the purpose of actuating two clutches, G G′, as will be hereinafter explained.

D^5 designates a bifurcated clutch-lever, which has its fulcrum at d^4 in the depending end of the fixed shaft *e* of a spur-wheel, E^2, which engages with the large spur-wheel E′, and also with a pinion, E^3, on a driving-shaft, G^2, supported by the end plate, B, and a long tubular bearing, *g*, thereof. The lower end of the lever D^5 is provided with a curved cam-ex-

tension, d^5, which passes freely through a hole in an offset of the flattened crank-arm H of an oscillating shaft, H′, and the upper bifurcated end of said lever D^5 embraces the slotted endwise-movable portion of the clutch G on shaft G^2. This endwise-movable portion of the clutch G is feathered on its shaft, and is adapted to engage with the toothed hub of the pinion E^3, which is loose on the shaft G^2, except when engaged with it by the clutch G. The curved thrusting-cam d at certain times presses on the lever D^5 and engages the pinion E^3, with its shaft G^2, transmitting rotation through the intermediate gear-wheel, E^2, to the large wheel E′. When the crank-arm H of shaft H′ is returned to its normal position after being depressed, as will be hereinafter explained, it acts on the curved or cam extension of lever D^5 and disengages the pinion E^3 from the shaft G^2 and stops the rotation of the gear-wheels.

Near the upper bifurcated end of clutch-lever D^5 is an offset, d^6, which is adjustably connected, by a rod, f, to a short bifurcated clutch-lever, g', which is pivoted to an extension of the inner end of the tubular bearing g, and which engages with the feathered endwise-movable portion of the clutch G′ on the shaft G^2. This endwise-movable portion of the clutch G′ is engaged at proper times with the toothed end of the tubular hub I of curved arms I′, which constitute a rotary grain-packer. The hub I of the packer I′ is free to turn on its shaft G^2 when not engaged with the feathered portion of the clutch G′.

It will thus be seen that the two clutches G G′ are connected together in such manner that when the clutch G′ is engaged with the hub of the packers I the clutch G is disengaged from the pinion E^3, and the movement of the needle ceases with its point back of the slotted table C. After a bundle has been collected, the clutch G is automatically engaged with the pinion E^3, and at the same time the clutch G′ is disengaged from the packer and the latter ceases to rotate while the bundle is bound, and then the operation is repeated.

On the oscillating shaft H′ are adjustably secured, by means of set-screws h h, two slightly-curved shields or stops, H^2 H^2, which are located below the bottom edge of the deck C and extend up across the grain-passage far enough to prevent the grain from falling out before it is bound. Between these shields H^2 H^2, and loosely applied on the shaft H′, are two curved tripping-fingers, H^3 H^3, fastened to their shaft by a set-screw, h, for the purpose of adjusting the fingers for bundles of different sizes.

For the purpose of giving the intermittent dropping motion to the shields at proper times for discharging the bundles, I fix rigidly to the shaft H′ an arm, h^2, and connect this arm with a three-cornered lever, h^3, by means of a spring connecting-rod, y, in the frame Y. One arm of said lever h^3 is pivoted to the rigid side plate or frame of the device, and at h^4 is an anti-friction roller, which is adapted to a cam-shaped groove, h^5, in the inner side of the large spur-wheel. This cam-groove h^5 is so shaped that it causes the shields and fingers to drop at proper times for discharging the grain when bound, after which the said cam lifts the shields and fingers and retains them in an elevated position under spring tension during the process of gathering a sufficient quantity of grain to form a bundle.

It will be observed that the cam in the wheel is so formed that when the pressure against the trip-fingers attains a predetermined point, and the machine is thrown into gear and the needle-arm starts forward, it now moves upward against the bundle (compresses it) until the needle-arm brings the cord over into a knotting device. (Not shown in the drawings.) After the knot is formed, and during the recession of the needle-arm, the shields and trip-fingers drop and allow the bundle to freely drop. While the needle-arm continues to recede the said trip-fingers and shields are returned to their starting-point. The spring-actuated rod y, above described, is for the purpose of compensating for undue strain on the tripping-fingers.

I will now describe the device for giving the proper tension to the binding-cord K. This device consists of a bracket, L, which is rigidly secured to the end plate, B, and provided with a fixed standard, l, and two vertical bifurcated plates, l' l', secured rigidly to the sides of the bracket L.

M M′ are two rollers, between which the cord K is drawn on its way to the needle F. The roller M is journaled in two half-bearings, m m, fixed on the bracket L, and the roller M′ is journaled in two corresponding bearings, m' m', fixed to the bottom of a pressure-bar, N, which is pivoted at one end to the standard l. Thus the rollers in their normal position are parallel with each other; but in the operation of the machine, when separated by the passage of the binding-cord between them, the upper roller is slightly inclined toward the lower.

P designates a rod, which is rigidly fixed to the bracket L, and which extends freely through the pressure-bar N, and is provided with a tension coiled spring, p, and an adjusting-nut, p'. It is obvious that the tension on the binding-cord can be regulated as desired by simply adjusting the nut p', and that the spring p will at all times yield and allow the roll M′ to accommodate itself to inequalities in the binding-cord.

It will be observed that when the desired quantity of grain to form a bundle has been packed into the grain-receptable by the packer-arms the pressure against the tripping-arms will depress the crank-arm H upon the spring d^2, the tension of which latter is adjustable for different pressures of grain, as described. The grain, pressing against the trip-fingers, forces these back, and with them the cranks fixed rigidly to their shaft. This, acting on the curved rod d' through the spring, draws the crank on the needle-shaft forward, and with it

the curved arm *d*, which throws the binder into and the packers out of gear. The needle and the packer-arms are thus actuated alternately and automatically, as above fully explained.

Having thus described my invention, what I claim is—

1. In a grain-binder, the main driving-shaft carrying loosely the rotating packers and a loose pinion in gear with the binder-train, both packers and pinion provided with clutches coupled by a rod, *f*, the clutch-lever D^5, pivoted to the frame and having a cam-extension, d^5, the thrusting-cam *d*, the crank-arm H and shaft H′, the needle-shaft crank, the rod *d′*, and spring d^2, connecting the thrust-cam and arm H, all combined and operating as described.

2. In a grain-binder, the main driving-shaft having thereon the packers, the crank-arm on the needle-arm shaft, carrying a curved bar or thrusting-cam, the clutch-lever D^5, having offset d^6, the adjustable coupling-rod *f*, and short clutch-lever *g′*, and the clutches G and G′, substantially as described.

3. The combination of the main driving-shaft, the packers, the clutches G and G′, the clutch-lever D^5, having offset d^6, the short lever *g′*, and the rod *f*, connecting offset d^6 and lever *g′*, the thrust lever or cam *d*, the crank on the needle-arm shaft, and the train of gear-wheels, substantially as shown and described.

4. The combination of the intermittent rotary packers, the oscillating needle, the crank-arm on the needle-shaft, the thrust-cam connected therewith, the curved arm secured to the crank-arm on the needle-arm shaft, the spring on said arm, the clutch-lever D^5, its extension d^5, the gate or shield H^2, their shaft, and the crank-arm H on said shaft, all as shown and described.

5. In a grain-binder, a tension-supporting bracket having an upper and an under roller, each journaled in half-bearings, the bearings for the lower roller fixed and those for the upper attached to a spring-actuated arm pivoted at one end to said bracket, said arm being parallel to the upper roller, substantially as and for the purposes set forth, whereby said rollers in their normal condition are parallel to each other, and when moved apart the upper is inclined with respect to the lower.

6. The shaft H′, carrying the shields H^2 and having near its end the arm h^2 and at its end the crank-arm H, the curved arm *d′* on the needle-shaft, the springs d^2, the spring connecting-rod *y*, the tripping-fingers, the lever D^5, having arm d^5, and its clutch-connections with shaft G^2, all combined in the manner described.

7. In a grain-binder, the combination of the following parts, viz: the main driving-shaft, the packers thereon, and the loose pinion engaging with the binder-operating train, the clutches connecting said packers and pinion to their driving-shaft, the clutch-lever D^5, its extension d^5, the needle-arm, and the thrusting-cam *d*, the shields H^2, their shaft H′, having arms h^2 and H, the arm *d′*, provided with the spring d^2, the spring connecting-rod Y, and the three-armed lever operated by the knotter driving-wheel.

8. In combination with a grain-binder, the bracket L, having the bifurcated side plates, *l′ l′*, the fixed half-bearings *m*, the spring-actuated bar N, pivoted at one end to the bracket and having on its under side the half-bearings *m′*, and the rollers M M′, the upper one journaled in said bearings *m′* and lengthwise of the bar N, substantially as and for the purposes set forth.

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

JOHN E. BUXTON.

Witnesses:
C. L. JONES,
H. C. YARCHOW.