

(No Model.)

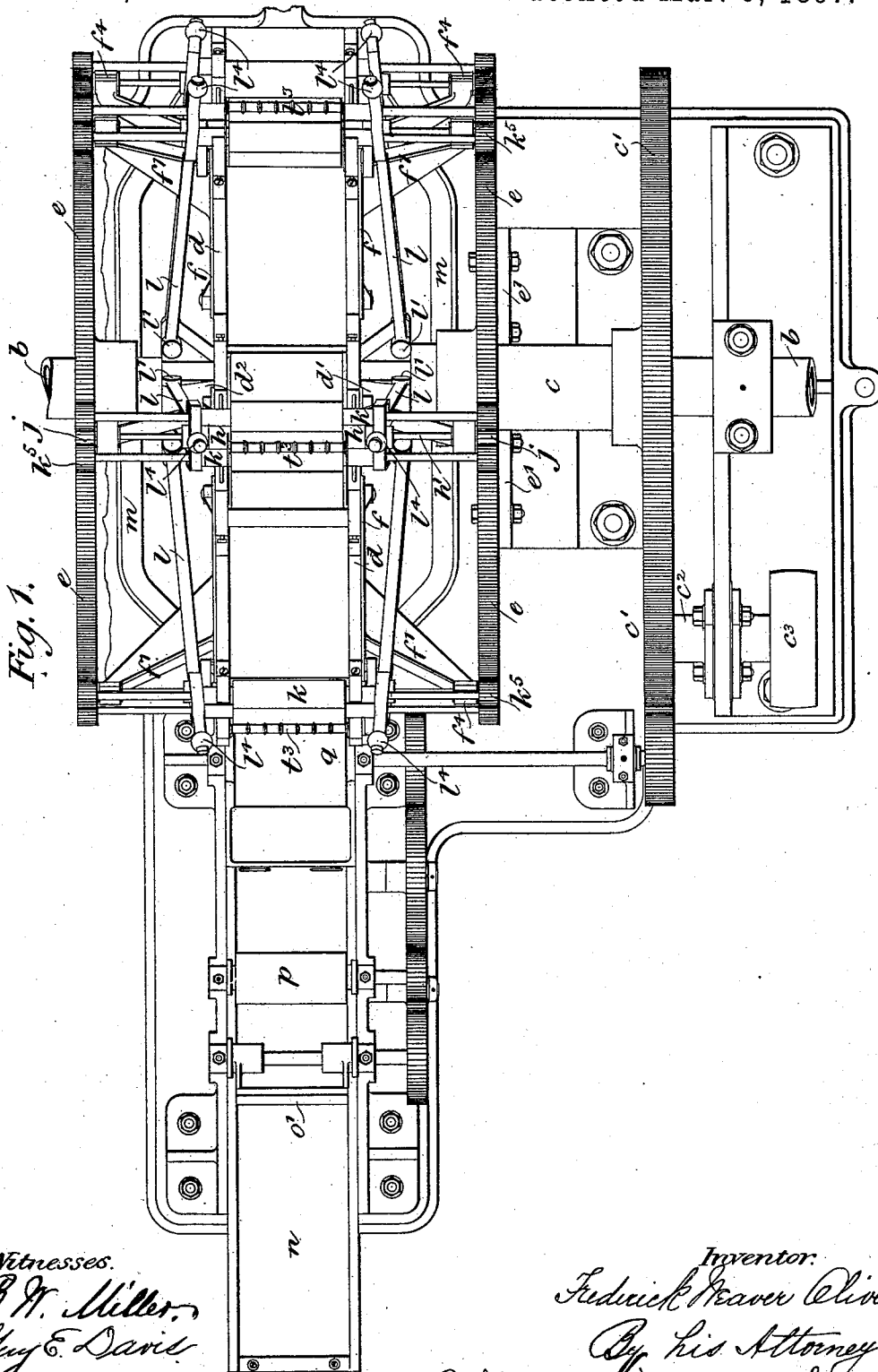
5 Sheets—Sheet 1

F. W. OLIVER.

APPARATUS FOR MAKING PAPER OR OTHER TUBES.

No. 578,355.

Patented Mar. 9, 1897.



Witnesses.

B. H. Miller,
Ray E. Davis

Inventor.

Fredrick Waver Oliver,
By his Attorneys,
Baldern Davidson & Wright

(No Model.)

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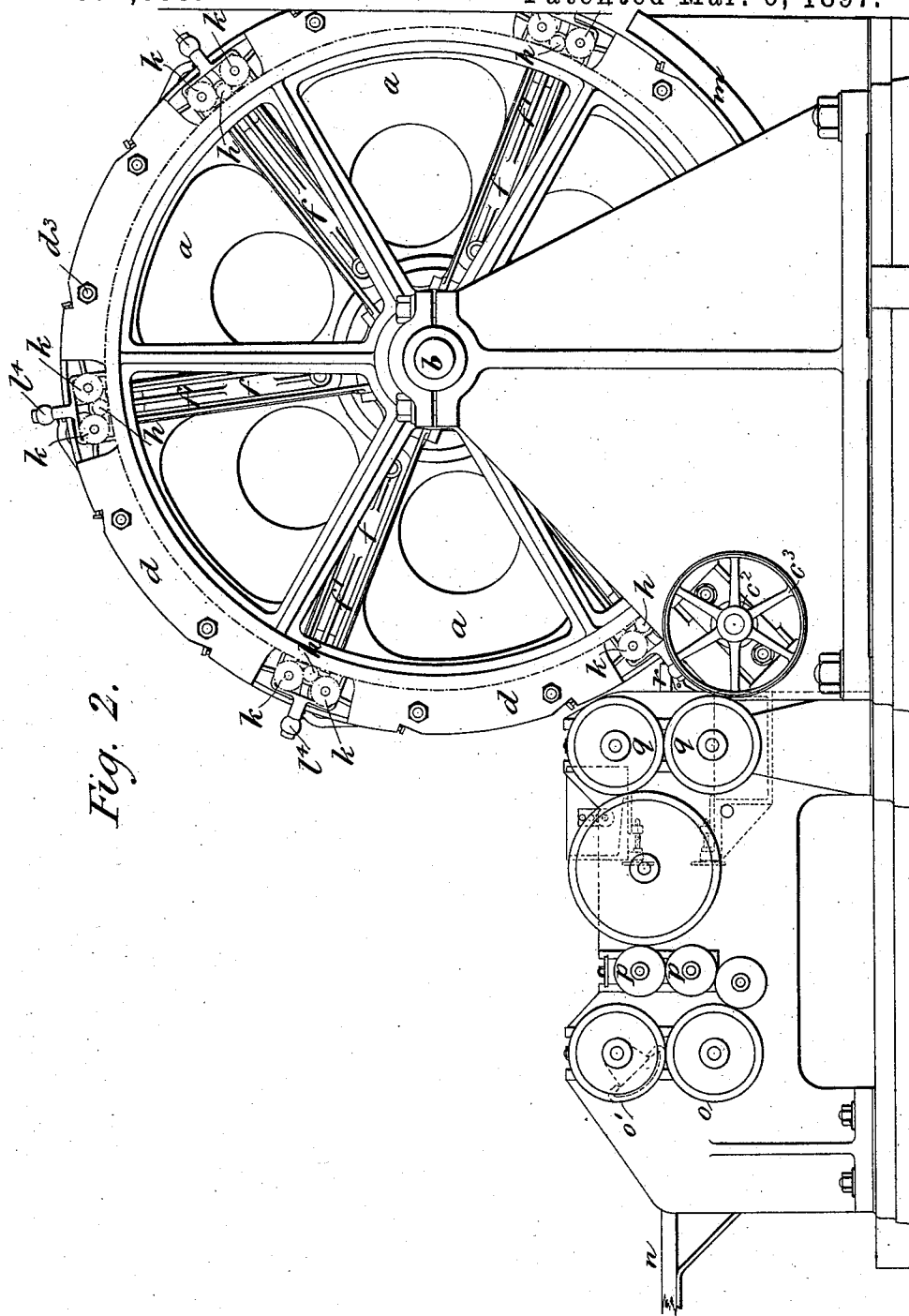


Fig. 2.

Witnesses

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(No Model.)

5 Sheets—Sheet 3.

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Fig. 3.

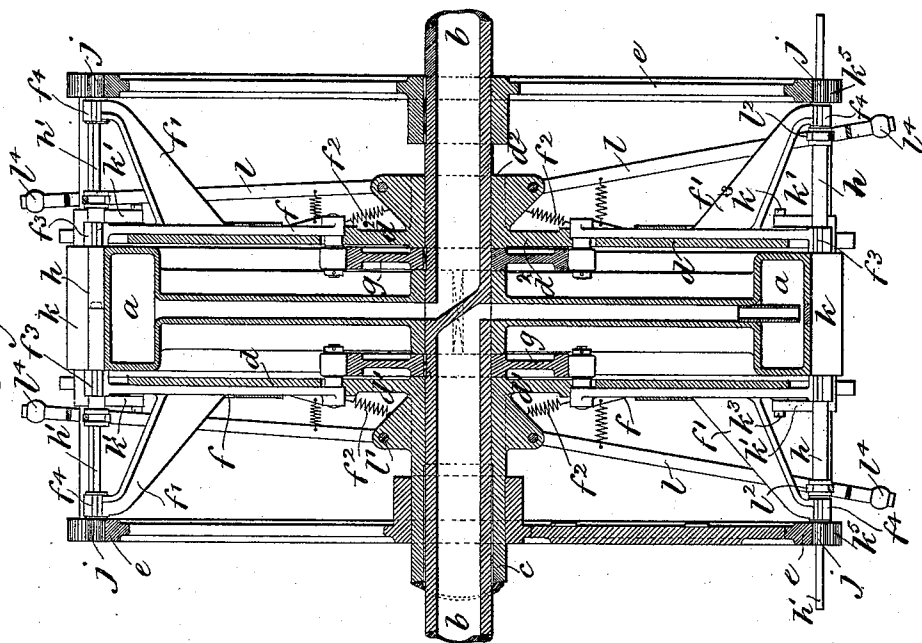
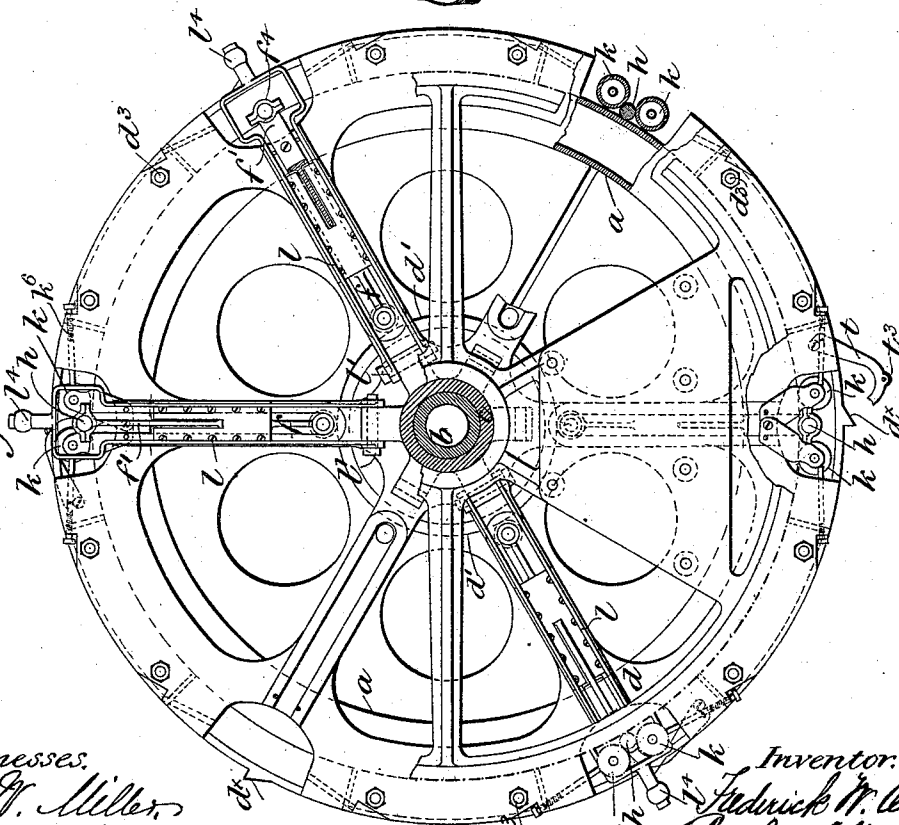


Fig. 4.



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(No Model.)

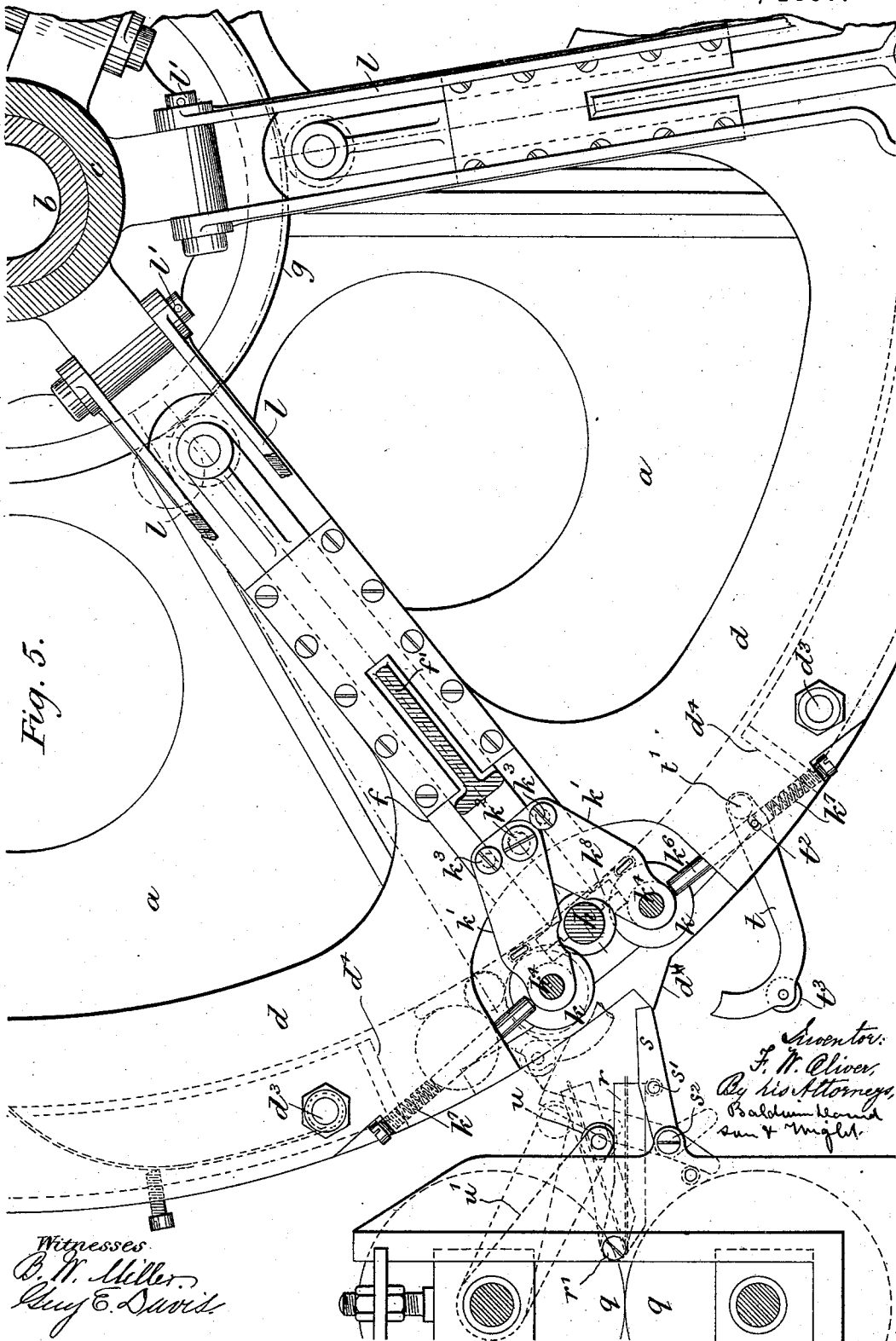
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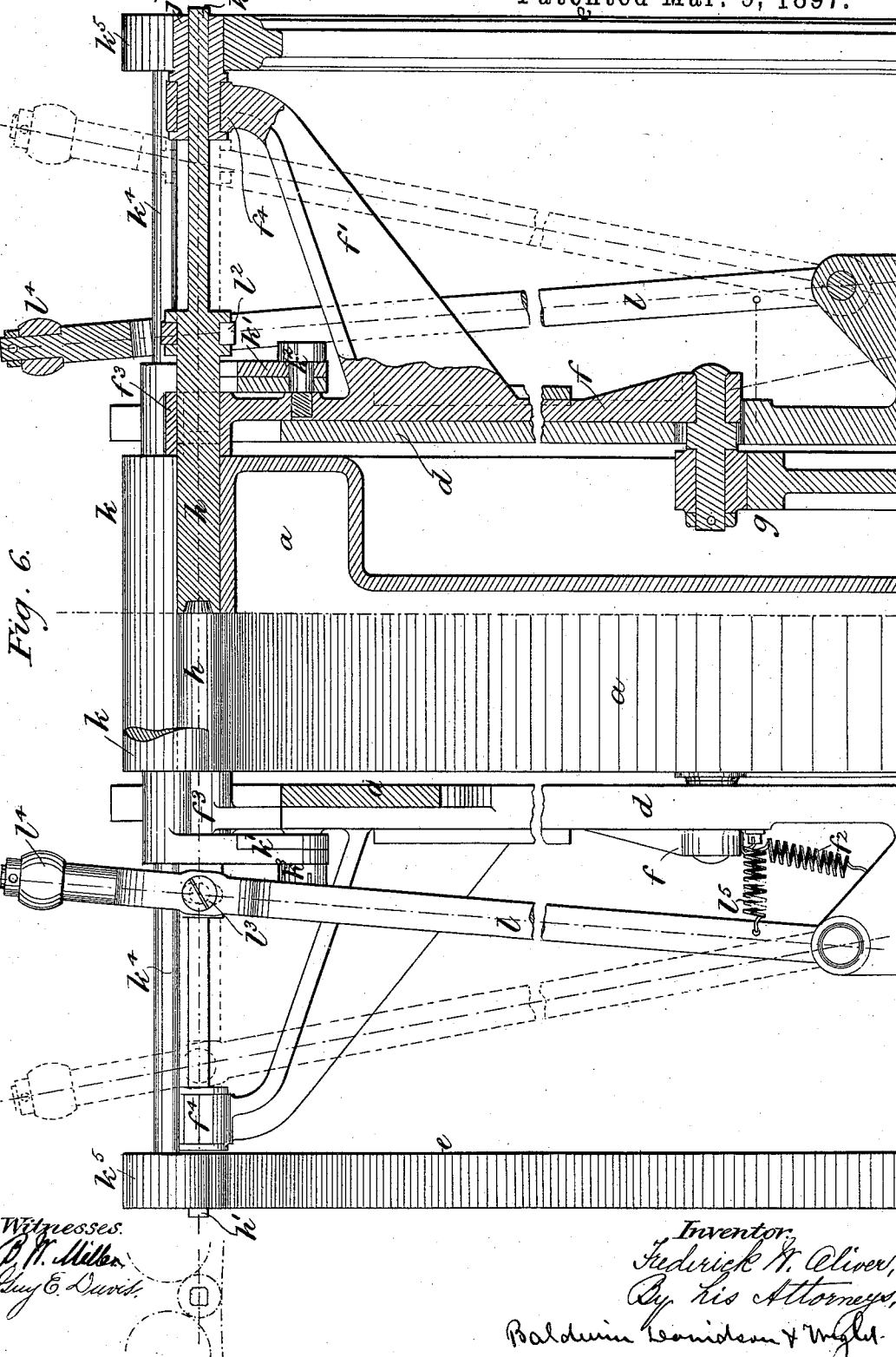
5 Sheets—Sheet 5.

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APPARATUS FOR MAKING PAPER OR OTHER TUBES.

No. 578,355.

Patented Mar. 9, 1897.



UNITED STATES PATENT OFFICE.

FREDERICK WEAVER OLIVER, OF LONDON, ENGLAND.

APPARATUS FOR MAKING PAPER OR OTHER TUBES.

SPECIFICATION forming part of Letters Patent No. 578,355, dated March 9, 1897.

Application filed July 18, 1896. Serial No. 599,710. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK WEAVER OLIVER, a subject of the Queen of Great Britain, residing at 40 King Street, Cheapside, in the city of London, England, have invented certain new and useful Improvements in Apparatus for Making Paper or other Tubes, of which the following is a specification.

The object of this invention is to provide a machine by which tubes may be formed by winding pieces of paper or similar material coated with a cementing material onto a series of mandrels, one after another, and by drying or partially drying the tubes as they are formed and then automatically delivering the completed tubes in regular succession.

Figure 1 is a plan, and Fig. 2 a side elevation, of the machine. Fig. 3 is a vertical section, and Fig. 4 a side elevation, partly in section, of the frames and drum. Fig. 5 is a part side elevation, partly in section; and Fig. 6, a part vertical section showing details to a larger scale.

a is a stationary hollow drum keyed to a fixed steam-pipe *b*, by which it is supplied with steam and so kept heated.

c is a sleeve free to revolve on the pipe *b* and having fixed to it a toothed wheel *c'*, Fig. 1, gearing with a pinion on a shaft *c''*, driven by the belt-pulley *c'''*.

d is an open-work frame surrounding the drum *a*. The hub *d'*, Fig. 3, of one side is in one piece with the sleeve *c*, while the hub *d''* of the other side runs loose on the steam-pipe *b*, the two sides of the frame being connected at the circumference by bolts *d'''*, passing through distance-pieces *d''''*, Figs. 2 and 4.

e e are two stationary toothed wheels, one keyed to the steam-pipe *b* and the other carried by a bracket *e'*, Fig. 1, bolted to the base of the machine.

f are arms carrying brackets *f'* and free to move radially in guides in the frame *d*, being pulled inward by springs *f''*, Figs. 3 and 6, and being pressed outward periodically by stationary cams *g*, keyed to the steam-pipe *b*.

h are the mandrels, free to rotate axially in bearings *f'''* at the ends of the radial arms *f*, and square prolongations *h'*, Fig. 6, of them pass through corresponding holes in toothed pinions *j*, working in bearings *f''''* at the ends

of the bracket *f'* and gearing with the stationary rings of teeth *e*.

k are pressing-rolls working in bearings in links *k'*, Fig. 5, which are pivoted at *k''* to the frame *d* and at *k'''* to the radial arms *f*. The axes *k''''*, Fig. 6, of the rolls *k* have fixed to them pinions *k'''''*, gearing with the stationary rings of teeth *e*. The rolls *k* are normally kept pressed against the mandrels *h* by rods *k''''''*, Fig. 5, actuated by springs *k'''''''*.

l are levers pivoted at *l'* to lugs on the hubs *d'* *d''* of the frame *d* and having holes or eyes near their ends through which the mandrels *h* and rolls *k* or their spindles *k''''* pass. *l''*, Fig. 6, are pieces engaging with grooves in the mandrels *h* and carrying pins *l'''*, working in longitudinal slots in the levers *l*.

l'''' are rollers at the ends of the levers *l*, which come periodically against stationary cams *m*, Figs. 1 and 2, fixed on the bed of the machine, the levers *l* otherwise keeping the mandrel closed by the action of the springs *l''''''*.

n is a table, along which sheets of paper or other material are fed by hand or otherwise between the roller *o* and feed-segment *o'*, the feed-rolls *p p*, and pasting-rolls *q q*, from whence they are delivered on the platform *r*, Fig. 5, pivoted at *r'* and resting on the roller or pin *s'*, carried by the lever *s*, which is pivoted at *s''*.

The action of the apparatus is as follows: The frame *d*, revolving continuously, carries with it the mandrels *h* and pressing-rolls *k*, which also revolve about their own axes by reason of the pinions *j* and *k'''''* on them gearing with the stationary rings of teeth *e*. At the lower part of their course the mandrels *h* are not in contact with the drum *a* and the rolls *k* are not in contact with the mandrels *h* for the stationary cams *g* have pressed the arms *f* radially outward, as shown in Fig. 5. When a mandrel *h* comes opposite the feed, a sheet of paper, coated on one or both sides with cementing material, is thrust between it and one of the rolls *k*, and then the arm *f*, coming to the end of the rise of the cam *g*, is brought back by the springs *f''*, and the leading edge of the paper is nipped between the roll and the mandrel and the drum and the mandrel and is wound upon the latter. To still further insure that the leading edge of

the paper shall be wound properly around the mandrel, curved guide-segments k^8 may be fixed on the links k' , which when they come together form an almost continuous semicircular guide around the mandrel, leaving a space, however, between it and the mandrel, which is filled up by the paper or other material, while on the opposite side is a guide t , pivoted at t' to the frame d , which is slotted to receive pins t^2 , fixed to the spring-rods k^6 , so that immediately the rolls k move toward the mandrel h the nose of the guide comes close down onto the latter between the two rolls k . The guide t carries on its back a roller t^3 to assist in the passage of the paper. As the frame d continues to revolve, a projection d^4 on it comes against the nose of the lever s , so raising the platform r , as shown in dotted lines in Fig. 5, its mouth moving approximately with the mandrel.

u is a roller (in the form of a number of narrow disks separated by distance-pieces) pivoted to arms u' . This rests on the paper and by its weight maintains a suitable tension. As the mandrel revolves all the paper is wound up onto it, and the paste dried or partially dried by the tube being kept constantly bearing against the heated drum. When the winding is complete and the paste set, the mandrel is moved a short distance outward away from the heated drum, and the rollers and guides away from the mandrel, as above described. By means of a rise in the cams g the mandrel is then withdrawn and the tube ejected by any suitable ejector or allowed to drop away. To enable the mandrel to be withdrawn, it is divided transversely into two halves, as is clearly shown in Fig. 6, and one half is withdrawn from one end, the other from the other. The sliding endwise of the two parts of the mandrel is effected by means of the fixed cams m , which operate the levers l .

What I claim is—

1. The combination of a drum, a mandrel parallel to the axis of the drum and adjacent to its periphery and means for causing the mandrel to roll upon the curved surface of the drum.

2. The combination of a drum, a mandrel and pressing-rolls parallel to the axis of the drum and adjacent to its periphery, means for causing the mandrel to roll upon the curved surface of the drum and means for causing the rolls to roll upon the mandrel.

3. The combination of a drum, a mandrel parallel to the axis of the drum and adjacent to its periphery, a ring of teeth fixed relatively to the drum, a pinion carried by the mandrel gearing with the ring of teeth and means for rolling the pinion around the ring of teeth.

4. The combination of a drum, a mandrel and pressing-rolls parallel to the axis of the drum and adjacent to its periphery, a ring of teeth fixed relatively to the drum, pinions carried by the mandrel and by the rolls gearing with the ring of teeth and means for rolling the pinions around the ring of teeth.

5. The combination of a drum, frames on each side of the drum, means for rotating the frames relatively to the drum, radial guides in the frames, arms working in the guides, bearings at the ends of the arms, mandrels working in the bearings, links pivoted to the guides and to the arms, bearings in the links, pressing-rolls working in these bearings, a ring of teeth on each side of the drum and fixed relatively to it, pinions carried by the mandrels and by the rolls gearing with the rings of teeth and means for moving the arms in the radial guides.

6. The combination of a drum, frames on each side of the drum, means for rotating the frames relatively to the drum, radial guides in the frames, arms working in the guides, bearings at the ends of the arms, mandrels working in the bearings, links pivoted to the guides and to the arms, bearings in the links, pressing-rolls working in these bearings, a ring of teeth on each side of the drum and fixed relatively to it, pinions carried by the mandrels and by the rolls gearing with the rings of teeth, curved guides around the mandrels and means for causing them to approach the mandrels when the feed has taken place.

7. The combination of a drum, a mandrel made in halves parallel to the axis of the drum and adjacent to its periphery, means for causing the mandrel to roll upon the curved surface of the drum and means for causing the halves of the mandrel to separate longitudinally to discharge the finished tube.

8. The combination of a drum, a mandrel made in halves and pressing-rolls parallel to the axis of the drum and adjacent to its periphery, means for causing the mandrel to roll upon the curved surface of the drum, means for causing the rolls to roll upon the mandrel, and means for causing the halves of the mandrel to separate longitudinally to discharge the finished tube.

9. The combination of a drum, a mandrel made in halves parallel to the axis of the drum and adjacent to its periphery, a ring of teeth fixed relatively to the drum, a pinion carried by the mandrel gearing with the ring of teeth, means for rolling the pinion around the ring of teeth and means for causing the halves of the mandrel to separate longitudinally to discharge the finished tube.

10. The combination of a drum, a mandrel made in halves, and pressing-rolls parallel to the axis of the drum and adjacent to its periphery, a ring of teeth fixed relatively to the drum, pinions carried by the mandrel and by the rolls gearing with the ring of teeth, means for rolling the pinions around the ring of teeth and means for causing the halves of the mandrel to separate longitudinally to discharge the finished tube.

11. The combination of a drum, frames on each side of the drum, means for rotating the frames relatively to the drum, radial guides in the frames, arms working in the guides, bearings at the ends of the arms, mandrels

made in halves working in these bearings, links pivoted to the guides and to the arms, bearings in the links, pressing-rolls working in these bearings, a ring of teeth on each side 5 of the drum and fixed relatively to it, pinions carried by the mandrels and by the rolls gearing with the rings of teeth, means for moving the arms in the radial guides and means for causing the halves of the mandrel to separate longitudinally to discharge the finished 10 tube.

12. The combination of a drum, frames on each side of the drum, means for rotating the frames relatively to the drum, radial guides 15 in the frames, arms working in the guides, bearings at the ends of the arms, mandrels

made in halves working in these bearings, links pivoted to the guides and to the arms, bearings in the links, pressing-rolls working in these bearings, a ring of teeth on each side 20 of the drum and fixed relatively to it, pinions carried by the mandrels and by the rolls gearing with the rings of teeth, curved guides around the mandrels, means for causing them to approach the mandrels when the feed has 25 taken place and means for causing the halves of the mandrel to separate longitudinally to discharge the finished tube.

FREDERICK WEAVER OLIVER.

Witnesses:

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