

O. Morland.
Paper Mach.

No 12,027.

Patented Dec. 5, 1854.

Fig. 1

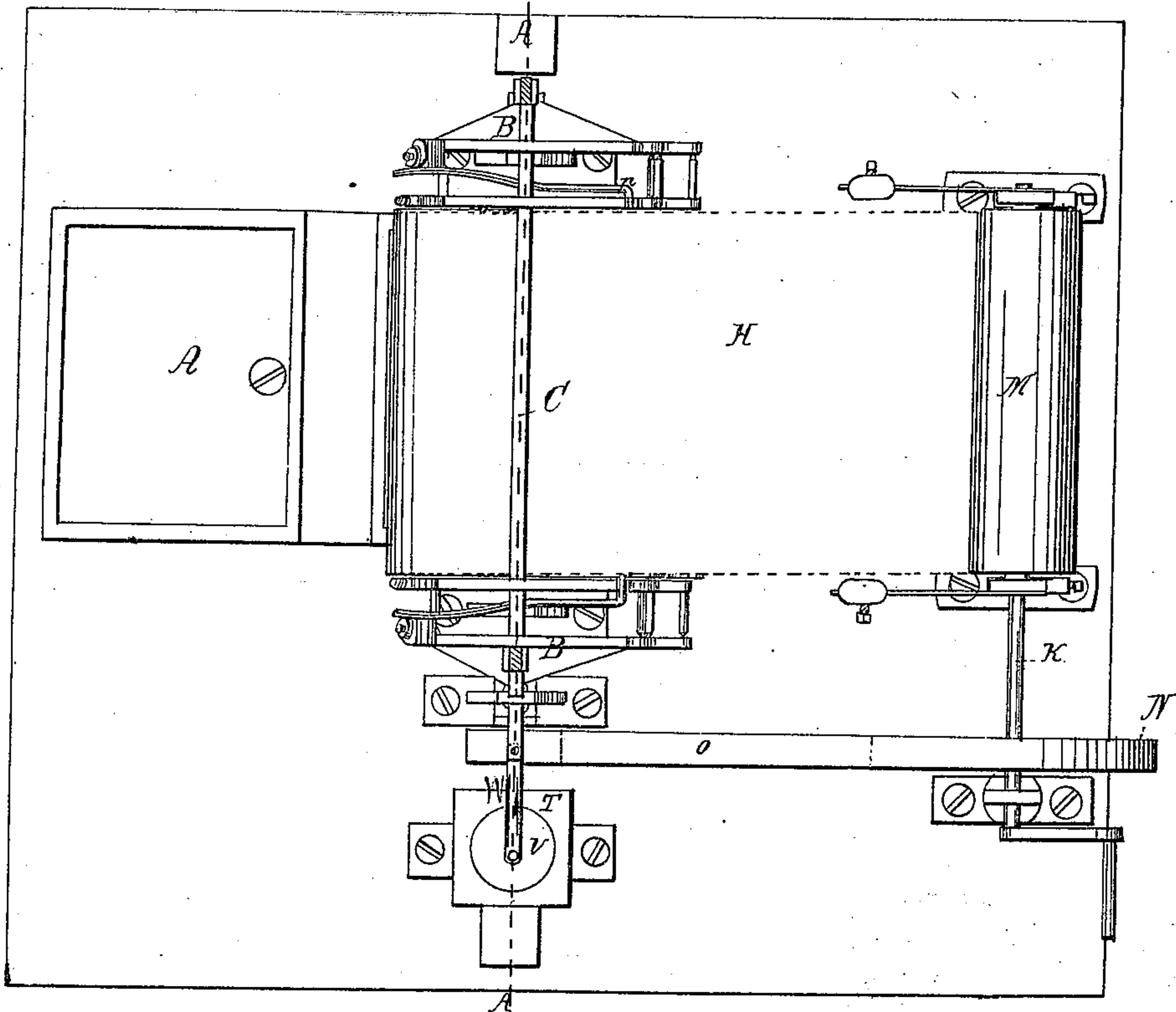
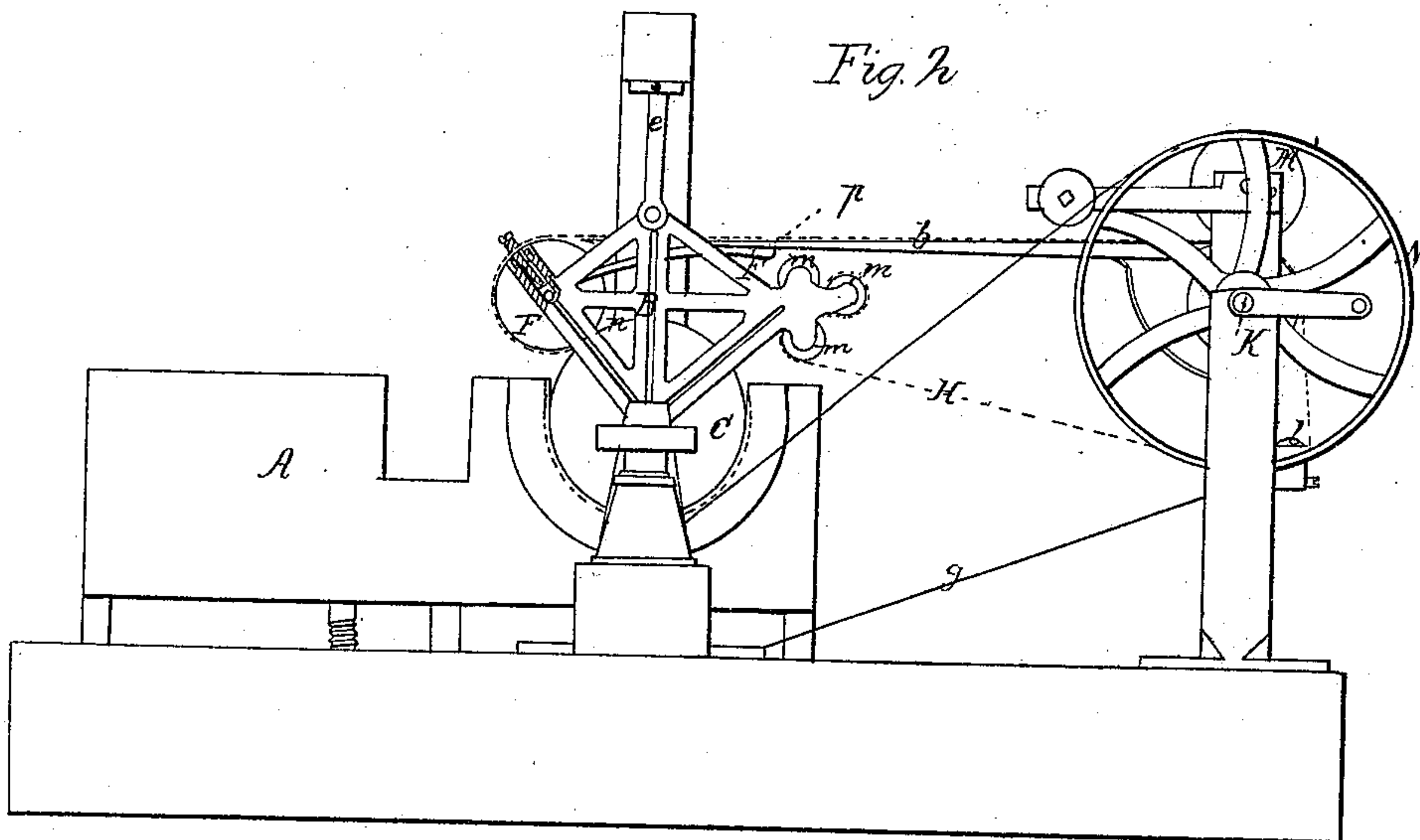


Fig. 2



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Fig 3

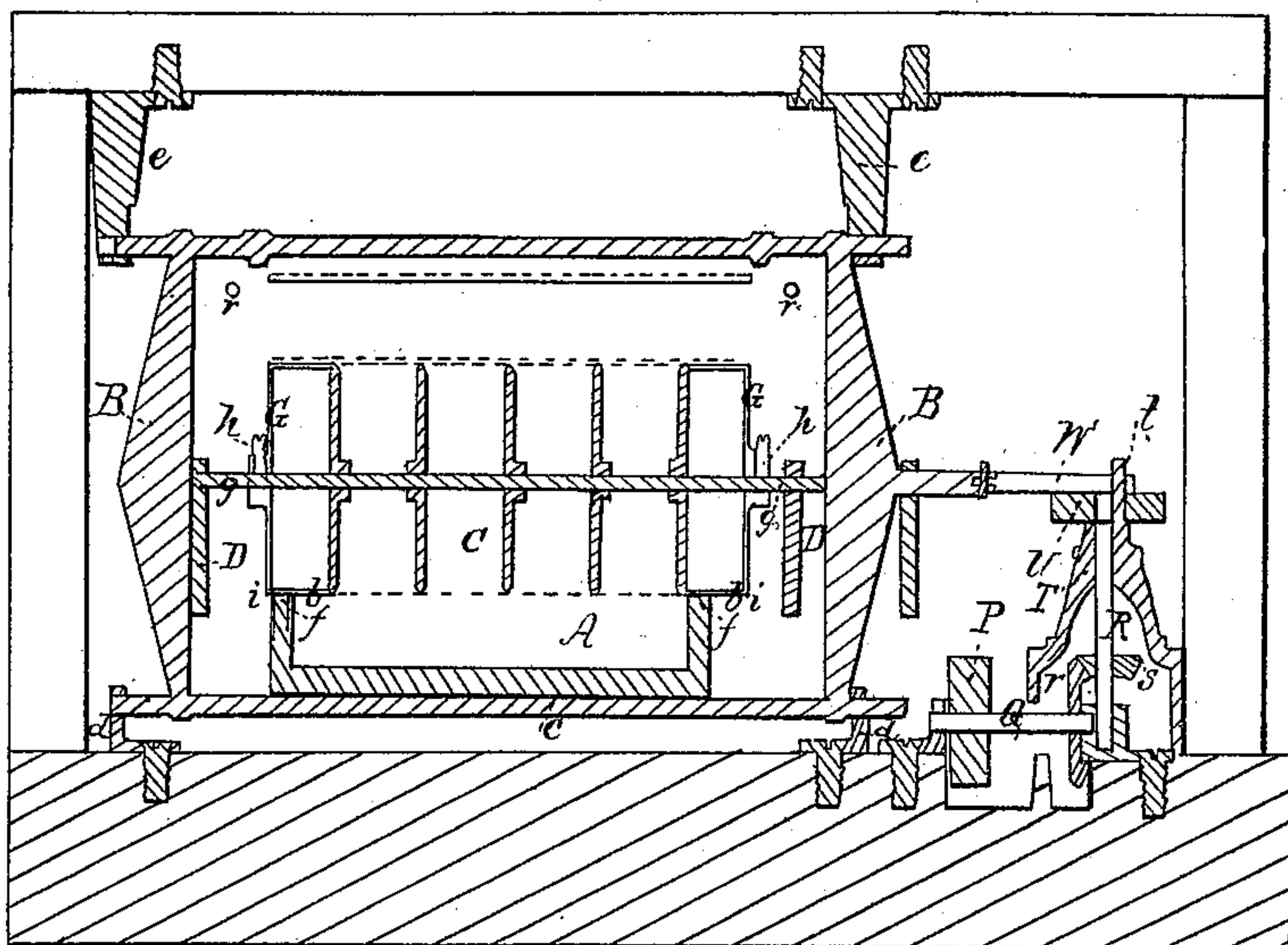
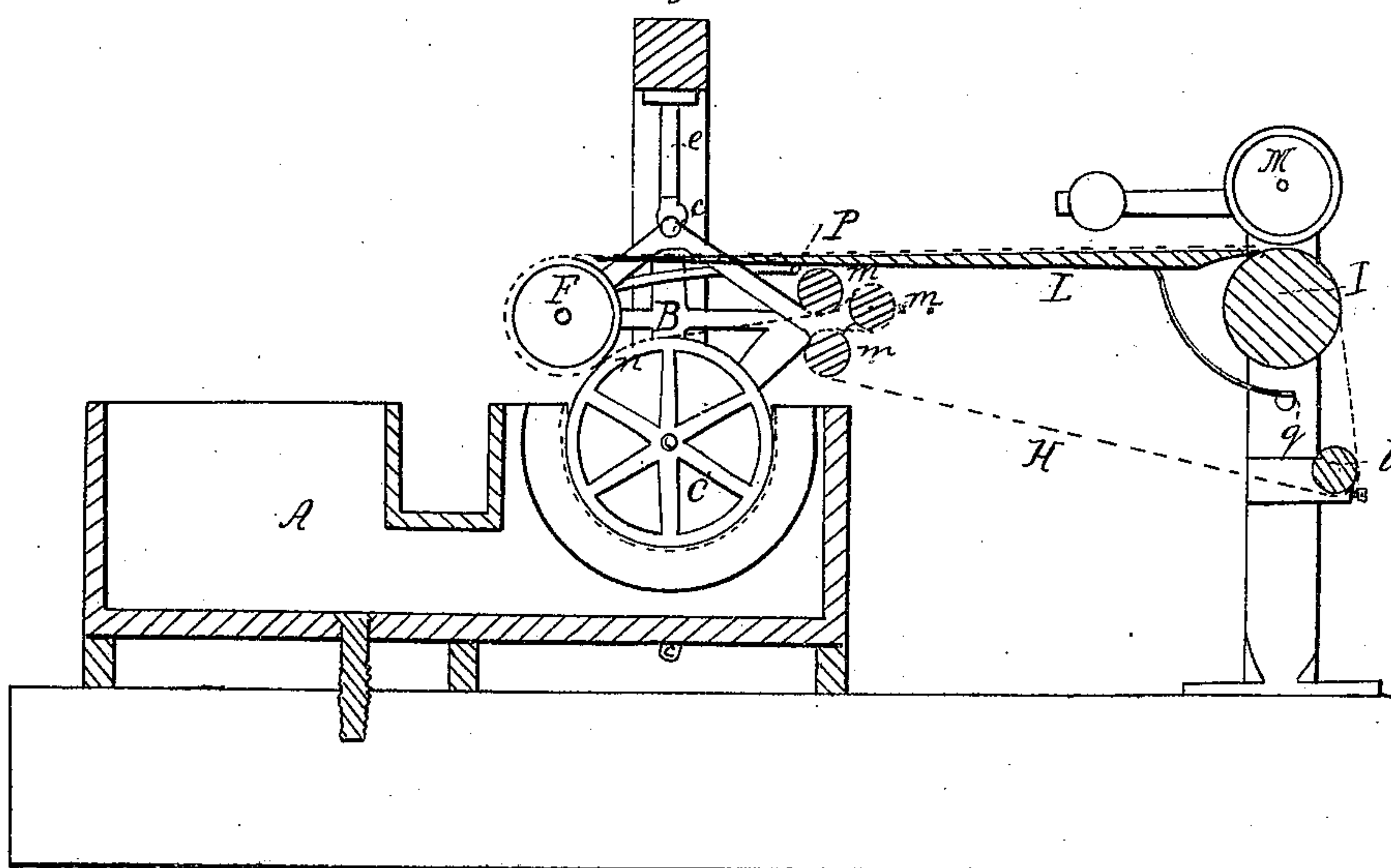


Fig 4



Sheet 3, 3 Sheets.

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Fig. 5.

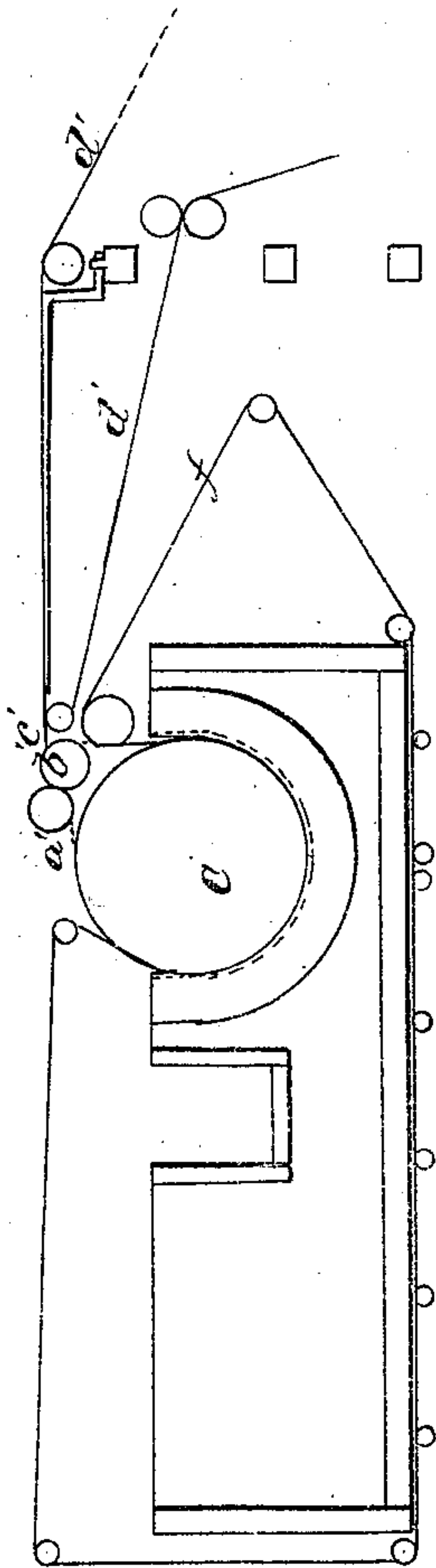
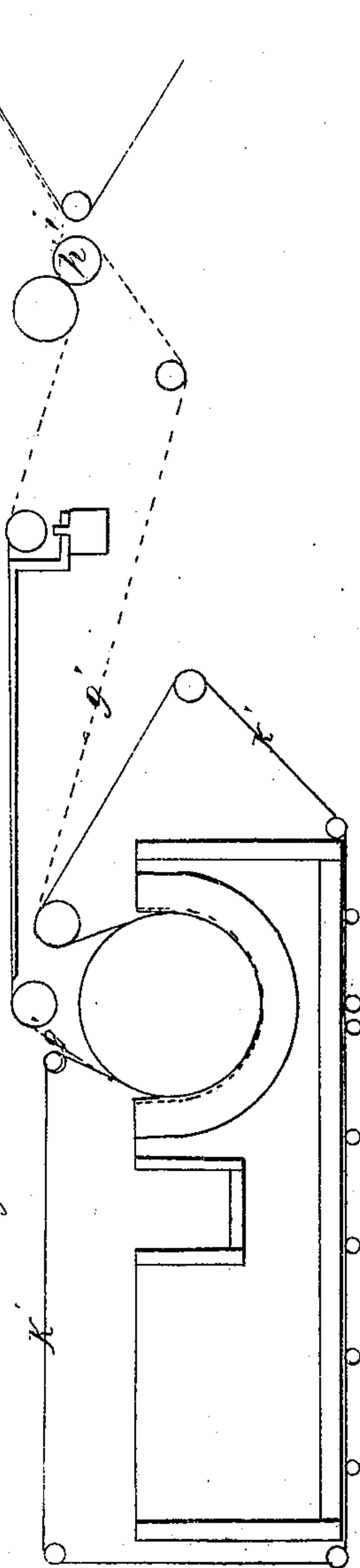


Fig. 6.



UNITED STATES PATENT OFFICE.

OBADIAH MARLAND, OF BOSTON, MASSACHUSETTS.

PAPER-MAKING MACHINE.

Specification of Letters Patent No. 12,027, dated December 5, 1854.

To all whom it may concern:

Be it known that I, OBADIAH MARLAND, of Boston, in the county of Suffolk and State of Massachusetts, have made certain
5 new and useful Improvements in Cylinder Paper-Machines, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, in which—

10 Figure 1 is a plan of a cylinder machine with my improvements attached. Fig. 2, a longitudinal elevation of the same. Fig. 3, a transverse vertical section upon the line A, A, of Fig. 1. Fig. 4, a longitudinal vertical section through the center of the machine. Figs. 5 and 6 are modified plans of
15 couching which will be referred to hereafter.

In the Fourdrinier machine the slight
20 shake given to the wire cloth is not sufficient to spread out the pulp horizontally, in the most desirable manner to form a good even and firm paper, before it has parted with its water, and by the time the water has
25 left it, the pulp is so set or fixed in an agglomerated lumpy condition that the "shake" cannot spread or equalize it. It is well known that if the "shake" motion is materially increased, the effect of such augmented shake is to pile up the pulp in the
30 center of the wire cloth and make the paper thicker in the middle than at the sides. The ordinary cylinder machine is not liable to this objection, as the fibers are gradually
35 deposited layer after layer upon the cylinder, and an exceedingly even and uniform web is the result. The paper made upon these machines is however liable to other objections which greatly diminish its value,
40 and which it is very desirable to remove. In the cylinder machine the fibers of the pulp, which are still floating in the liquid after they are attached at one end to the wire cylinder are all laid parallel to each
45 other in a longitudinal direction, and are not interwoven and made to cross each other as in the Fourdrinier machine; this results from the fact that the cylinder moves regularly and uniformly in one direction
50 through the pulp, and the consequence is that cylinder made paper is always much weaker in one direction than in the other.

To obviate the objections to which both of the above systems are liable, I have originated my present invention, by which I am
55 enabled to interlace and interweave the

fibers of the pulp upon the cylinder machine, and thus to combine the advantages of both this and the Fourdrinier machine, without the disadvantages of either.

The main feature of my invention consists in vibrating the revolving cylinder mold while it is immersed in the pulp, by which motion the fibers of the pulp as they are successively laid upon the cylinder mold, are
65 caused to overlay each other at angles dependent upon the relative velocities of the two motions of the cylinder, viz., its vibrating and revolving motion.

This invention is dependent mainly upon
70 the fact, that while one end of a fiber fastens itself to the surface of the cylinder mold, the other end is still floating in the liquid, and if unmolested will be laid longitudinally in the manner already explained,
75 but it may be easily moved in any direction and where the cylinder mold is vibrated as before suggested, will be thrown into a position parallel with the actual motion of the cylinder. I am thus enabled to produce
80 a paper of great strength in either direction, and of great uniformity of thickness and perfection of surface.

To enable others skilled in the art, to make use of my invention, I will proceed to describe the method which I have adopted of
85 carrying it out.

In the accompanying drawings A is the vat, which is elevated a short distance above the floor.

B is a strong iron frame, the horizontal rods *c, c*, of which, are carried by the standards *d, d*, and hangers *e, e*.

The cylinder mold C, is about 3 inches longer than the width of the vat A, in and
95 across which it is placed, the cylinder being immersed to the proper depth in the pulp; the ends of the cylinder at *b*, are metallic and adapted to slide easily upon the sides of the box, or rather upon the packing *f*, which
100 is interposed between it and the box to prevent the escape of the pulp;—the journals *g* of the cylinder which run in the A shaped standards D, support its whole weight, and are prolonged as seen in Fig. 3, and bear
105 upon the inner surface of the heads of the frame B, there being no space or play between the ends of the arbor and the frame heads.

The couch roll F has its bearings in the
110 frame B;—the pressure of this roll upon the cylinder mold C being made adjustable by

springs and screws as seen in Fig. 2, the spring giving ease to the motions of the couch roll upon the cylinder mold.

The heads G of the cylinder mold, are capable of a longitudinal motion upon the shaft *g*, independent of the cylinder mold itself, and are clamped in the desired position by means of the screws *h*. When the machine is in operation these heads are run back upon the shaft *g*, so as to leave a slight opening all around the cylinder mold at *i* for the escape of the water from the cylinder mold. Whenever it is necessary to stop, temporarily, the working of the machine the heads G are run up against the ends of the cylinder as seen in Fig. 3. If found necessary an india rubber or other packing may be introduced between the heads and the cylinder mold for the purpose of more effectually closing the joint between them.

The cylinder mold C, is caused to revolve by means of the felt cloth H, which passes over the felt roll I, beneath the felt stretcher *l*, around the felt spreader and carrying rolls *m*, thence it touches the cylinder mold at *n*, and passes around the couch roll F, back to the felt rolls I and M, between which and the couch roll it is supported by a felt bed L, one end of which rests upon the rod *p*, and is allowed to vibrate with the cylinder mold and couch roll, the other being supported upon brackets, and pivoted at the point *q*, to one of the transverse bars of the machine. The object of the felt bed is to prevent any flapping up and down motion of the felt cloth, and to steady it as it moves along. Under certain circumstances small friction rollers may be placed 10 or 12 inches apart across the felt bed to ease the motion of the felt across it. The journals of the felt spreader and carrying rolls *m*, run in boxes in the branching arms of the vibrating iron frame B, with which they vibrate; the former is wound spirally midway from its ends with felt or list to keep the felt cloth well spread.

The iron frame B, the cylinder mold, the couch roll, the felt spreader, and carrying rolls, and one end of the felt bed L, are vibrated in the following manner.

N is a pulley on the shaft K, which communicates motion through the band O to the pulley P upon the short shaft Q; this shaft carries a miter gear *r*, which engages with the gear *s* upon the vertical post R within

the shake monument T. U is the fly wheel upon the top of this shaft, which carries the wrist pin *t*, from which, through the connecting rod W, the vibratory motion is communicated to the frame B, and the parts connected therewith.

The ends of the arbors that bear against the inside surfaces of the iron frame B, are tipped with hardened steel or chilled iron, the points of the iron frame against which these arbors bear being similarly protected, the pieces of steel inserted within the frame for this purpose being made adjustable by means of a set screw to keep the bearings close and firm. These details however are simply referred to as they form no part of my present invention.

Upon the above described apparatus the paper is couched at the point *n* onto the felt cloth, from which it is taken in the customary manner after passing the rolls I, M.

In Figs. 5 and 6 are represented modified methods of couching, which may be adopted when the vibrating cylinder mold is employed.

In Fig. 5 an endless web of wire cloth *a'*, passes around the vibrating cylinder mold C, and over one of the vibrating couch rolls *b'*. The paper leaves the wire cloth at *c'*, and passes off as before, upon the endless felt cloth *d'*. The deckle straps *f'* pass over appropriate carrying rolls, and beneath the vat, which is elevated for the purpose.

A third method of couching which may be adopted with the vibrating cylinder mold is represented in Fig. 6. In this case a much longer wire cloth *g'*, is made use of, which passes around the vibrating cylinder mold as before, and over the non-vibrating couch roll *h'*, the paper leaving the wire cloth at *i'*, and the deckle straps *k'* passing beneath the vat as before.

What I claim as my invention and desire to secure by Letters Patent in cylinder paper machines in which the cylinder mold revolves within the vat and is partially immersed in the pulp, is—

Vibrating the revolving cylinder mold and the parts immediately connected therewith, as set forth, and for the purpose described.

OBADIAH MARLAND.

Witnesses:

SAM COOPER,
JOHN S. BLOW.