

No. 710,386.

Patented Sept. 30, 1902.

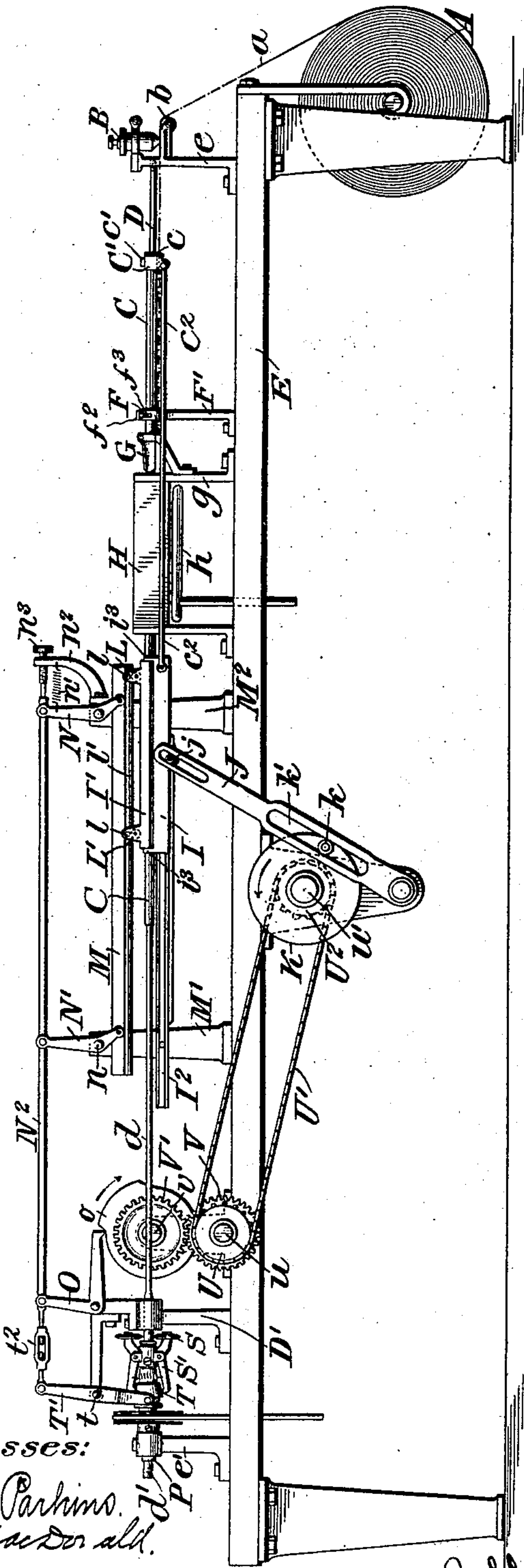
J. H. & E. L. WHITE.
MACHINE FOR MAKING PAPER TUBES.

(Application filed Oct. 23, 1901.)

(No Model.)

3 Sheets—Sheet I.

Fig. 1.



Witnesses:

A. M. Parkins.
J. A. Macdonald.

Fig. 3.

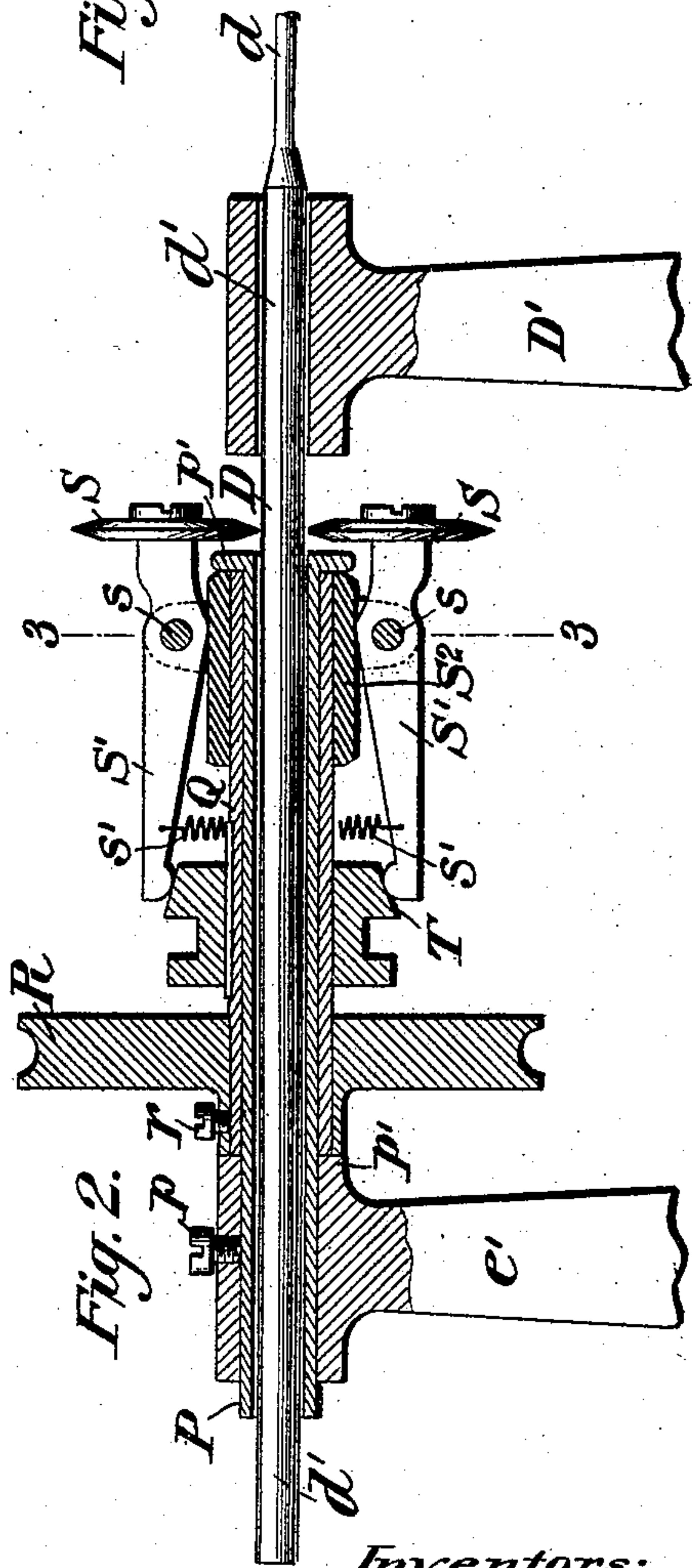
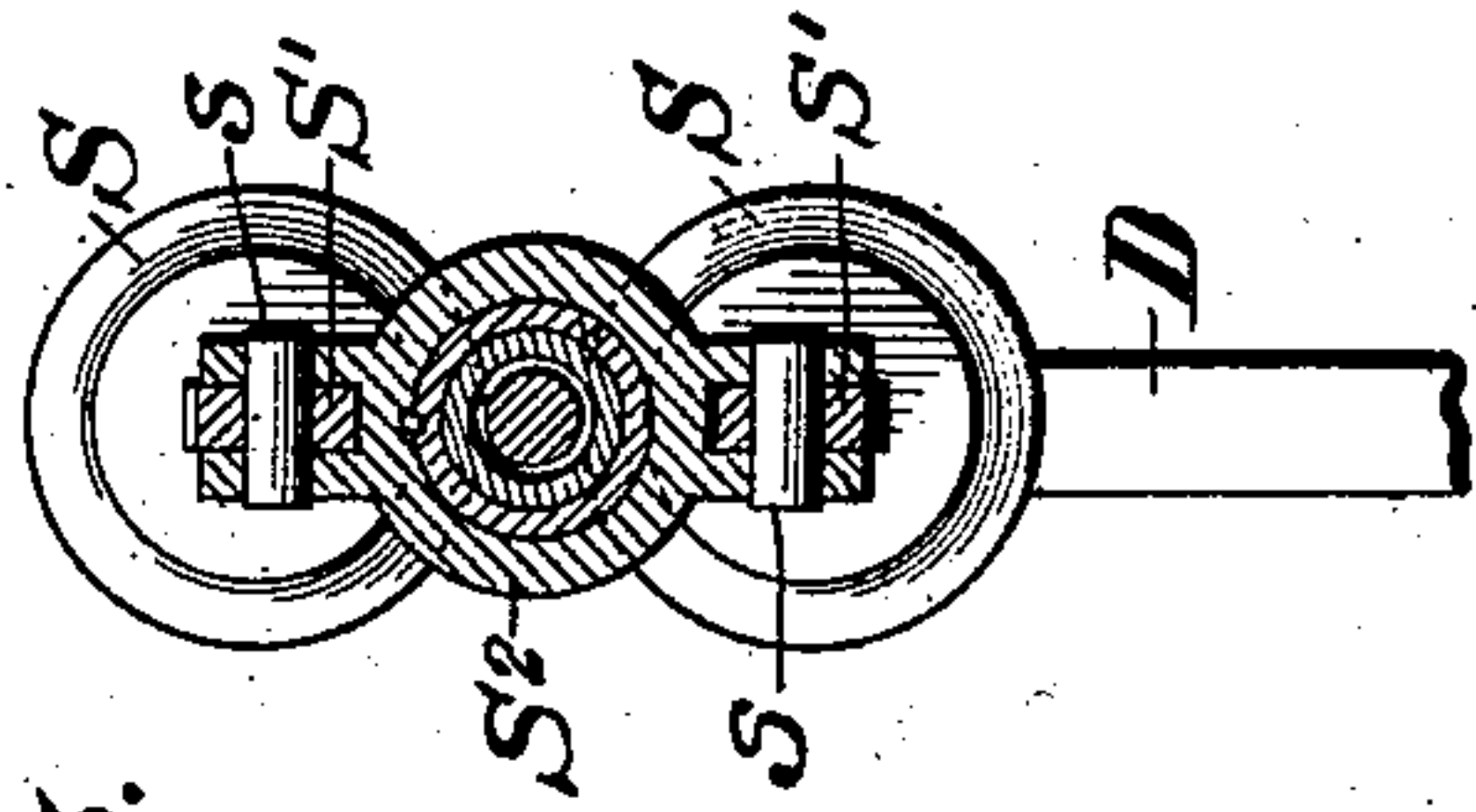


Fig. 2.

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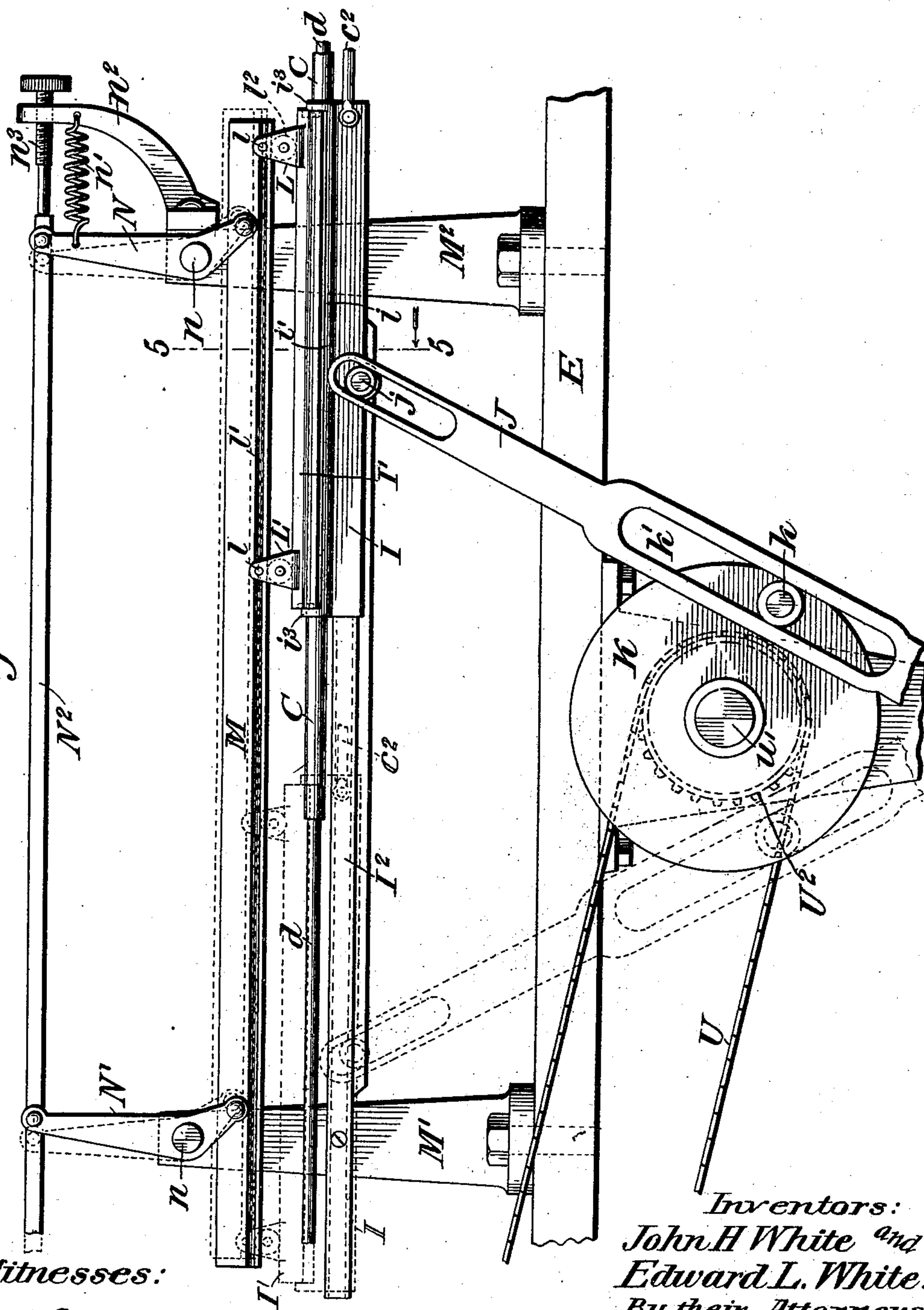
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Fig. 4.



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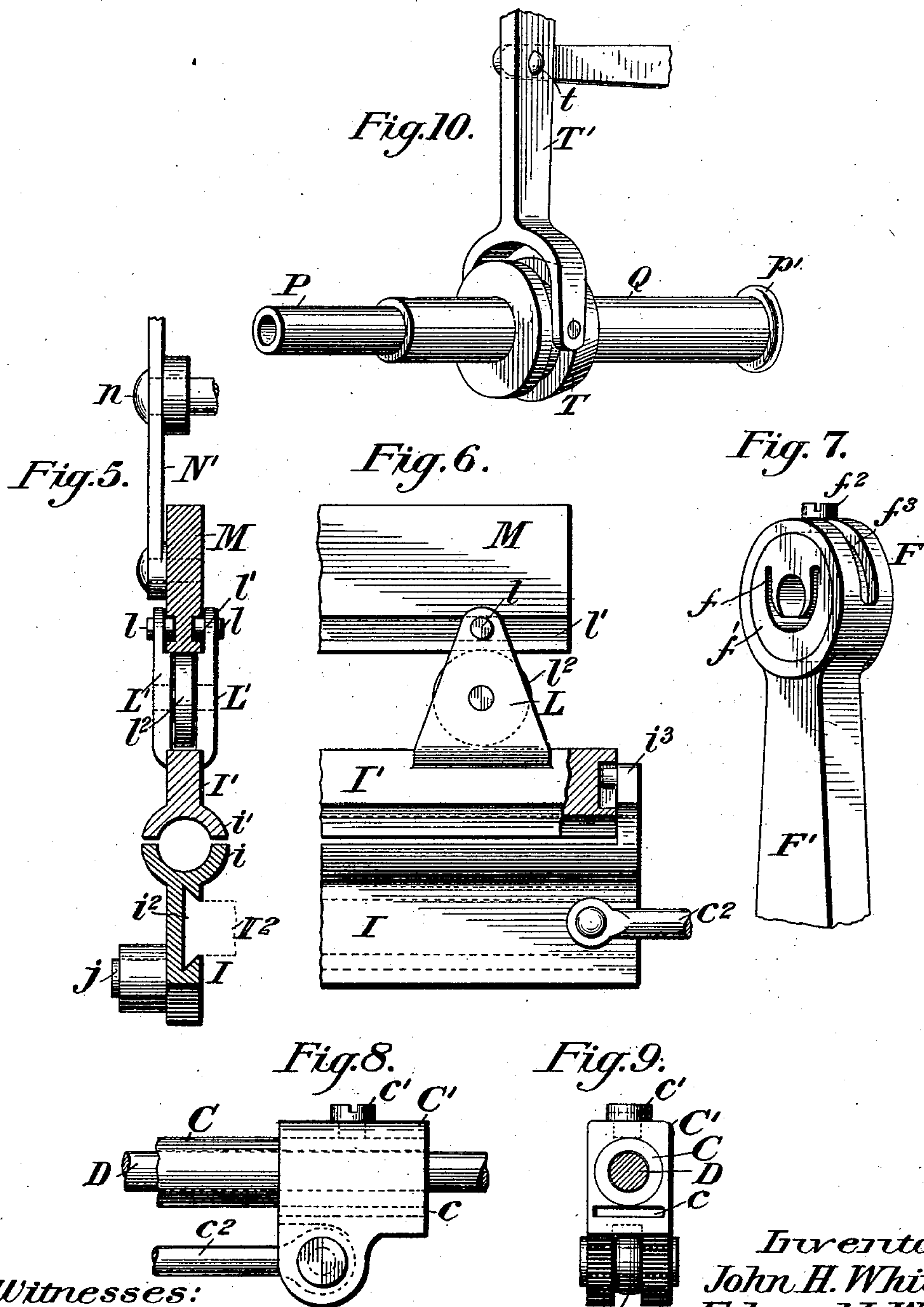
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3 Sheets—Sheet 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN HOWARD WHITE AND EDWARD LOWRY WHITE, OF ENGLEWOOD,
NEW JERSEY.

MACHINE FOR MAKING PAPER TUBES.

SPECIFICATION forming part of Letters Patent No. 710,386, dated September 30, 1902.

Application filed October 23, 1901. Serial No. 79,713. (No model.)

To all whom it may concern:

Be it known that we, JOHN HOWARD WHITE and EDWARD LOWRY WHITE, citizens of the United States, formerly residing at Washington city, in the District of Columbia, but now residing at Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Machines for Making Paper Tubes, of which the following is a specification.

Our present invention more especially relates to and constitutes improvements upon the apparatus illustrated in United States Letters Patent No. 642,656, granted to us jointly February 6, 1900. Some of our improvements may, however, be used without the others and in machines differing in form, construction, and operation from the machine shown in said patent.

Our present improvements relate more especially to the tube forming and feeding devices; and our improvements consist in certain novel combinations and organizations of instrumentalities hereinafter described, and set forth in the claims at the end of this specification.

The accompanying drawings show so much of one form of approved apparatus for carrying out our invention as is necessary to illustrate the subject-matter claimed.

Unless otherwise specified the different parts of the apparatus are of usual well-known construction. The feed end is hereinafter called the "front" of the machine and the discharge end the "rear."

Figure 1 is an elevation of one side of the essential parts of the apparatus. The remaining figures are on a larger scale. Fig. 2 is a vertical central longitudinal section through the cutting apparatus; Fig. 3, a vertical transverse section therethrough on the line 3 3 of Fig. 2; Fig. 4, a view in elevation showing one side of the feed mechanism; Fig. 5, a view of the clamping devices, partly in vertical cross-section, on the line 5 5 of Fig. 4; Fig. 6, a detail view of one side of some parts of the clamping devices; Fig. 7, a detail view in perspective of the adjustable former of the paper strip. Figs. 8 and 9 are respectively side and end views showing details of the reciprocating mandrel and paper-

strip guide. Fig. 10 is a view in perspective showing the details of the devices for actuating the cutters.

The paper strip *a* is shown as passing from a suitably-mounted roll A between a guide-plate *b* and a paster B, which gums the strip in the usual way, preferably in this instance on the upper side of one edge. The strip then passes through a horizontal slot or flat guide *c*, Fig. 9, in a collar C', mounted on a tubular mandrel C, reciprocating on a supporting-rod D, mounted in standards *e e'* on the frame or bed-plate E. The rear end *d'* of this supporting-rod is made of the full size of the bore of the tube, (see Fig. 2,) while that portion *d* of it forward of the bracket or standard D', through which it passes, is of about one-half of the diameter of said rear portion. The collar C' is mounted on the front end of the tubular mandrel C, to which it is adjustably secured by a clamp-screw *c'*. This tubular mandrel extends backward beyond the feed-clamps. (See Figs. 1 and 4, which also show it as reciprocated by a link-rod *c''*, pivoted to the lower feed-clamp and collar C', respectively. See also Figs. 6, 8, and 9.) The paper strip *a* passes from the flat guide *c* through a U-shaped former *f*, Fig. 7, in a circular block *f'*, capable of turning axially around the mandrel and supporting-rod in a ring F in a standard F', mounted on the bed-plate or frame E. A clamp-screw *f''*, passing into the block *f* and adjustable in a slot *f'''* in the ring, serves to adjust and hold the former in proper relation to the paper strip and mandrel. This former is somewhat similar to the one shown in our Patent No. 642,656, above mentioned; but it is supported on the standard F independently of the mandrel instead of being mounted directly thereon, as shown in said patent. This construction is, in fact, essential, as the mandrel reciprocates through the former on the supporting-rod, which likewise extends there-through. From this former the partially-folded paper strip passes through a folder G, also mounted on a bracket *g* on the frame, which folder completes the formation of the tube by wrapping it upon and around the tubular mandrel. The finished tube then passes through a heater H, mounted on the frame

and provided with a Bunsen or other burner *h*, the construction and operation of these devices being substantially similar to that of the corresponding devices in our patent above mentioned. In the heater the tube is given a permanent form. The heat is sufficient to soften the sizing or other material contained in the paper, enabling the tube to receive a definite form and to retain this form after it emerges from the heater. In our prior patent the mandrel was stationary and the tube moved along the mandrel while moving through the heater. In the machine constructed in accordance with our present invention the tube immediately after being folded by the folding devices is carried through the heater by the reciprocating mandrel, so that the tube and mandrel move together through the heater. Thus considerable friction is avoided, and the machine is found to work more efficiently by this construction.

The feed mechanism shown consists, essentially, of two clamps *I I'*, the adjacent faces of which form semicircular forks *i i'*, which encircle the reciprocating tubular mandrel or sleeve *C*, the paper tube passing between the mandrel and clamps. The lower or driven clamp *I* is shown as provided with a groove *i²*, traversing a guide-bar *I²* on the frame. A stud *j* on this clamp is traversed by a slotted pitman *J*, pivoted on the frame and vibrated by a stud *k* on a driving-pulley *K*, this stud traversing a slot *k'* in the pitman. (See Fig. 4.) The lower clamp is thus caused to travel parallel with and in a fixed relation to the mandrel or sleeve. The upper clamp *I'* likewise travels parallel with the mandrel, but approaches and recedes from it periodically to clamp or release the paper tube, as required. The upper clamp lies between lugs *i³* at opposite ends of the lower clamp and is thus compelled to partake of its reciprocating movement. Arms *L L'*, secured to the opposite sides of the upper clamp at each end, carry stud-pins *l*, traversing grooves *l'* in a presser-bar *M*, suspended from standards *M²* on the frame by means of elbow-levers *N N'*, rocking on pivots *n*. Friction-rollers *l²*, interposed between the upper clamp and its presser-bar and turning in bearings in the lugs *L L'*, serve to relieve strain and diminish friction. The upper ends of the elbow-levers *N N'* are connected by a link-rod *N²*, driven by a bell-crank *O*, actuated by a cam *o* on the shaft *v*, as hereinafter more fully explained. The pressure of the upper clamp upon the paper tube is normally regulated by means of a coil-spring *n'*, connecting one of the elbow-levers *N* and a bracket-arm *n²* on the standard *M²*. A set-screw *n³* regulates the tension of this spring and limits the pressure of the upper clamp on the paper tube. These clamps feed the finished tube from the traversing tubular mandrel or sleeve *C* onto or over the enlarged portion *d'* of the supporting-rod *D*, which extends clear

through and projects beyond the rear end of the machine.

A tubular sleeve *P* is mounted at its rear end in a standard or bracket *e'* on the frame and is capable of turning and moving endwise therein, but is clamped in any desired relation to the other parts of the machine by a binding-screw *p*. (See Fig. 2.) A collar *Q* turns freely on this sleeve, being prevented from moving endwise therein, however, by a suitable stop *p'*. A suitably-driven driving-pulley *R* is secured on this collar by a clamp-screw *r* to rotate the cutter. The drawings also show cutter-disks *S*, mounted on arms *S'*, rocking on pivots *s* on a ring *S²*, carried by and turning with the collar *Q*, above mentioned. The cutters are normally drawn away from the mandrel by retracting-springs *s'* and pressed toward it to sever the finished paper tube by means of a cone *T*, movable endwise on the collar *Q* and acting upon the rocking arms. (See Fig. 2.) This cone is shifted as required by means of a lever *T'*, Fig. 10, rocking on a pivot *t* on the frame and actuated by the bell-crank lever *O*, with which it is connected by a turnbuckle *t²* or other well-known adjusting device, which regulates to a nicety the relation of the cone and rocking arms, and consequently the relation of the cutter to the tube. The details of the construction of this cutter may be modified in various well-known ways without departing from the spirit of our invention. For instance, the drawings show disk cutters arranged on opposite sides of the mandrel. These cutters may or may not rotate on their axes as well as around the mandrel. Furthermore, one disk might be omitted, if desired, and the cutter still do good work. Other well-known forms of cutter besides a disk might be employed, as the entire perimeter of the cutter need not necessarily act upon the paper tube. Such modifications involve no invention, but the mere skill of the workman.

The drawings show a driving-shaft *u*, carrying a sprocket-wheel *U*, actuating a similar wheel *U²* on a counter-shaft *u'* by means of a sprocket-chain *U'*. A pulley *K* on the axle *u'* carries a stud *k*, traversing a slot in the pitman *J*, actuating the feed-clamps, as hereinbefore explained. A spur-gear *V* on the shaft *u* drives a similar gear *V'* on a shaft *v*, carrying a cam *o*, actuating the upper feed-clamp and the cutters through the bell-crank *O*, as hereinbefore explained. The details of the driving-gear may be varied in well-known ways. For instance, the drawings show and describe one set of tube-making devices and gearing for actuating them. Obviously, however, a plurality of such devices may be employed, as shown in our patent above mentioned. The drawings also show one cam only actuating both the feeding and cutting devices; but in practice it would be, perhaps, desirable to actuate them by separate

cams, which could easily be done in well-known ways. The mechanism is of course to be driven from some suitable prime mover.

In starting the machine the paper strip necessarily has first to be drawn by hand through the various guides, which fold it around the mandrel and then through the heater and feed-clamps. The automatic operation of the machine begins with the paper tube grasped between the mandrel and feed-clamps, which carry forward the tube and mandrel until the latter reaches the enlarged end of the supporting-rod. The clamps then release their grasp upon the tube and mandrel and return to the position shown in Fig. 1, the mandrel sliding within the tube and returning with the clamps. The latter then at the proper time renew their grasp upon the paper tube and mandrel and feed them along, the paper strip of course being simultaneously drawn through the tube-forming devices. This forward feed of the clamps moves the finished tube over the mandrel and the enlarged end of the supporting-rod. The feed-clamps and mandrel then return to their normal position. During the pause in the movement of the paper tube thus occasioned the cone advances on the collar Q and forces the cutter against the tube and its supporting-rod, thus severing the tube without crushing it. The cutter retracts out of the way as the feed is resumed until the proper time for its next action. The relation of the cutter and support can be adjusted to a nicety by means of adjusting devices, such as t^2 , so as to sever the tube without cutting into the supporting-rod. As the reciprocating mandrel travels with the paper tube during its forward feed, the friction caused by the passage of the latter through the machine is greatly diminished. As the tube while being severed rests on the enlarged portion of the supporting-rod, the cutter acts rapidly and effectively without crushing it.

The word "folding-guide" hereinafter used in the claims is intended to include either or both of the devices hereinbefore called a "former" or "folder."

We claim as of our own joint invention—

1. A former or guide for partially folding a paper strip comprising a support, a block capable of turning therein, having a folding-guide therein, and an axial perforation therethrough, a mandrel reciprocating through said perforation, and devices for adjusting the block around the mandrel in its support.

2. The combination, substantially as hereinbefore set forth, of a folding-guide, a reciprocating mandrel adapted to carry a partially-folded paper strip therethrough, and a supporting-bar on which the mandrel traverses.

3. The combination, substantially as hereinbefore set forth, of a reciprocating mandrel and a paper-strip guide attached directly thereto.

4. The combination, substantially as hereinbefore set forth, of a fixed folding-guide, a reciprocating mandrel adapted to carry a par-

tially-folded paper strip therethrough, and a paper-strip guide carried by the mandrel.

5. The combination, substantially as hereinbefore set forth, of a supporting-rod, a mandrel reciprocating thereon, a paper-strip guide carried by the mandrel, and a folding-guide traversed by the mandrel.

6. The combination, substantially as hereinbefore set forth of a reciprocating mandrel, a guide attached directly thereto, a fixed former or partial-folding guide and a finishing-folding guide, through which the mandrel carries the paper strip.

7. The combination, substantially as hereinbefore set forth, of a reciprocating mandrel, a paper-strip guide attached directly thereto and two folding-guides through which the mandrel carries the paper strip to complete the formation of the tube.

8. The combination, substantially as hereinbefore set forth, of pasting mechanism, a supporting-rod, a mandrel reciprocating thereon, and a folding-guide through which the pasted strip is carried by the mandrel.

9. The combination, substantially as hereinbefore set forth, of folding-guides, a mandrel, a heater encircling the mandrel and which softens the paper and sets it in permanent form after the guides have formed it into a tube, a supporting-rod passing through the guides, mandrel and heater and on which the mandrel slides and means for drawing the mandrel and paper simultaneously and coincidentally through the heater.

10. The combination, substantially as hereinbefore set forth, of a supporting-rod, a mandrel reciprocating thereon, and reciprocating feed-clamps which carry forward the paper tube and mandrel on the rod.

11. The combination, substantially as set forth of a reciprocating mandrel, fixed folding-guides which complete the formation of the tube, and reciprocating feed-clamps separate from the folding-guides, which clamps carry forward the finished tube and mandrel.

12. The combination, substantially as hereinbefore set forth, of a supporting-rod, a mandrel reciprocating thereon, folding-guides, and feed-clamps which carry forward the paper tube on the mandrel.

13. The combination, substantially as hereinbefore set forth, of pasting mechanism, a reciprocating mandrel, folding-guides, and feed-clamps separate from the folding-guides, which clamps carry forward the pasted tube on the mandrel.

14. The combination, substantially as hereinbefore set forth, of pasting mechanism, a supporting-rod, a mandrel reciprocating thereon, folding-guides, and reciprocating feed-clamps which carry forward the pasted tube on the mandrel.

15. Feed-clamps, substantially such as hereinbefore set forth, comprising a lower member reciprocating in a fixed path, an upper member reciprocating therewith and movable laterally relatively thereto, a laterally-

movable presser-bar connected with the upper member, and means for raising and lowering the presser-bar and upper member positively to open and close the clamp.

5 16. The combination, substantially as here-
inbefore set forth, of the upper member of
the feed-clamp, a longitudinally-grooved
presser-bar, lugs connected with the upper
member traversing these grooves, rocking le-
10 vers carrying the presser-bar, a link-rod con-
necting these levers with actuating mechan-
ism which releases the clamp, a spring which
normally closes the clamp, and an adjusting-
stop regulating the pressure of the clamp.

15 17. The combination, substantially as here-
inbefore set forth, of the lower feed-clamp
reciprocating in a fixed path, the upper clamp
reciprocating therewith and movable later-
ally relatively thereto, a supporting-rod, and
20 a mandrel movable thereon by the clamps
and carrying the finished tube.

18. The combination, substantially as here-
inbefore set forth, of a supporting-rod, a re-
ciprocating mandrel, means for forming a
25 paper tube around the mandrel, and a cutter
revolving around the supporting-rod and

adapted to sever the tube delivered thereto
by the mandrel.

19. The combination, substantially as here-
inbefore set forth, of a supporting-rod over 30
which the finished paper tube passes, a cut-
ter revolving around the rod, means for ap-
proximating the cutter and rod to sever the
tube between them, and devices for adjust-
ing the position of the cutter relatively to the 35
axis of the supporting-rod, so that the tube
may be severed without cutting into the rod.

20. The combination, substantially as here-
inbefore set forth, of a reciprocating man-
drel, its supporting-rod having an enlarged 40
rear portion, means for forming a tube around
the mandrel, devices feeding the mandrel and
tube to the enlarged portion of the support-
ing-rod, and a cutter severing the tube into
proper lengths. 45

In testimony whereof we have hereunto
subscribed our names.

JOHN HOWARD WHITE.

EDWARD LOWRY WHITE.

Witnesses:

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