

(No Model.)

H. FAIRBANKS.
APPARATUS FOR CUTTING SHEETS FROM ROLLS.

No. 538,245.

Patented Apr. 30, 1895.

Fig. 1.

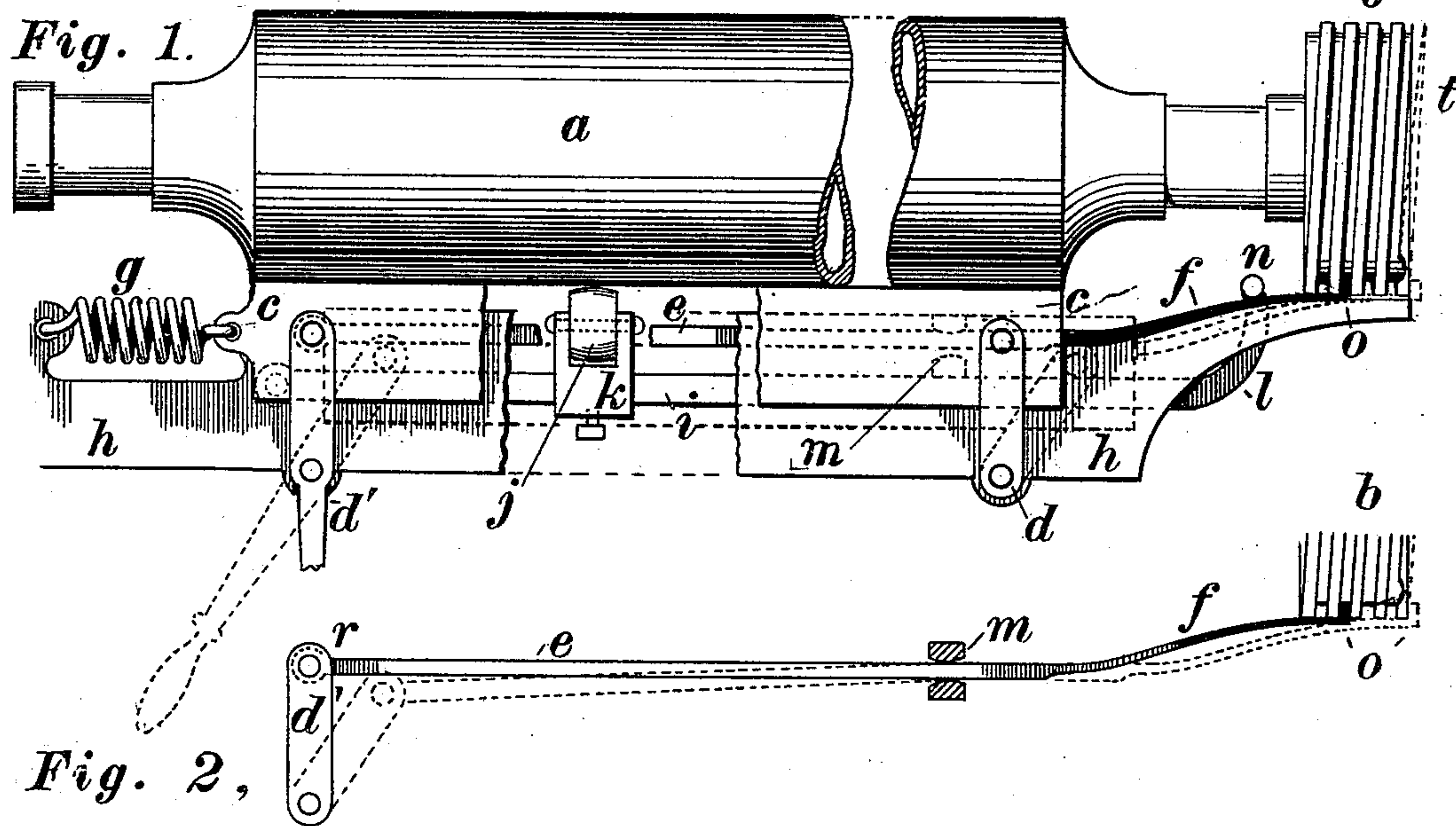


Fig. 2,

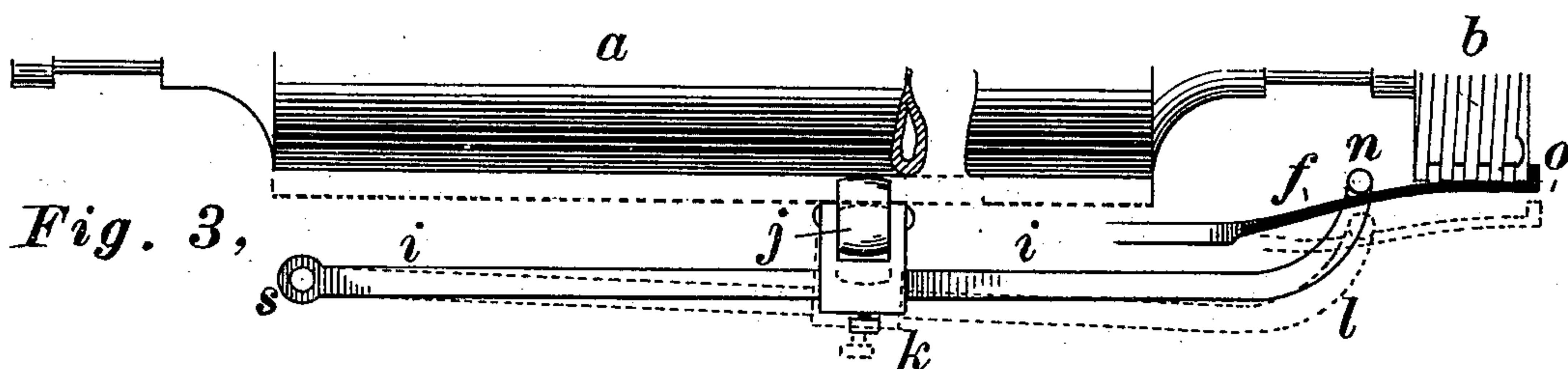


Fig. 4.

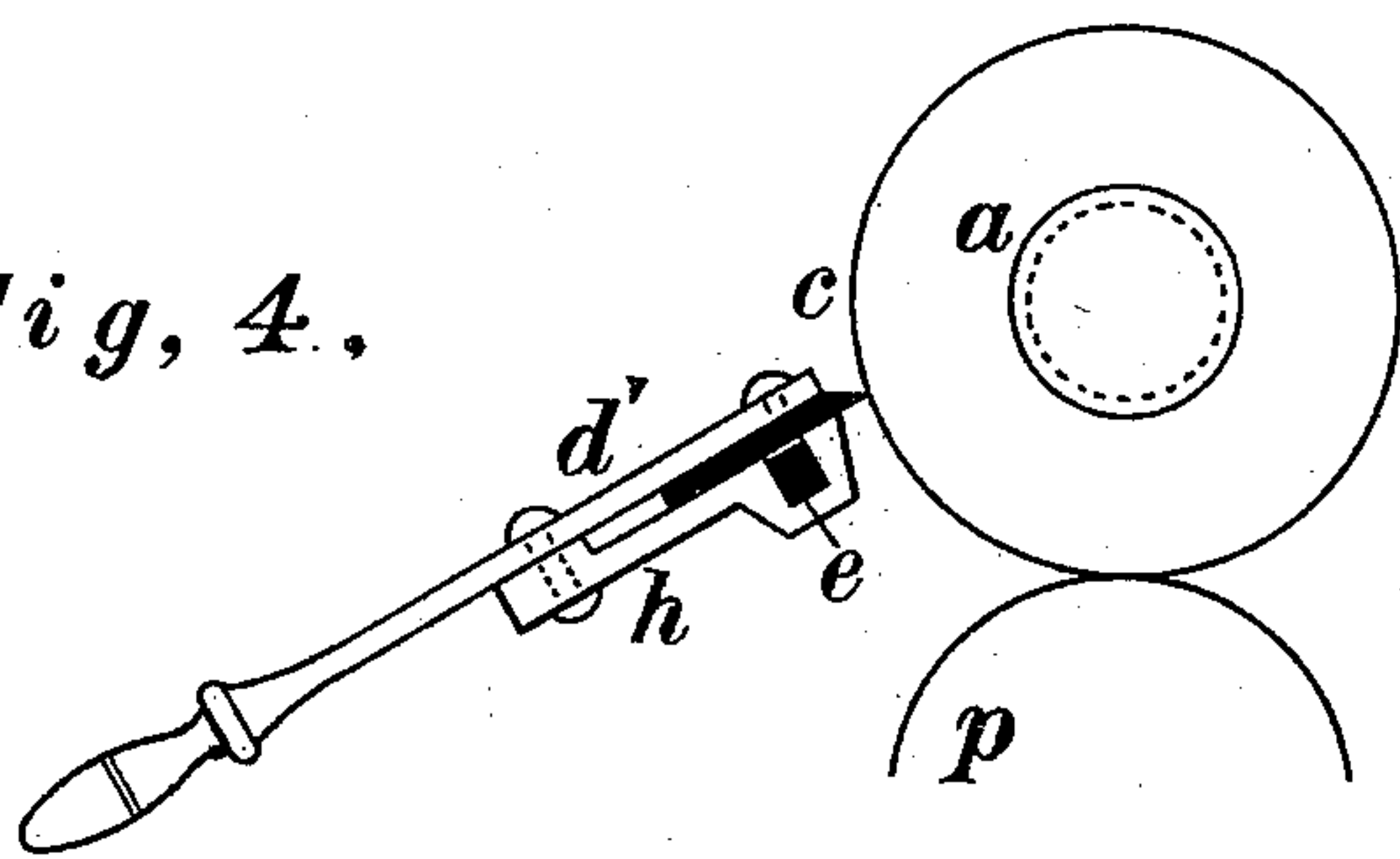
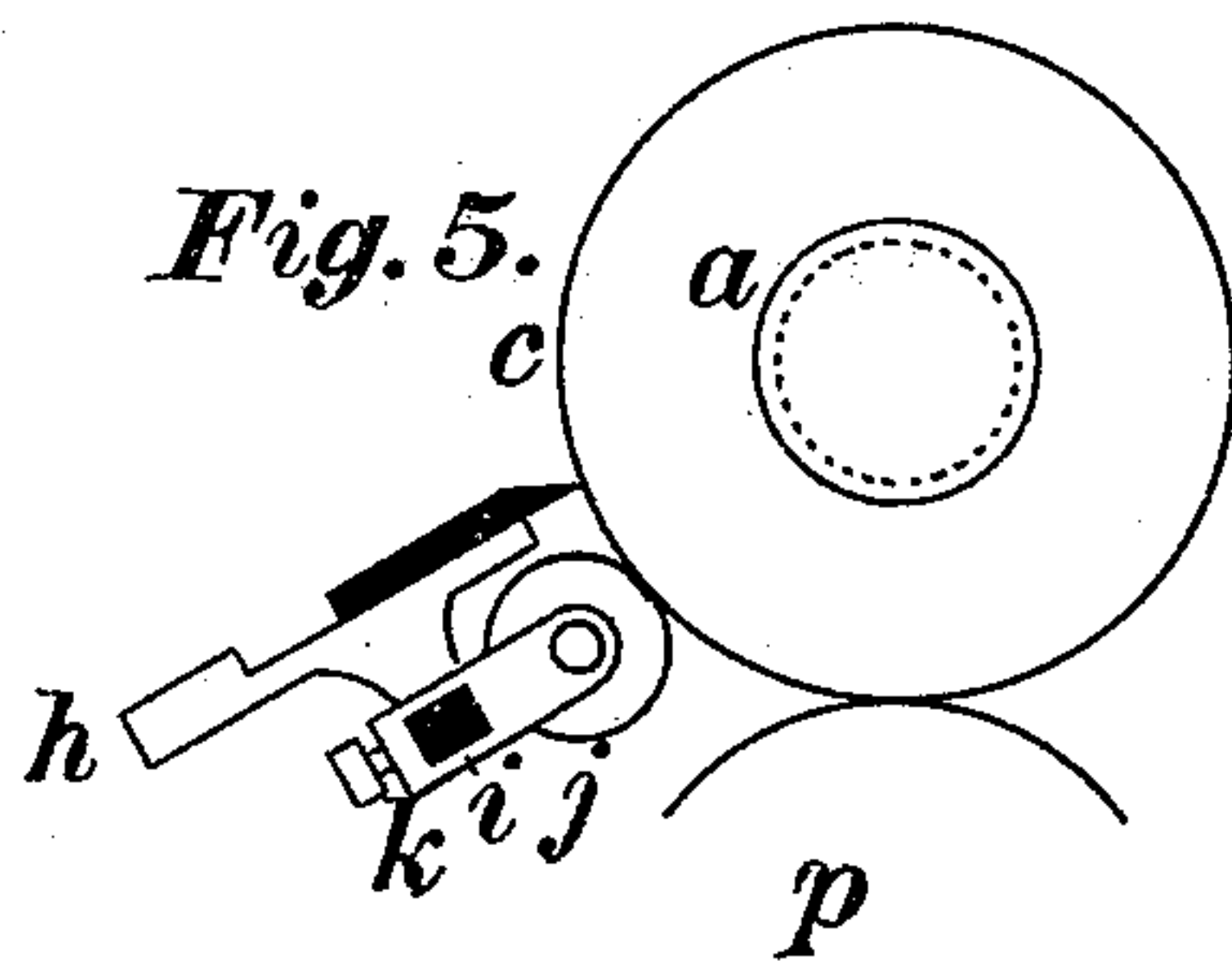


Fig. 5.



Witnesses,

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UNITED STATES PATENT OFFICE.

HENRY FAIRBANKS, OF ST. JOHNSBURY, VERMONT.

APPARATUS FOR CUTTING SHEETS FROM ROLLS.

SPECIFICATION forming part of Letters Patent No. 538,245, dated April 30, 1895.

Application filed September 21, 1892. Serial No. 446,372. (No model.)

To all whom it may concern:

Be it known that I, HENRY FAIRBANKS, of St. Johnsbury, in the county of Caledonia and State of Vermont, have invented certain new and useful Improvements in Apparatus for Cutting Sheets from Rolls, Particularly Sheets of Pulp or Strawboard from the Forming-Roll of the Wet Machine, of which improvements the following description, in connection with the accompanying drawings, is a full and exact specification.

The sheets of pulp formed by successive layers wound upon the forming roll have usually been cut, or rather, torn, by the attendant, drawing a pin under the sheet from one end of the roll to the other.

Most pulp makers have considered it impracticable to use a knife. The well known difficulty of cutting a sheet of common paper, when wet, with shears, of which, even with the advantage of meeting edges, the blades are liable to clog and spring apart, indicates the greater difficulty of cutting a thick wet sheet when clinging to the roll. It has been proposed to use a blade springing out from the roll itself, which might tear its way through, as the pin in the hand of the attendant does, but this is not cutting. A blade making a shearing cut will not go through the thick sheet of fibrous spongy wet paper, but will clog unless the sheet also is moved to strain open a path for it, the crowding upon one side doing no harm if the other side is drawing away; and on the other hand a blade merely pressed up to the moving roll, and not having itself endwise motion will not cut, but will stop the roll or strain the machinery in tearing off the sheet. I have discovered that it is necessary to give the knife an endwise motion when it strikes the sheet, and that a shearing cut, in combination with the motion of the roll itself is effective. I have accordingly mounted a long flat knife to slide upon a fixed rest with a motion that, while keeping its straight edge parallel to the axis of the roll upon which the pulp sheet is forming, brings that edge to the surface of the roll, and at the same time carries it endwise in the direction of the length of the roll; and as it is desirable that the knife remain almost in contact with the surface of the roll after the

sheet is cut until it is fully detached, namely, until the roll has made nearly a complete revolution, and should then be drawn back from that surface to allow the successive layers of pulp deposited to form the next sheet, and as doing this by hand confines the attendant, I have arranged an automatic device for drawing it back slowly at first but faster than the pulp accumulates upon the roll, and to hold it back until a catch is released; and in order that the knife may deliver a sharp effective stroke, I have applied a spring to be strained when the knife is in this way drawn back, and to be held by the said catch until that is released. This may be released by the attendant, but I have further provided an automatic device for pushing back this catch when the pulp sheet attains the proper thickness, which device, used with certain kinds of pulp, will make the machine almost independent of the workman, so that it will form and cut sheets of pulp or straw board of uniform thickness and pile them to wait until they can be conveniently folded; and consequently several machines can be tended by one man.

In the drawings similar letters of reference designate similar parts in all the figures.

Figure 1 is a plan view of the forming roll, knife and knife-rest, shown in the plane in which the knife moves, the parts under the rest appearing where it is broken away, and by dotted lines. Fig. 2 shows the sliding rod partly flattened into a spring, by which the knife is drawn back after cutting. Fig. 3 illustrates the mechanism under the rest by means of which the thickening sheet of pulp upon the roll moves the lever that releases the catch and allows the knife to slide up. Fig. 4 is an end view of the forming roll, knife and knife-rest, and Fig. 5 an end view of the accumulating pulp upon the roll gives motion to the releasing lever.

α is the forming roll, receiving the web of pulp from the couch roll p , and winding it up into a thick sheet. This roll α carries on its extended gudgeon the coarse screw b , of which screw the thread is not cut as deep as the length of the tooth o , of the catch, and therefore the point of this tooth, after coming to

the end of the screw cylinder, rides upon that end smoothly, all the way round.

c is the knife, sliding upon the flat top of the rest *h*, as guided by the links *d d'* which move in arcs about fixed centers. One of these may be extended to form a handle.

g is a spring drawing the knife, when released, endwise and forward into contact with the roll.

e is a rod, under the knife-rest, hinged by a pin (reaching it through a slot in the knife-rest), to the link *d'* at *r*, guided by running through a staple at *m*, which stands down from the underside of the knife-rest, and having the part *f* flattened into a spring which carries the tooth or catch *o* at its end in position to be engaged by the screw *b*.

i is a lever underneath the rest, moving upon a stud at *s* projecting down from said rest, as a fulcrum, and carrying the slide *k* in which moves the small roller *j* in position to be pushed back by the thickening layer of pulp upon the roll. The position of this slide is made adjustable upon the lever *i* in order that it may be readily set for sheets of any desired thickness.

The machine of which parts appear in the present drawings is the three-roll or vacuum wet machine, which has no felt, and of which the forming roll turns over toward the side where the sheets come off, but the device can be applied to other machines. In this machine the pulp is taken up by the mold-cylinder and couched from that directly to the vacuum roll *p*, from which it passes immediately to the under side of the forming roll *a* and the web is wound upon that in successive layers, building up a thickening sheet. This sheet as it thickens presses back the roll *j* and swings the free end *l n* of the lever *i* upon its fulcrum *s*. This free end engaging the spring *f* is carried a distance several times the thickness of the forming sheet, and amply sufficient, whether adjusted for thick or thin sheets, to draw back and unhook the tooth *o*, and hold it free from the screw *b* while the knife, thus released, is drawn by the spring *g* with a swift stroke up to and through the sheet of pulp upon the roll, the downward motion of this sheet, combining with the endwise and forward motion of the knife aiding in cutting and separating the edges as cut. The sheet cut in this way passes above the knife and is detached from the roll as it comes over. When the cut edge below the knife passes down past the roller *j*, that roller is free to swing up against the press roll, and the tension of the spring *f*, no longer held back by the point *n* of the releasing lever *i*, carries the tooth *o* between the threads of the screw *b*, and the motion of that screw begins to draw back the knife; but this motion of the knife is at first simply endwise, parallel to the surface of the roll, and for nearly a complete revolution its edge is close enough to scrape off any clinging pulp,

but it begins to draw back in time to give the first layer, going to form the new sheet upon the roll, room to pass without touching that edge, and the succeeding turns carry the knife back more rapidly. The tooth or catch *o* follows up between the threads of the screw, and being longer than the depth of the groove, slides upon the smooth end of the screw-cylinder until it is again released.

The curved path of the knife is determined by the swinging links *d d'*, but it is obvious that substantially the same motion may be given it by curved guides which may either form part of the knife rest or be carried by the knife itself, and if carried by the knife may be at its ends, and slide in proper supports extending out from the standards in which the forming roll is mounted, in which case the knife rest may perhaps be dispensed with. What is essential is that the knife approaching the roll shall be at the same time moved endwise, while the sheet to be cut is also continuously moving at right angles to the plane of the knife. The movement of the sheet strains the fibers across the cutting edge and widens the cut as fast as made so as to make room for the advancing blade, while the endwise motion of that blade prevents the fibers folding across the edge and clinging to it. This double motion of the knife, and motion of the sheet have not previously been combined, and I have proven them to be very effective.

With most kinds of pulp, the edge of the pulp sheet when cut clings to the knife, so that the sheet as it comes over turns completely, and brings its inside to the top upon the table which stands close behind the knife rest, this side up being best for folding, and as each is carried quite over in this way, successive sheets pile quite regularly.

In this apparatus it is evident that certain details may be changed without destroying its identity. With a modification of the releasing device the spring knife and the carrying screw may be applied to cutting paper or sheet metal in desired lengths from the forming machine. As shown above, the knife may have sliding guides instead of the swinging links. A cam might replace the screw, though hardly with complete success, and the releasing device may be moved by the surface travel of the enlarging loaded forming roll instead of by its radial increase.

When the apparatus is applied to the wet machine, the releasing device may be omitted and the catch thrown off by hand, or both this and the screw, and the knife moved by the handle of the link *d*, but the whole mechanism described above carries out my invention in the best way known to me; and

I claim—

1. The combination of a forming roll, upon which, in a wet machine, thick sheets of pulp or straw board are wound, with a straight knife mounted independently of said roll, and

with the mechanism whereby this knife, being parallel with the said roll, is moved endwise and into contact with it, the whole being adapted, in cutting a sheet, to combine the motion of approach of the knife, its endwise motion, and the motion of the sheet carried by the roll, whereby the sheet is cut and inverted, substantially as described.

2. The combination of a roll carrying the sheet to be cut, a long knife parallel with this roll, mechanism supporting and guiding this knife and a spring so connected as to draw it endwise in its swing toward the roll, substantially as herein set forth.

3. The combination of a roll, carrying the sheet to be cut, a long knife supported for moving into light contact with this roll, a spring acting to draw it endwise in its motion toward the roll, a connecting rod and catch attached to draw it in the other direction and a coarse screw carried by the roll and engaging this catch, adapted to move it and thereby the

knife against the strain of the said spring,—substantially as herein set forth.

4. The combination of a roll carrying the sheet to be cut, a straight knife supported and guided into light contact with this roll, a spring acting to draw it endwise and toward the roll, mechanism connected to draw the said knife in the other direction, a catch holding it with the said spring strained, and a releasing lever adapted to push back this catch when moved by the thickening sheet upon the roll, substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 19th day of September, A. D. 1892.

HENRY FAIRBANKS.

Witnesses:

C. M. SPENCER,
WM. C. TYLER.