

(No Model.)

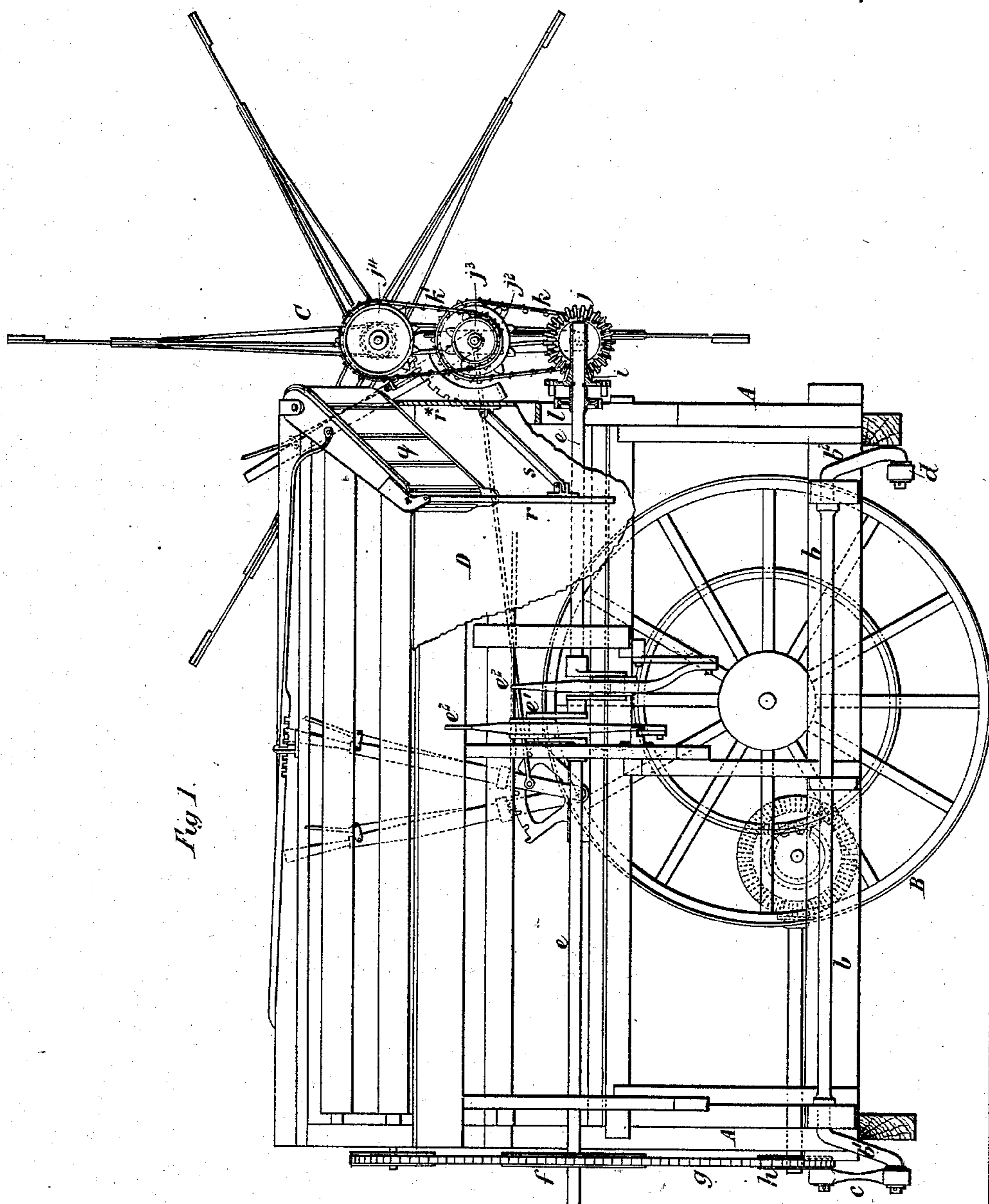
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J. HOWARD & E. T. BOUSFIELD.

GRAIN BINDING MACHINE.

No. 274,772.

Patented Mar. 27, 1883.



Witnesses.

J. A. Ruthenford

Robert Everett

Inventors.

James Howard

Edward T. Bousfield.

By James L. Norris,
Atty.

(No Model.)

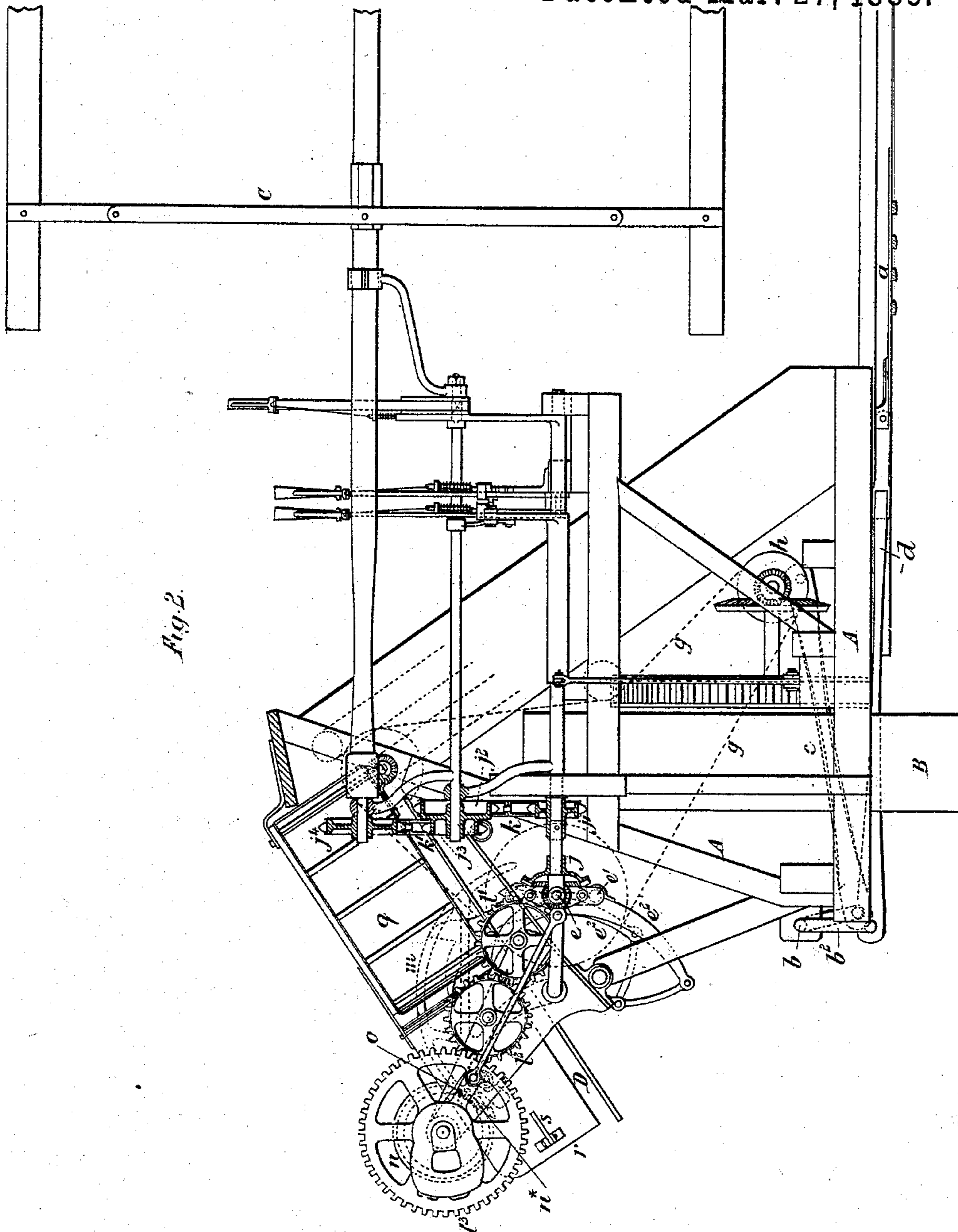
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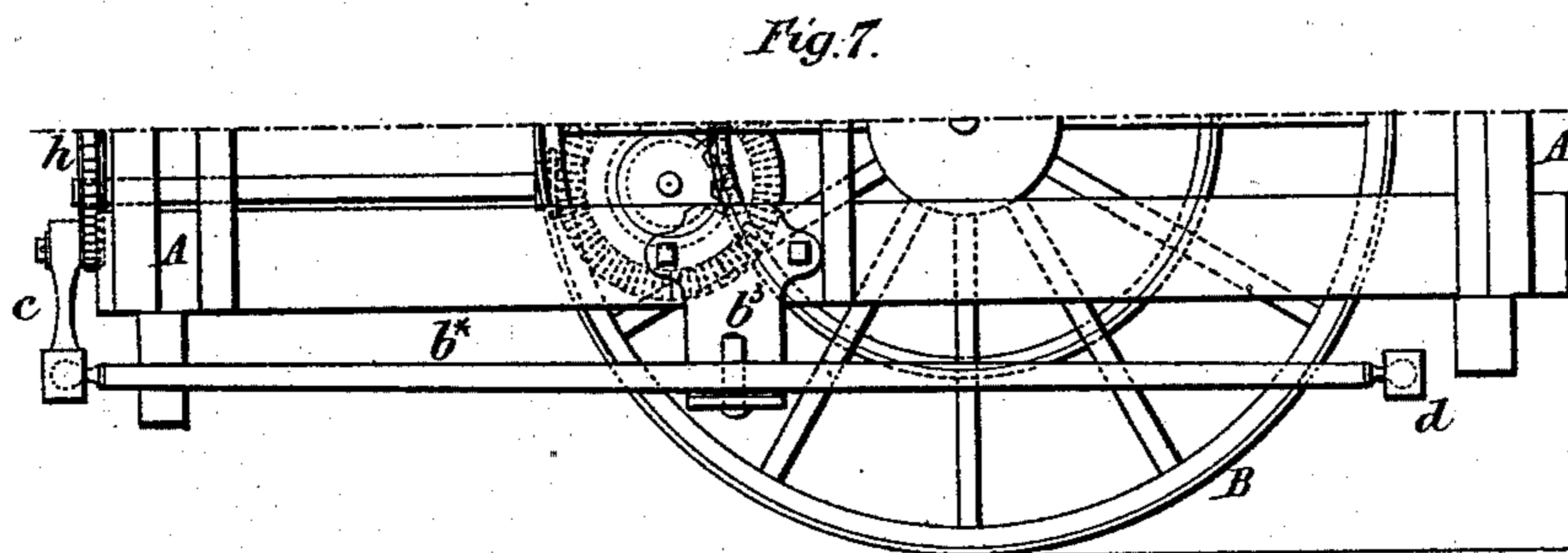
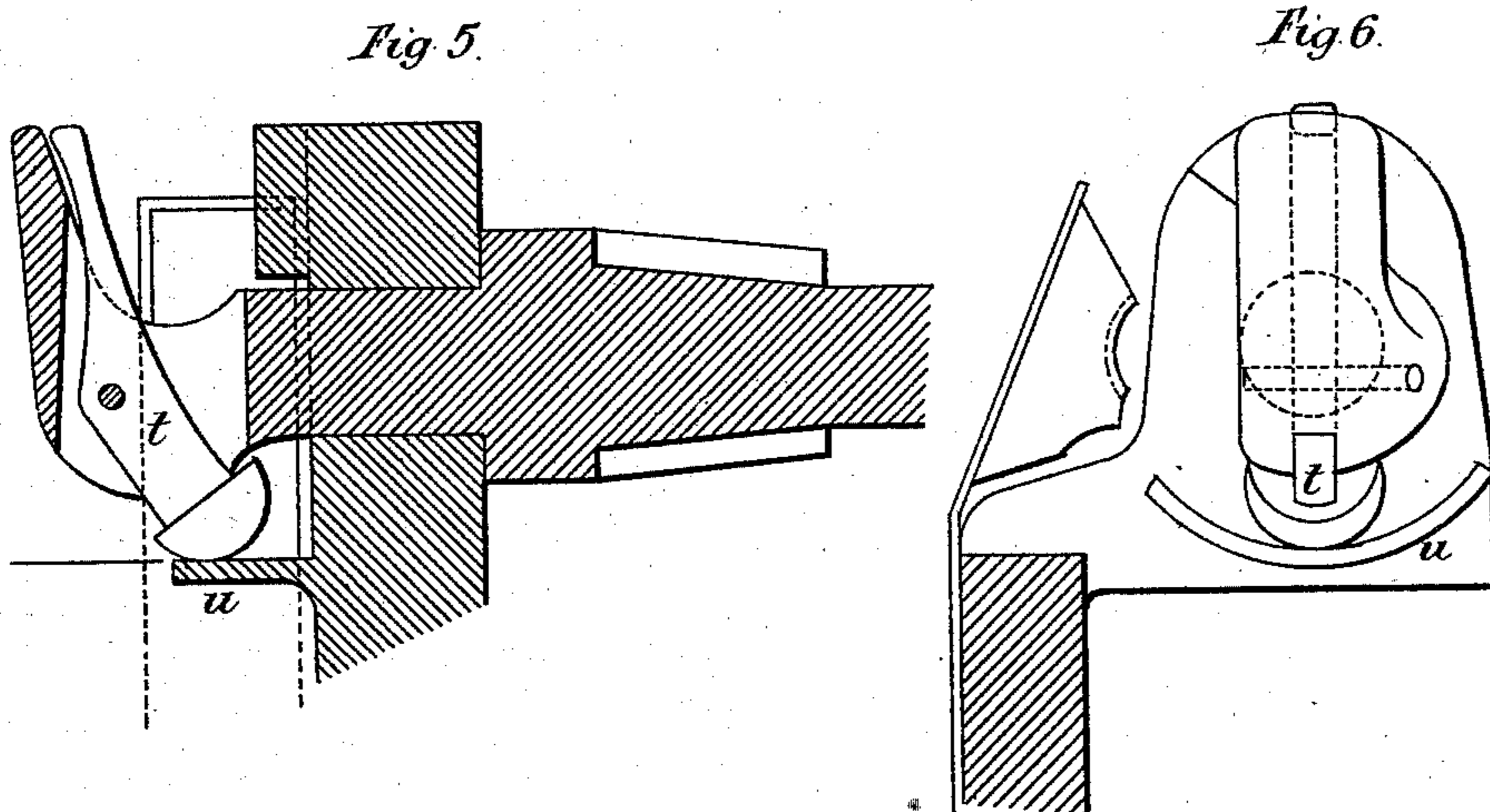
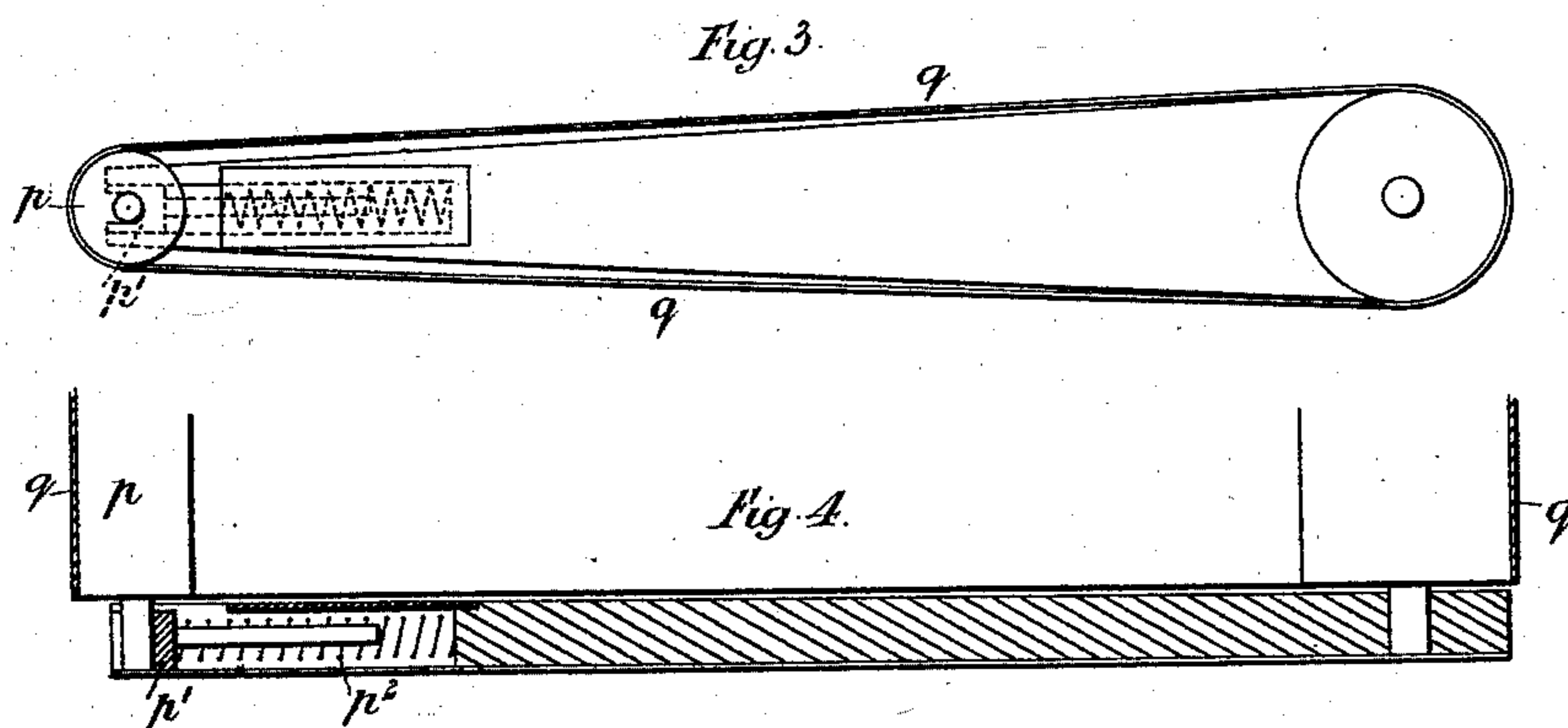
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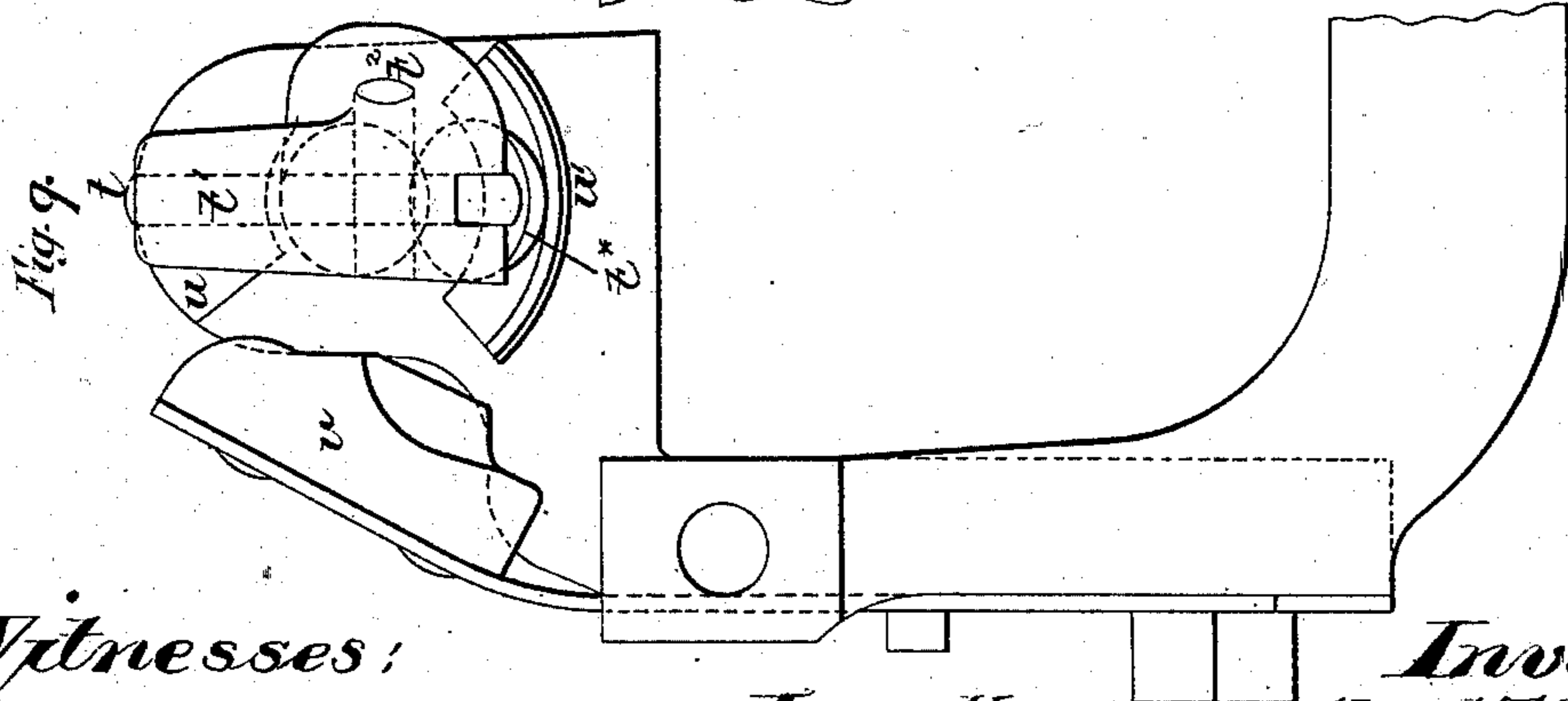
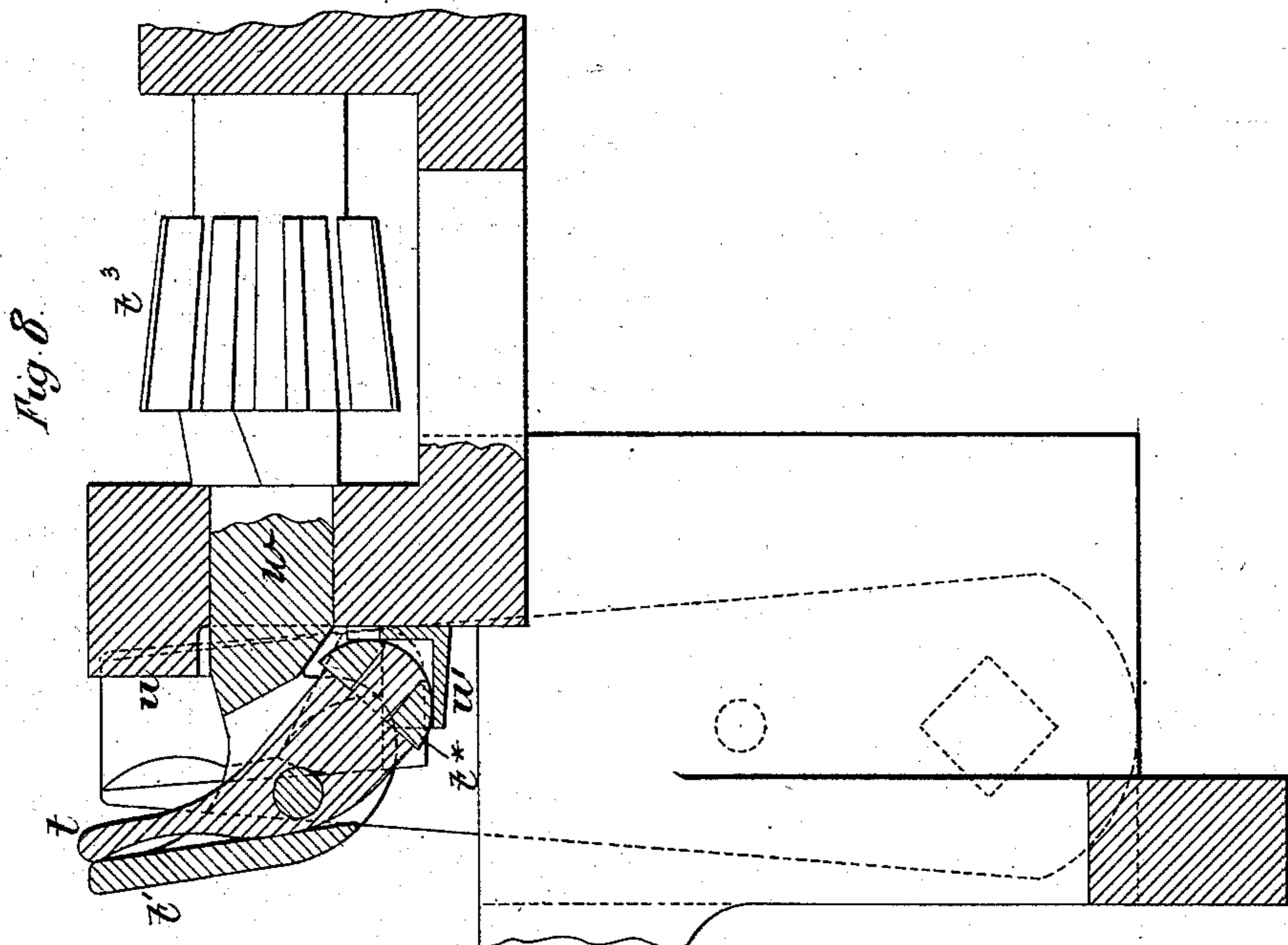
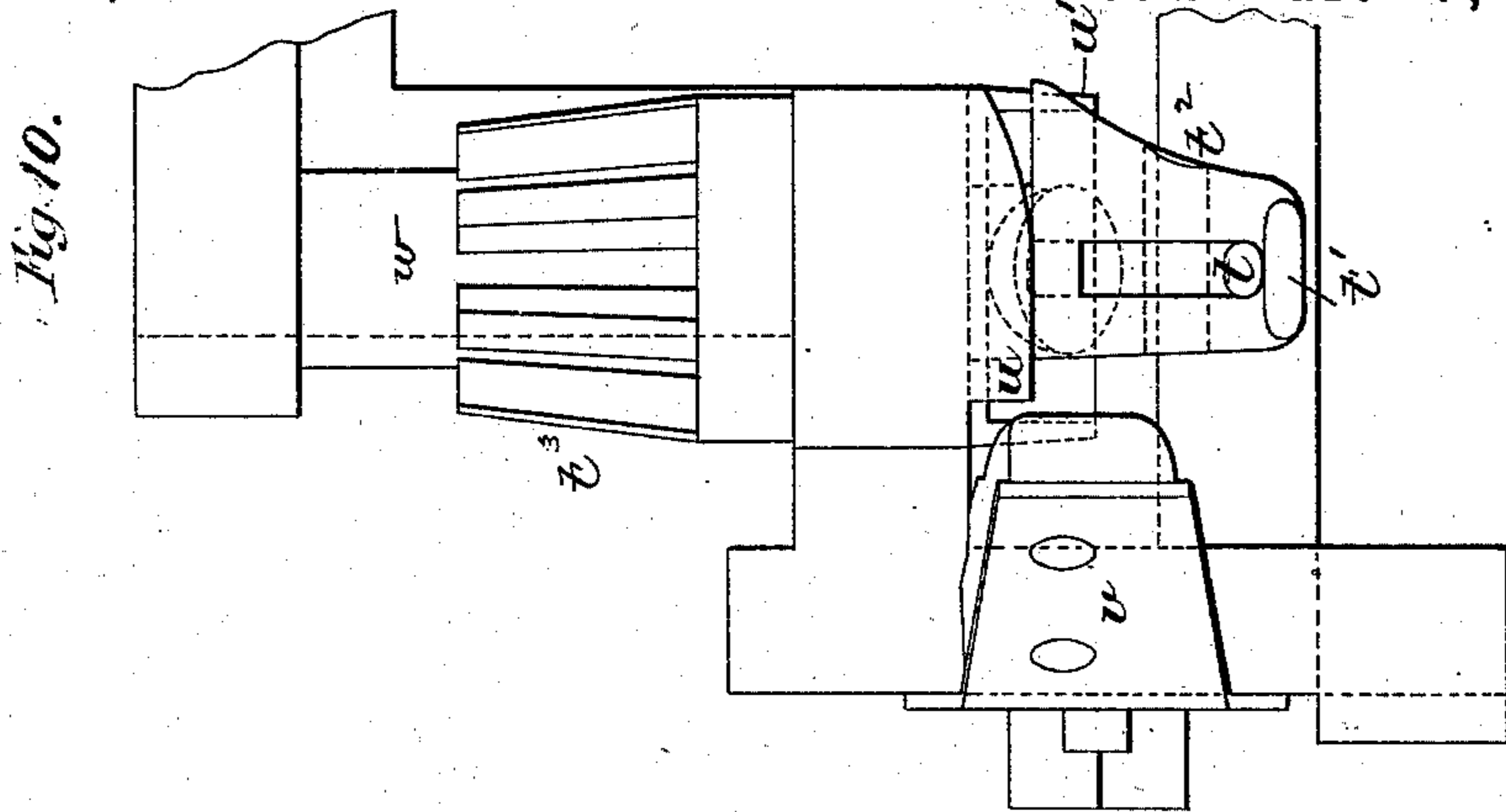
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Witnesses:
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UNITED STATES PATENT OFFICE.

JAMES HOWARD AND EDWARD T. BOUSFIELD, OF BEDFORD, ENGLAND.

GRAIN-BINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 274,772, dated March 27, 1883.

Application filed December 12, 1881. (No model.) Patented in England September 22, 1881, No. 4,092.

To all whom it may concern:

Be it known that we, JAMES HOWARD, agricultural engineer, and EDWARD TENNEY BOUSFIELD, engineer, both of Bedford, England, have jointly invented new and useful Improvements in Grain-Binding Machines, (for which we have obtained provisional protection in Great Britain, No. 4,092, bearing date September 22, 1881,) of which the following is a specification.

The main object of our present invention is to improve the construction and increase the efficiency of sheaf-binding harvesting-machines of the type or class commonly known as the "Marsh Harvester," and more especially the machines of this class as modified by the application thereto of the devices described in the specification of a patent granted to John F. Appleby, dated February 18, A. D. 1879, No. 212,420.

The said invention is illustrated in the accompanying drawings, in which Figure 1 is a side elevation, and Fig. 2 a front elevation, of one of these machines with our improvements applied to the same. Figs. 3 and 4 illustrate, by a plan and vertical section, portions of our said improvements. Figs. 5 and 6 illustrate, by a longitudinal section and end view, (drawn to an enlarged scale,) other features of our improvements. Fig. 7 illustrates a modification of part of our invention. Figs. 8, 9, and 10 are views of the knot-tying device on an enlarged scale.

Like letters indicate the same parts throughout the drawings.

A is the main frame of the machine. B is the driving-wheel. C is the gathering-reel. D is the binder-board. The remaining parts are hereinafter specified.

We prefer the following mechanism for operating the knife-bar *a*—that is to say, we mount in suitable bearings a cranked shaft, *b*, outside of the main frame A and the driving-wheel B. The crank *b'* on one end of the said shaft is connected by the pitman-rod *c* to the pin on the pitman crank-wheel, while the crank *b²* at its other end is connected by a rod, *d*, to the knife-bar or sickle *a*. Therefore the said shaft *b* receives from the pitman crank-wheel a vibrating or to-and-fro motion, which it transmits through the crank *b²* and rod *d* to the knife-bar *a*. By this arrangement or con-

trivance we effect the important object of having the parts of the mechanism for operating the said knife-bar easily accessible, so that they may be readily inspected or examined at all times, and any repairs, if necessary, may be conveniently effected. The same results are obtained by the arrangement illustrated in Fig. 7, wherein a lever, *b**, vibrating on the stud *b³*, replaces the shaft *b*, the said lever being connected at its opposite ends to the pitman-rod *c* and connecting-rod *d*.

The shaft, which we term the "binder-driving shaft," is mounted in suitable bearings on the frame-work A, and is cranked about the middle of its length, as shown at *e'*, for giving the necessary to-and-fro motion to the compressing or packing levers *e²*. At the rear of the machine the said binder-driving shaft *e* carries a chain-wheel, *f*, to which extends a pitch-chain, *g*, from the pitman crank-wheel *h*. At the front of the machine the said binder-driving shaft *e* has keyed thereon a bevel-pinion, *i*, for giving motion through the bevel-wheel *j*, the chain-wheels *j'* *j²* *j³* *j⁴*, and the chains *k* *k'* to the gathering-wheel C. The said shaft is also provided with a pinion, *l*, for driving the binding mechanism through the gear-wheels *l'*, *l²*, and *l³*. This shaft is also provided with an automatic clutch, whereby the pinion *l* is engaged and disengaged, so that the binding mechanism is put into and out of gear with the said shaft each time a sheaf is bound.

m is the binder-arm, and *n* is a wheel, provided with teeth at *n**, which in the revolution of this wheel are alternately in and out of gear with the pinion at *o*, and thereby serve to rotate the knot-tying devices at the proper times during the working of the binding mechanism.

It is obvious that the shaft *e* may be arranged to drive the gathering-reel without actuating the binding mechanism.

When a revolving apron is used for the purpose of regulating the position of the cut grain endwise on the binder-board, as shown in Fig. 1, we adopt the following arrangement, viz: To one extremity of the pivoted frame which carries the said revolving apron we hinge a board, *r*, which we term a "butting-board," and which is connected by a radial jointed rod, *s*, to the shield-plate *r**. This arrangement permits the

said butting-board to be kept at a right angle to the sheaf on the binder-board, although the revolving apron *q* may be set in various positions to suit the length of the straw. Moreover, this butting-board assists materially in making the bottom end or base of the sheaves even or level.

The part of our improvements which relates to the knotting device of these machines has for its object to obtain a more perfect control of the movable jaw of the knotting device shown and described in the specification of British Letters Patent granted to us February 24, A. D. 1880, No. 821, and which is used in a modified form in the machines described in the specification of the aforesaid Patent No. 212,420. According to this part of our invention, *t t'* are two jaws of the knotting-hook. The jaw *t'* is attached to or forms part of the shaft or spindle *w* of the hook, and the jaw *t* is jointed to the said jaw *t'*, as shown. This jaw *t* has a head or roller, *t**, which is arranged to work as the hook rotates in contact with the fixed cam *u*, whereby the said jaw is opened at the proper time to admit the cord or string between the two jaws *t t'*. The spring *v* serves to close the said jaw *t* when the roller *t** leaves the inclined surface of the cam *u*. The aforesaid hook has a curved or inclined face at *t²*, which guides the string and acts in conjunction with the jaws *t t'* in the formation of the knots.

The hook turns in one direction—that is to say, its motion is not reversed during the working of the machine, movement being imparted to the said hook through the pinion *t³*. The said hook is arranged above the binder-board *D* in such a position relatively to the binder-arm *m* that the latter will lay the string or cord properly upon it and in front of the jaw *t*. In addition to the fixed cam *u* for opening the movable jaw *t*, we provide a second or auxiliary fixed cam, *u'*, arranged to close the said jaw at the proper times. This auxiliary fixed cam is used for keeping said jaw closed and preventing injury to the same when operating without string around the jaws.

We claim—

1. The combination, with the traveling apron for regulating the position of the cut grain on the binder board or table *D*, of the automatically-adjustable butting-board, substantially as and for the purpose specified.

2. In a sheaf-binder knotting mechanism, the combination, with the movable jaw *t'* and the fixed cam *u* for operating the same, of the spring *v* and auxiliary fixed cam *u'*, substantially as and for the purpose set forth.

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EDWARD TENNEY BOUSFIELD.

Witnesses:

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T. J. OSMAN.