4 Sheets—Sheet 1.

E. S. FROST.

GRAIN BINDING ATTACHMENT FOR REAPERS.

No. 263,160. Patented Aug. 22, 1882.

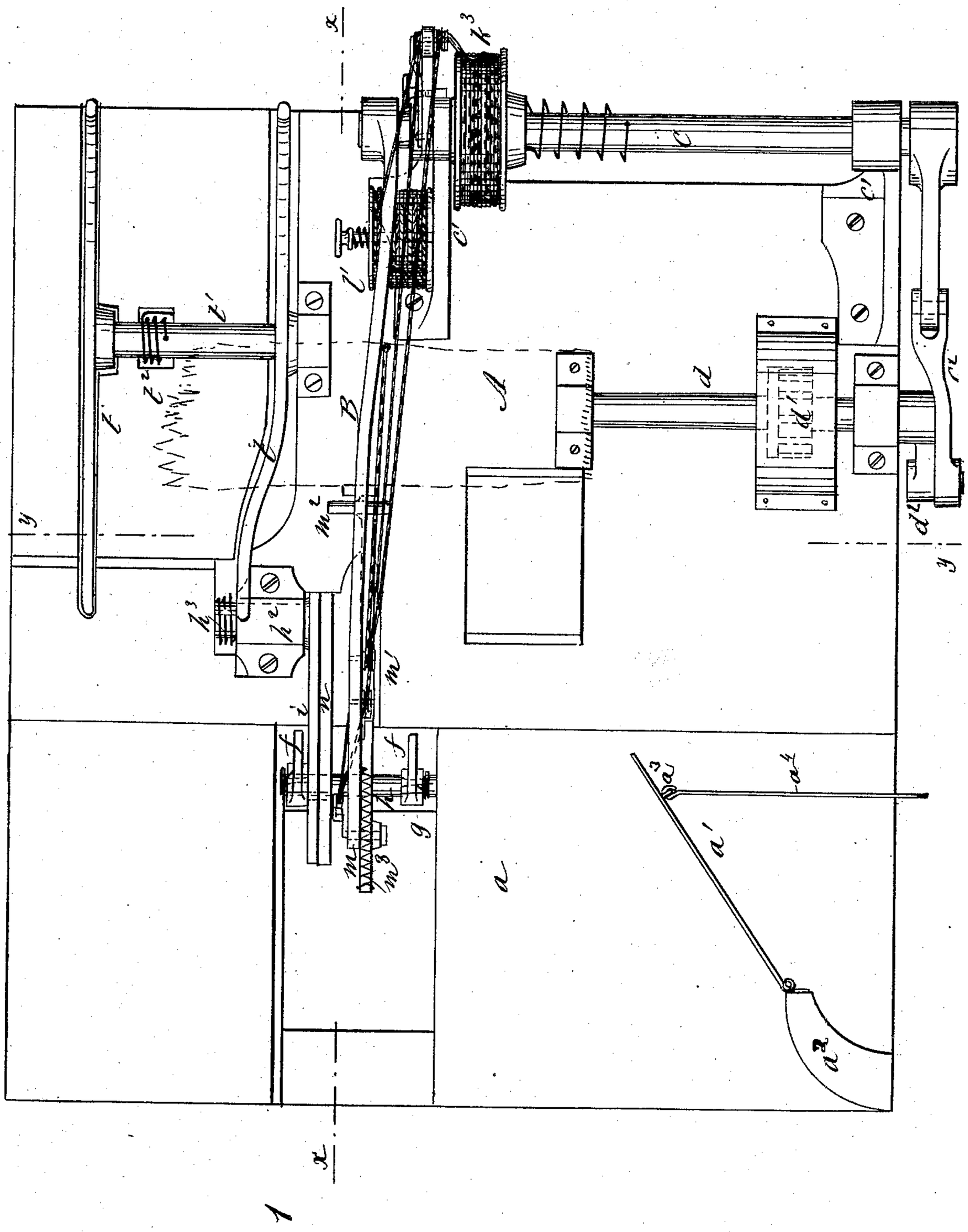

Fig. 1.

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Fig. 2.

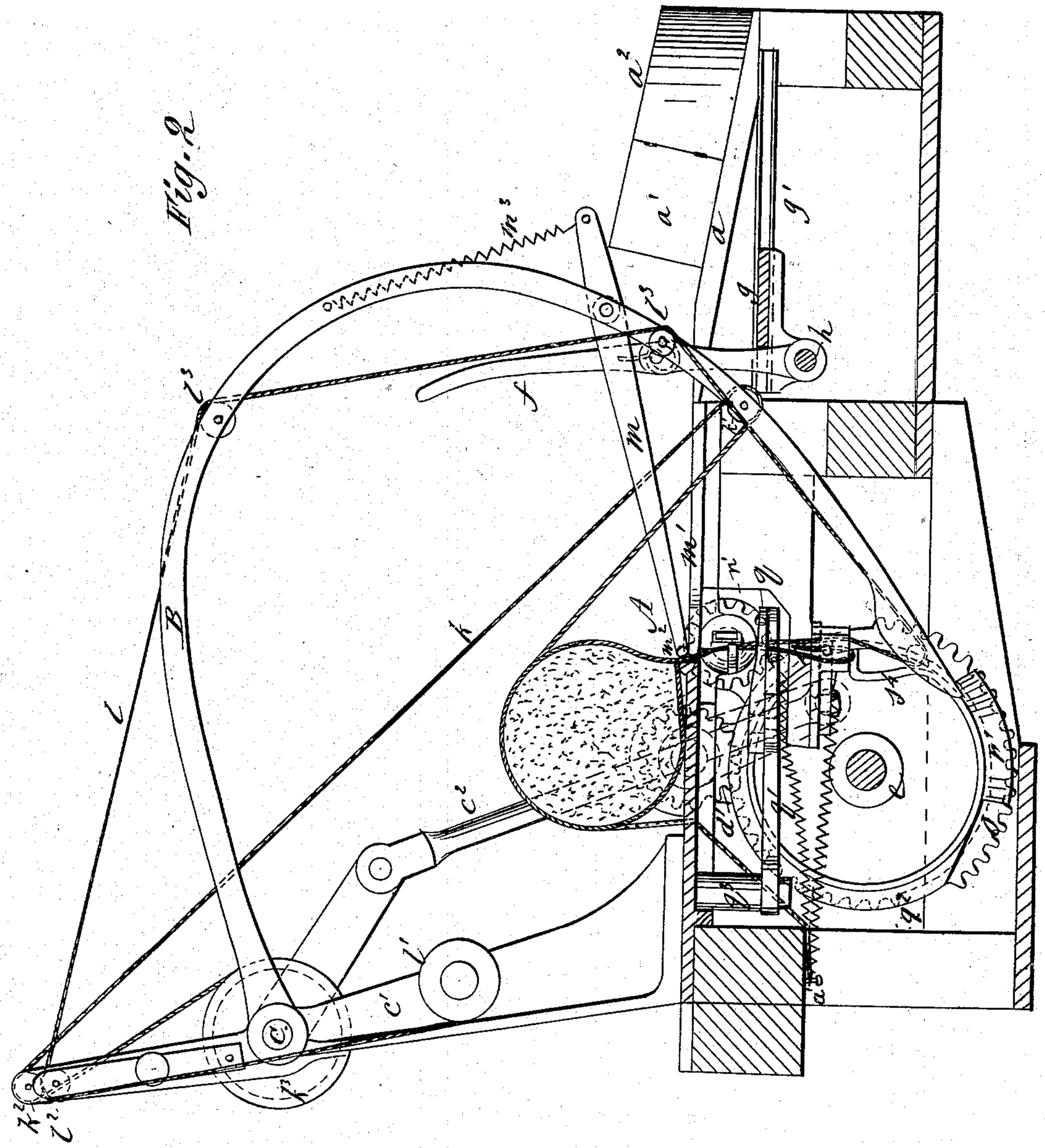

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Fig. 5

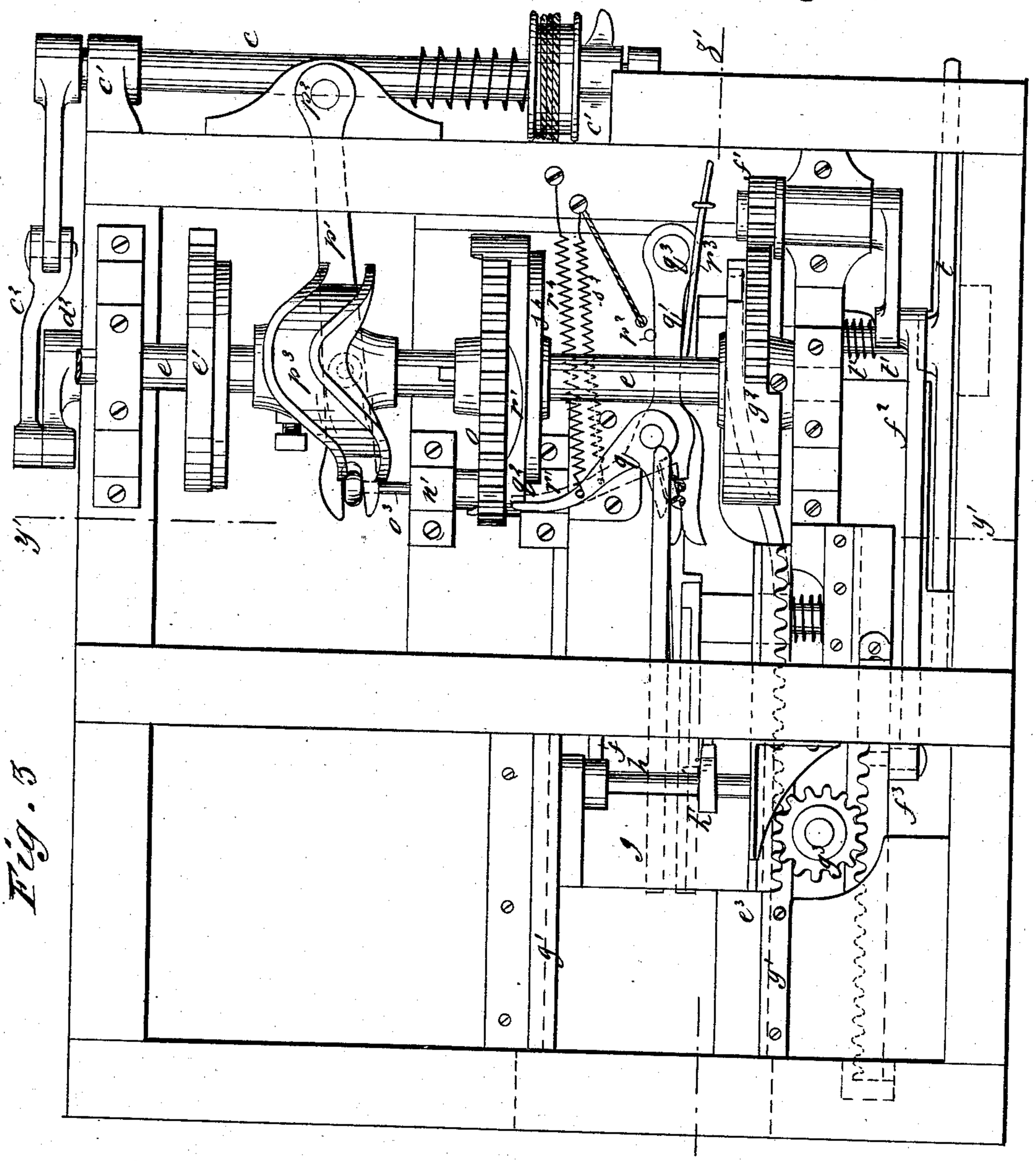

Fig. 6

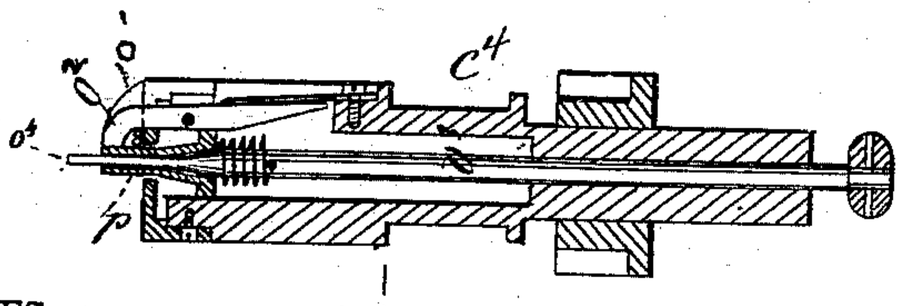

Fig. 7

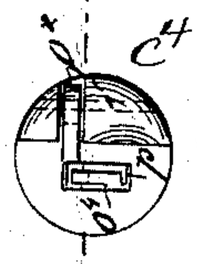

Fig. 8

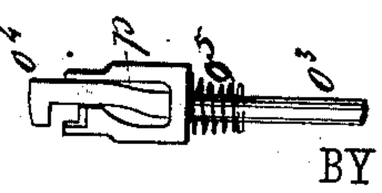

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Fig. 5.

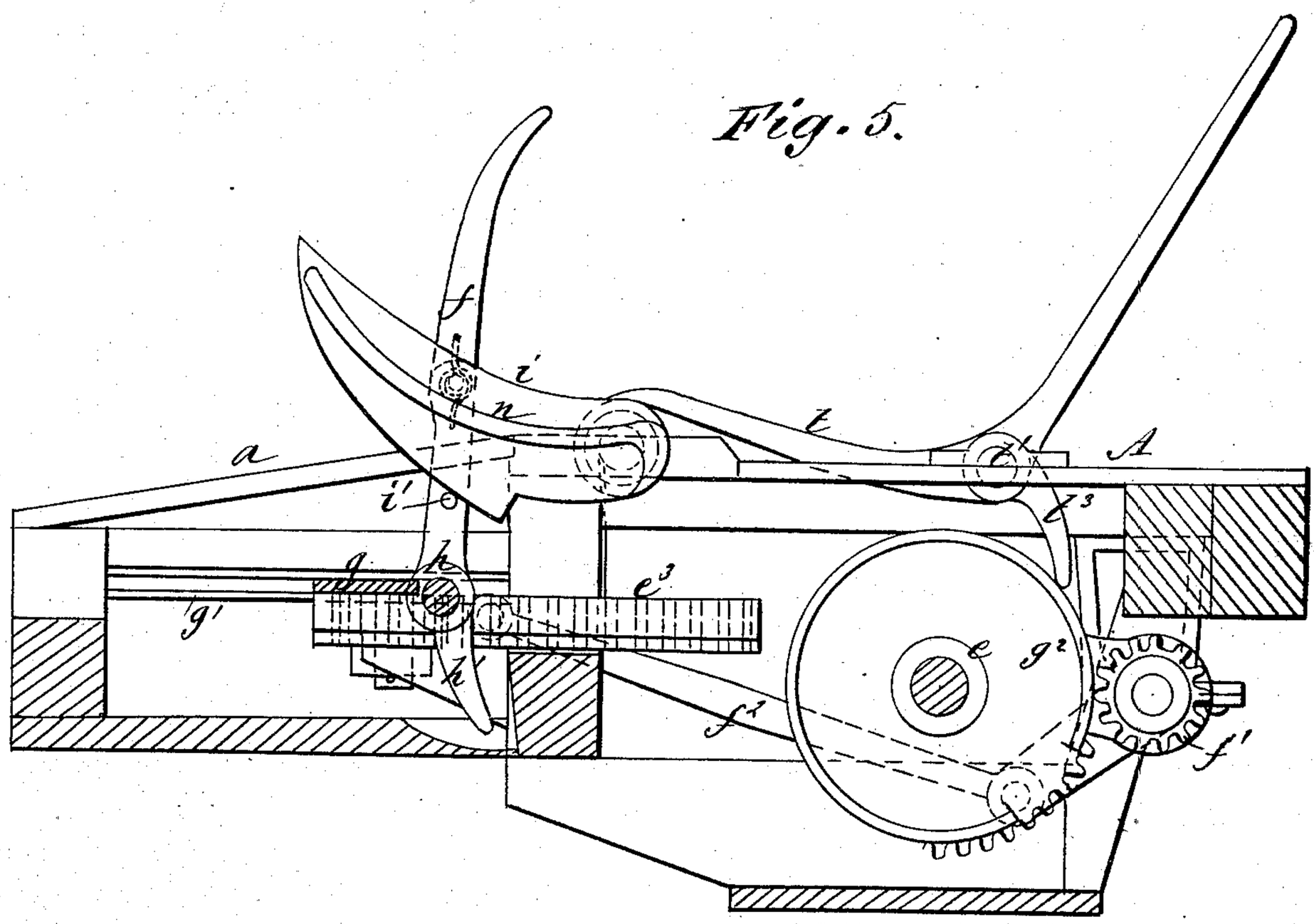
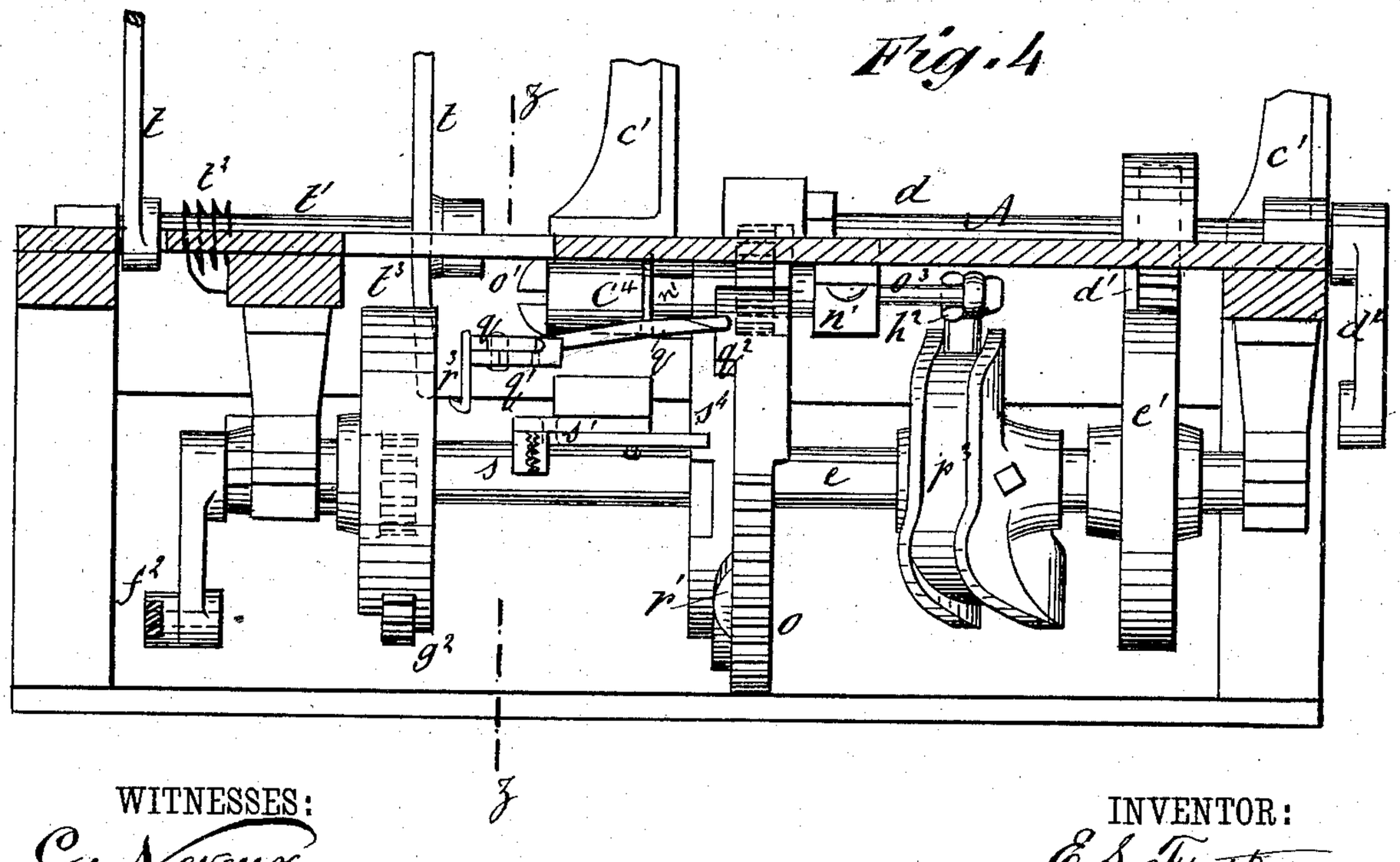


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWIN S. FROST, OF WATKINS, NEW YORK.

GRAIN-BINDING ATTACHMENT FOR REAPERS.

SPECIFICATION forming part of Letters Patent No. 263,160, dated August 22, 1882.

Application filed February 16, 1880.

To all whom it may concern:

Be it known that I, EDWIN S. FROST, of Watkins, in the county of Schuyler and State of New York, have invented a new and useful Improvement in Grain-Binding Attachments for Reaping-Machines, of which the following is a specification.

My invention relates to improvements in self-binders for harvesters; and it consists in the peculiar construction and arrangement of the parts, as hereinafter more fully set forth.

In the drawings, Figure 1 is a plan view of the reaper-table and binding mechanism. Fig. 2 is a vertical section on line *x x* of Fig. 1. Fig. 3 is an inverted plan view. Fig. 4 is a vertical section on line *y y* of Fig. 1 and line *y' y'* of Fig. 3. Fig. 5 is a vertical section on line *z z* of Fig. 4 and line *z' z'* of Fig. 3, showing the gathering-fingers. Fig. 6 is a longitudinal section of the revolving looper. Fig. 7 is an end view of the same. Fig. 8 shows the knotting devices at right angles to their position in Fig. 6.

Similar letters of reference indicate corresponding parts.

A is the binding-table. *a* is the portion of the reaper-table upon which the grain is thrown, and *a'* is a hinged board that is hung on a curved standard, a^2. The front face of the guide-board *a'* is provided with a loop, a^3, to which is secured a rod, a^4, the opposite end of the rod being attached to a lever (not shown in the drawings) operated by the driver in his seat, and serves to direct the grain to the binding devices. By this construction the driver in his seat can operate the guide-board back and forth for short or long grain, so as to throw the middle of the gavel under the needle-arm without leaving his seat.

B is a curved needle-arm, hung above table A on the end of a horizontal rock-shaft, *c*, that is supported in standards *c' c'*.

d is a shaft mounted on table A, carrying a pinion, *d'*, Fig. 2, and fitted with an arm, d^2, that connects by a pitman, c^2, with an arm on shaft *c*.

e is the driving-shaft, fitted in bearings beneath table A, and operating the shaft *d* by a segmental gear, *e'*.

The gathering-fingers *f* are hung on a slide, *g*, Figs. 2, 3, and 5, that is supported in slideways *g'* beneath an aperture in table *a*. The slide *g* has an intermittingly-reciprocating movement given to it by means of the segmental gear g^2 on driving-shaft *e*, pinion *f'* on a crank-shaft fitted beneath the table, pitman f^2, connecting with a sliding rack, f^3, pinion g^3, that is on a fixed stud, and a rack, e^3, on side of slide *g*. (See Fig. 3.) The fingers *f* are fixed upon a rocking arbor, *h*, supported on slide *g*, which arbor is provided with an arm, *h'*, Fig. 5, that comes in contact with a fixed portion of table *a* as slide *g* reaches its extreme outward position, thereby moving the arbor *h* and raising the fingers *f* upward, while during the outward movement of slide *g* the fingers *f* fall by gravity and move beneath the advancing grain. Upon the table A, in a box, h^2, is fitted a stud carrying a curved sector, *i*, Figs. 1 and 5, that is thrown downward beneath the table *a* as the slide *g* moves outward by a spiral spring, h^3, on its stud, and is raised with the fingers by a pin, *i'*, on one finger *f*, acting upon the lower edge of the sector as the slide *g* moves inward. The function of the sector *i'* is to compress and carry forward the grain gathered by the fingers *f*.

I also provide for drawing the bundle into shape and holding it while the knot is being tied by means of a cord, *k*, Fig. 2. One end of the cord *k* is secured at the back of table A at *a'*, from whence the cord passes over a sheave, *k'*, on needle-arm B, over a sheave, k^2, on the upper end of standard *c'* to a loose pulley, k^3, on shaft *c*, that is fitted with a spring for giving spring-tension to cord *k*. As the needle-arm descends the cord *k* is carried around the bundle, compresses the same to shape, and holds it while the knot is being tied in the binding-cord, so that there is no strain on the binding-cord until the arm B rises and carries the cord *k* up with it. As the needle-arm descends, the compressing-cord strikes the gavel lying under it on the table, drawing off the cord *k* from the sheave k^2 to encompass the gavel and compress it, and at the same time winds up the coiled spring. In the ascent of the needle-arm the unwinding of the spring takes up the slack of the compressing-cord *k*, and always affords a yielding tension to the compressing-cord *k* to furnish more or less cord to compress a large or small gavel.

The grain received on the table *a* is directed to the center of the table A by the hinged

board a', which is set at an inclination, more or less, according to the length of the straw. By this board short grain may be moved beneath the binding-arm, so as to bring the band in the middle of the bundle.

To facilitate the passage of the fingers f beneath the advancing grain, the upper ends of the fingers are jointed, so that the weight of grain may press the ends down upon the table A, and springs are fitted at the joints to throw the ends upward when the fingers are turned up by the movement of the slide g.

The binding-cord l passes from the tension-spool l' on standard c' over a friction-pulley, l^2, on said standard and pulleys l^3 on arm B, through the eye on the end of the needle.

Upon the arm B is hung a loose arm, m, which is pivoted at a point on arm B, which is just above the table in the lowered position of B, and extends to the end of the cord-slot m' in table A. This end of the arm is provided with lugs m^2, forming a T, and is kept in contact with the table by a spring, m^3, that is connected to arms B and m. The loose end of the binding-cord l will rest upon the T end of arm m in the upward position of the needle-arm, and the sector i is formed with a side flange, n, (see Figs. 1 and 5,) upon which the T end of arm m passes as it is drawn out by the rise of the needle-arm. As the arm B again descends, the end of arm m moves forward on the sector, and from that onto the table A, over the cord-slot m', carrying the cord forward around the gavel and into the knotting devices.

The knotting mechanism is constructed and operated as follows:

c^4 is a head, of tubular form, (see Figs. 6 and 7,) sustained beneath table A in bearings n', Figs. 3, and 4, and fitted with a pinion that meshes with a segmental gear-wheel, o, on driving-shaft e. The end of head c^4, beneath the cord-slot m' in table A, is formed with a slotted projection, o', in the slot of which is the hook end of an arm, o^2, that is pivoted in head c^4. Through the center longitudinally of head c^4 extends a sliding rod, o^3, having a hook end, o^4, and upon the end of rod o^3 is a loose piece, p, having a forked end. The operation of these parts will be described hereinafter. The rear end of rod o^3 is connected to a lever, p', that is hung at p^2, and upon the driving-shaft is a grooved cam-wheel, p^3, that operates upon a pin on lever, p', to vibrate the said lever and move the slide-rod o^3. Contiguous to the head c^4 are fitted gripping-fingers q q' in position for receiving the cord between their ends. The finger q is hung on q', and is opened by a cam, q^2, on the segmental gear o, which acts on an extension of the finger q. (See Figs. 3 and 4.) The finger q' is hung on a stud, q^3, so as to be capable of movement to and from the head c^4, toward which the finger q' is pressed by a spring, r^3, until arrested by a stop-pin, r^2. Upon the side of segmental gear o is a curved projection, r', which acts on the end of finger q to press the finger q' away from head c^4. A spiral spring, r^4, acts to close the finger q upon q' when the finger is released by the cam q^2. There is also a pair of nipping-and-cutting fingers, s s', fitted to seize and cut the cord, one of which, s, is fixed, while the other, s', is pivoted, and is closed by the action of a cam, s^4, on the segmental gear o, and opened by a spring, s^2.

In the operation of the machine the loose end of the binding-cord is held by the nippers s s', the grain being fed in against it, and as the needle-arm descends is caused to encircle the gavel by the action of arm m, as seen in Fig. 2. In this position the cord is seized by the grippers q q', and at the same moment the nippers s s' open and take a second hold upon the cord, cutting off the portion around the bundle, and retaining the end passing to the needle. (See Fig. 2.) The two cords are held against the sliding yoke p by the hook o^2. The revolution of the tube c^4 carries the cord around the yoke p, forming a loop, and in the further revolution of the tube the cord is carried up over the projection o', and slips across under the hook o^4. The rod o^3 is then operated, and the cord is clamped by the hook o^4, and the further movement of the rod o^3 carries with it the yoke p, (the cord being held between the hook o^4 and the yoke p,) and the loop around the yoke p is pushed off by reason of the yoke p being pulled from it.

The bound bundle is thrown from the table A as the needle rises by double-ended arms t t, which are hung on a shaft, t', that is fitted with a spring, t^2, acting to give a partial revolution to the shaft. A tail-piece, t^3, from shaft t', bearing upon the rim of the segmental gear g^2, holds the fingers t down in position for receiving the bundle until a notch in the wheel g^2 permits the spring t^2 to act.

This binding attachment may be attached to self-raking reapers to take the grain from behind the knives, and may be put on or off without interfering with the working of the reaper. It may also be used with an endless apron running behind the knives to carry the grain to the binder. In the last-named case the sliding fingers f will be dispensed with and a rock-shaft, carrying curved fingers, placed at the place where the curved piece a' is shown, and such fingers will be fitted to rise and carry the gavel to the binder, the apron being stopped at that moment.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a grain-binder, the combination, with the T-ended arm, of the hinged sector and spring, the sector serving to raise the grain for the needle-arm and as a guide to the said T-ended arm, as described.

2. The combination, with the shaft c, carrying the needle-arm B, and sheave k^3, loose on said shaft, of a coiled spring secured to the sheave k^3 and shaft c, and compressing-cord k, secured at one end to the frame, and passing around the sheaves k' k^2 k^3, substantially as described, and for the purpose set forth.

3. The knotter herein described, consisting of a tubular head, c^4, provided with a pinion on its shank, slotted projection o' on the outer end of the head, arm o^2, pivoted in the head, and having its hook in the slot of the projection o', sliding rod o^3, having a hooked end, o^4, loose piece p, sliding on the arm o^3, and having a forked end and spring o^5, substantially as described.

4. The arm m, hung on arm B, spring m^3, and sector i, having flange n, combined together and with the needle-arm, binding-cord, and slotted table A, for operation substantially as described.

5. In grain-binders, the grippers q q', pivoted together and upon the stud q^3, the springs r^3 r^4, and the cam-wheel q^2, fitted with a projection, r', combined together and with the knotting devices, substantially as shown and described.

6. The organized grain-binder, consisting of vibrating needle-arm B, gaveling-fingers f, and sector i, tucking-arm m, holding-cord k, tying device C, grippers q q', gripping-shears s s', and delivery-arms t, combined for operation substantially as shown and described.

EDWIN SEYMOUR FROST.

Witnesses:
A. C. FROST,
C. S. FROST.