

(No Model.)

6 Sheets—Sheet 1.

E. BUXTORF.

YARN FEEDING DEVICE FOR KNITTING MACHINES.

No. 495,472.

Patented Apr. 18, 1893.

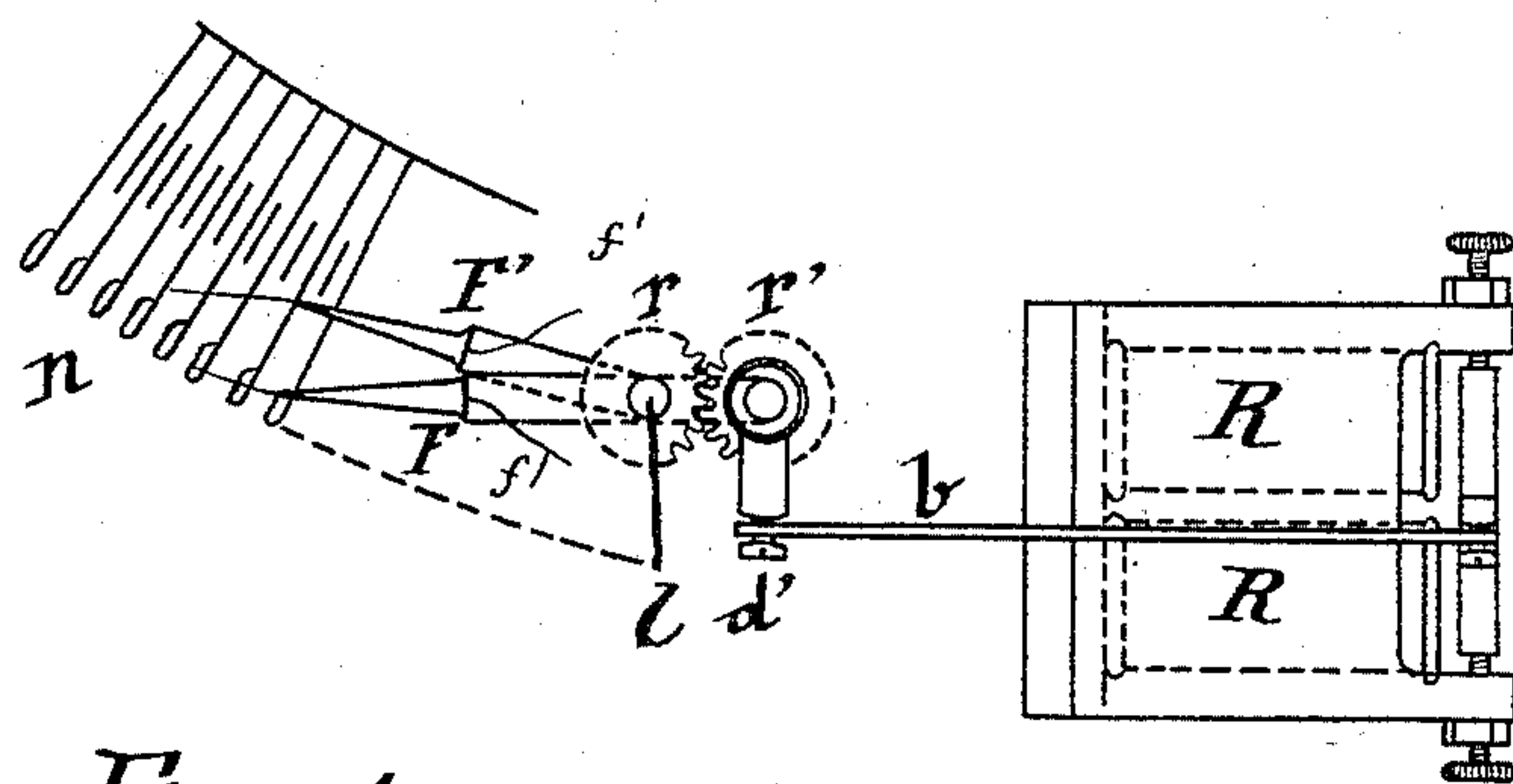
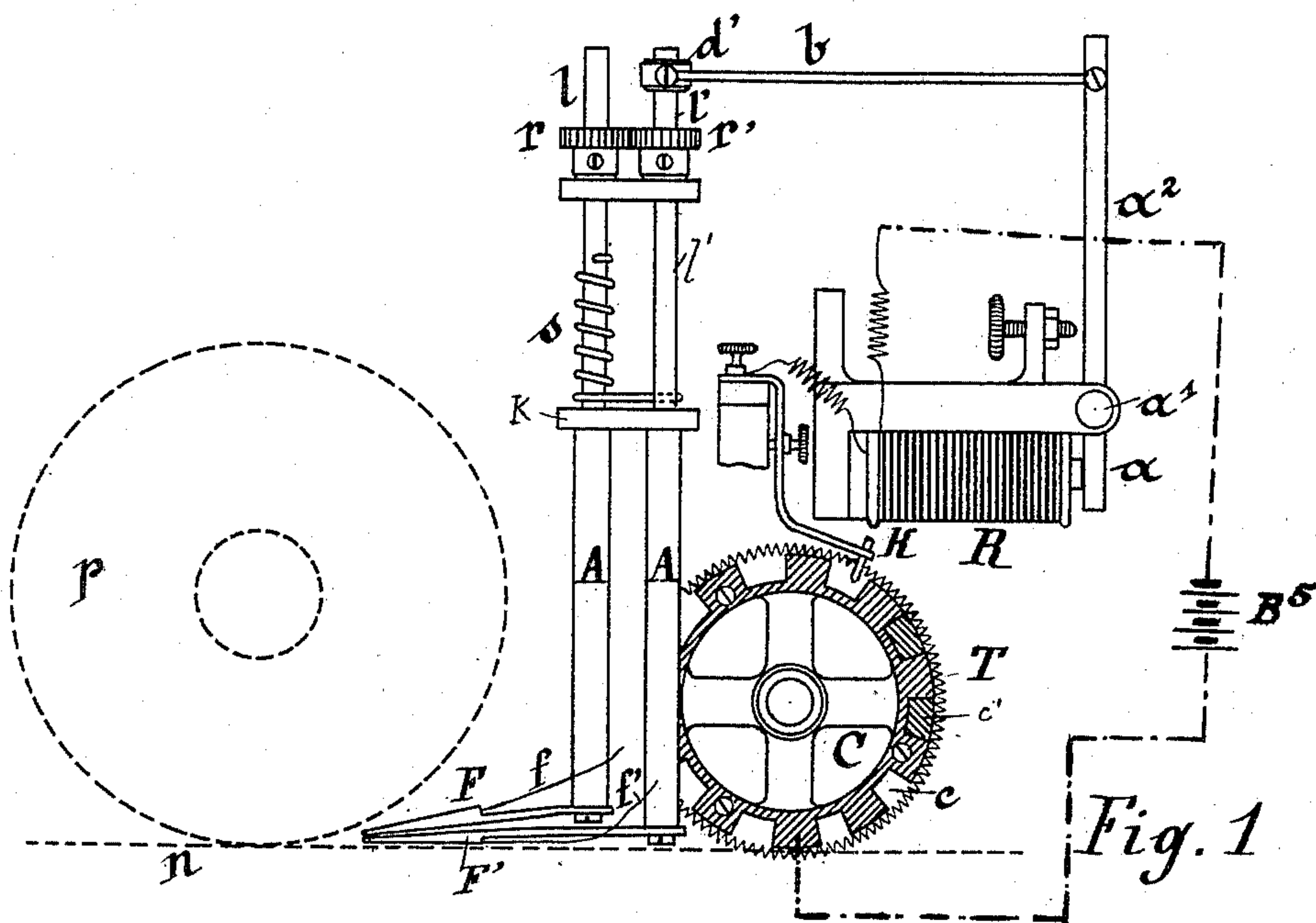


Fig. 1^a

Witnesses:

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Louis J. Smith

Inventor:

Emanuel Buxtorf

by A. J. Sumner

(No Model.)

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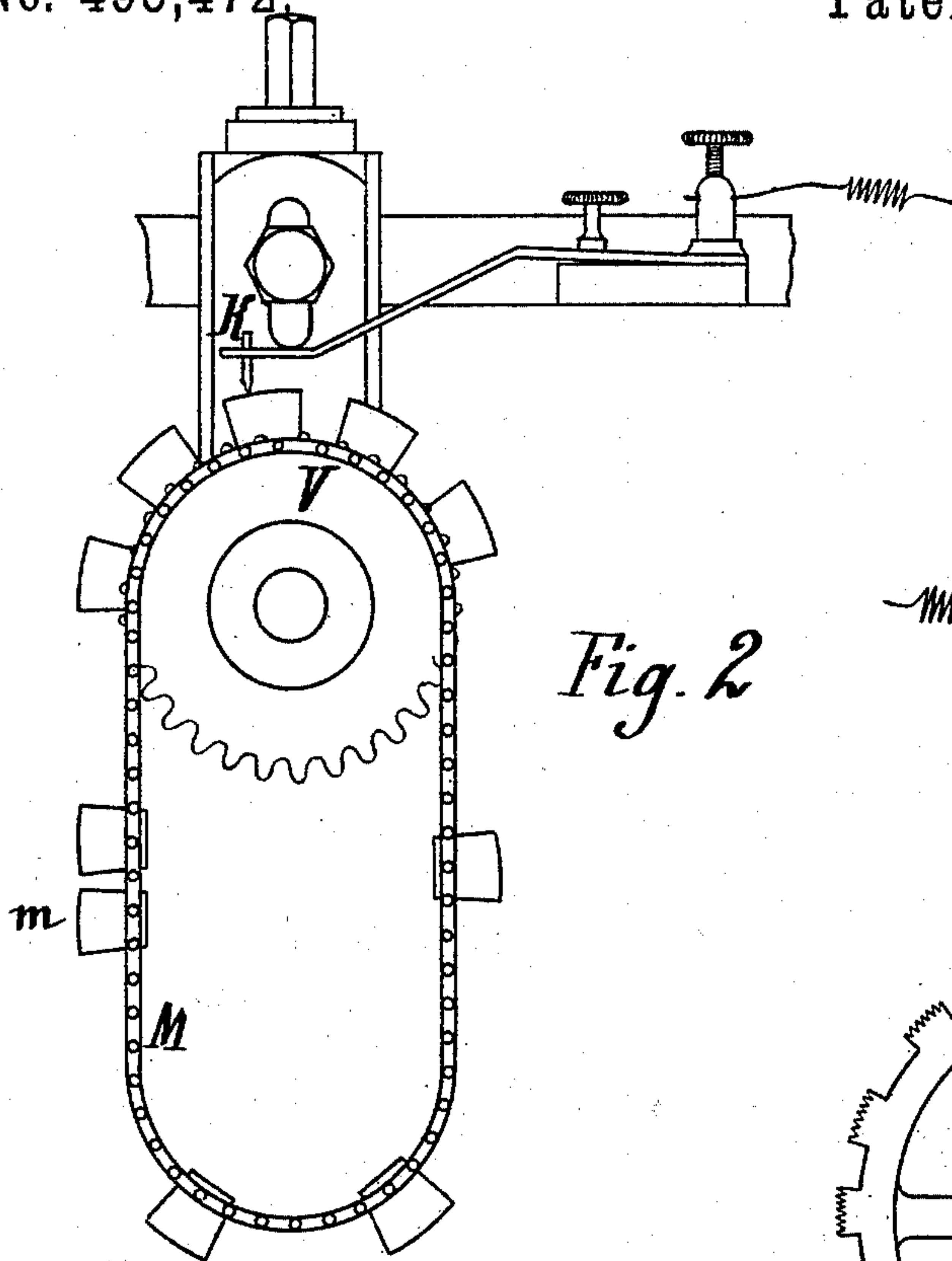


Fig. 2

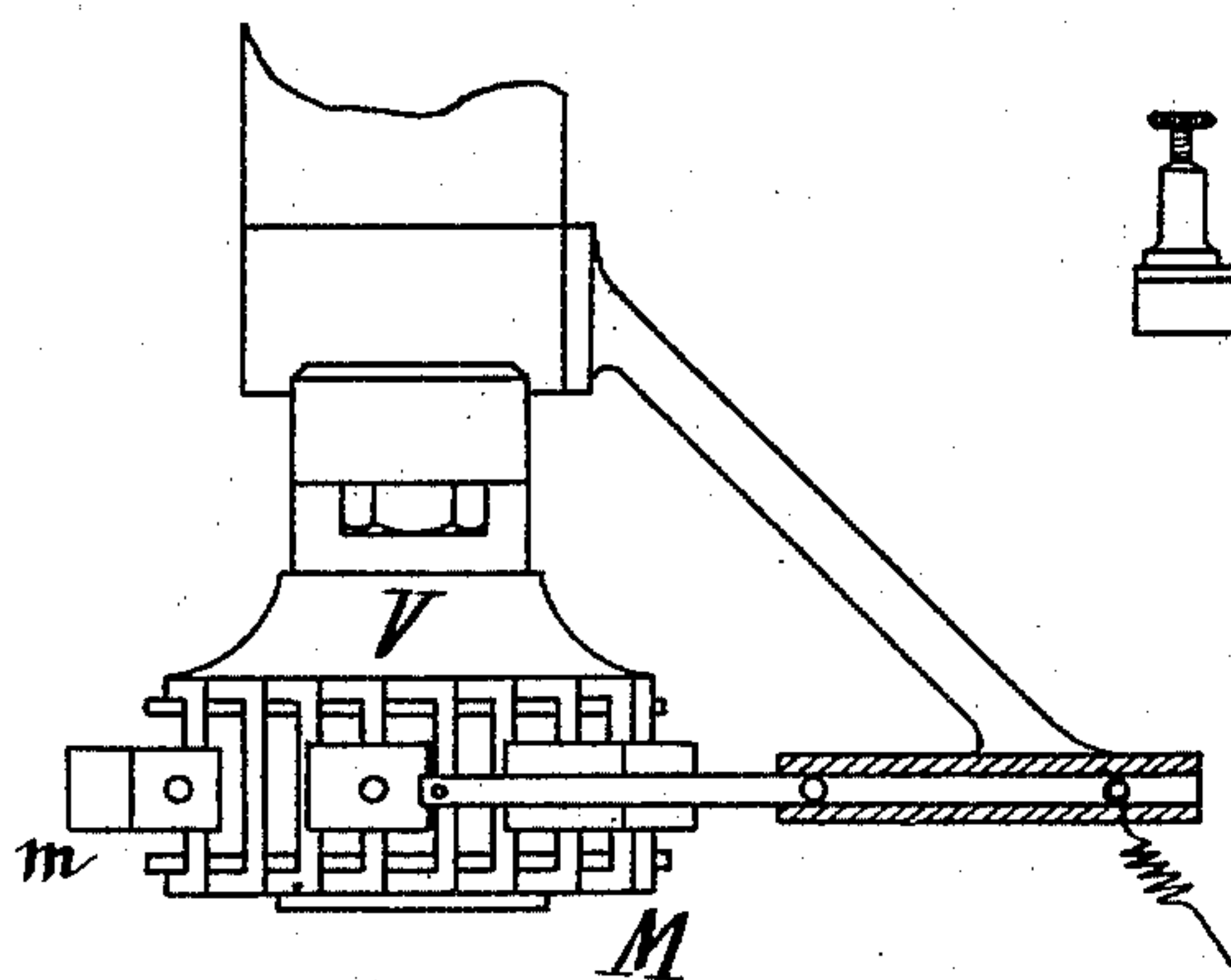


Fig. 2a

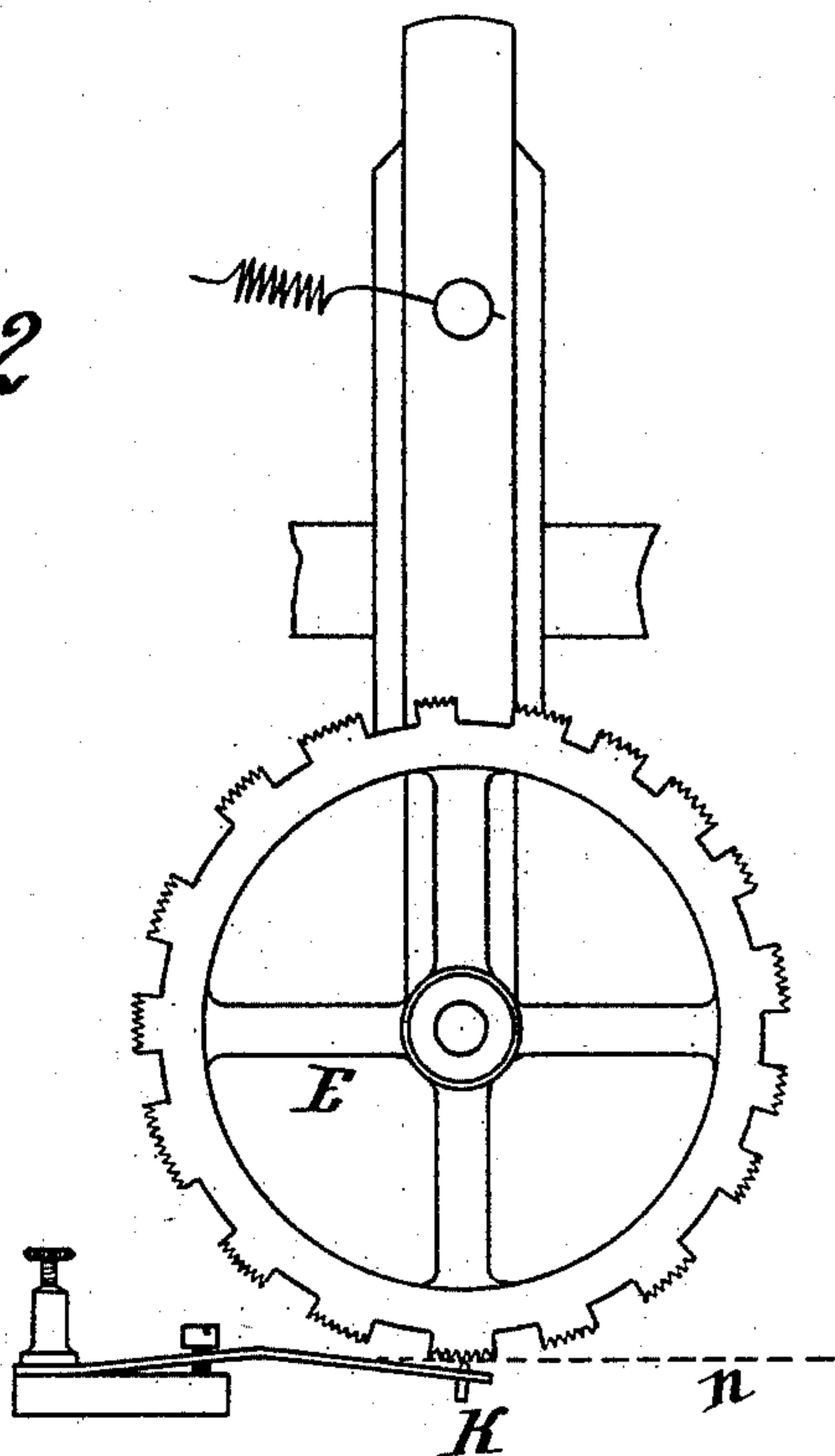


Fig. 3.

Witnesses:
J. H. Mudd
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(No Model.)

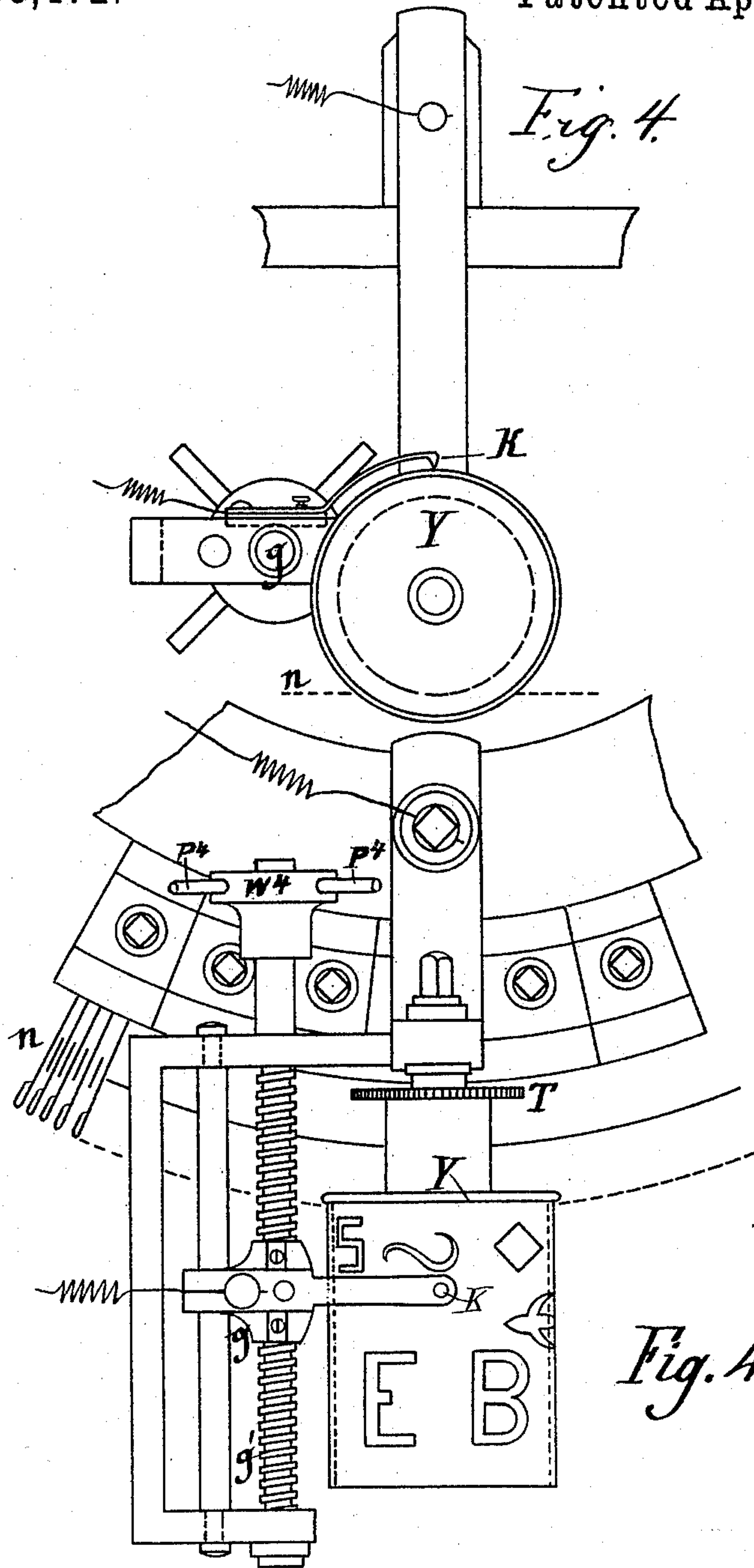
6 Sheets—Sheet 3

E. BUXTORF.

YARN FEEDING DEVICE FOR KNITTING MACHINES.

No. 495,472.

Patented Apr. 18, 1893.



Witnesses:
J. A. Hurdell
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Inventor:
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(No Model.)

6 Sheets—Sheet 4.

E. BUXTORF.
YARN FEEDING DEVICE FOR KNITTING MACHINES.
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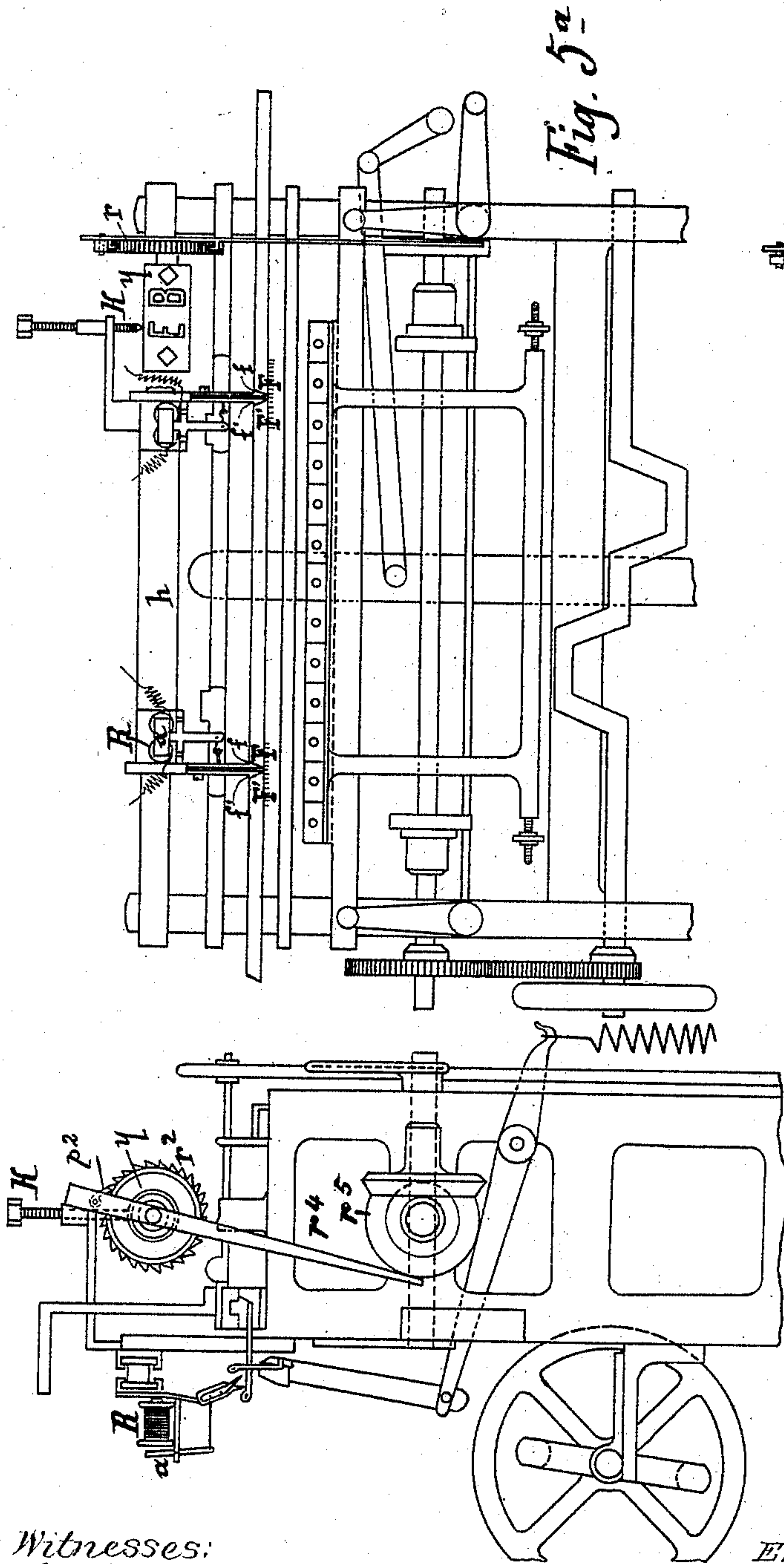


Fig. 5

Witnesses:
J. A. Hardy
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Inventor:
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(No Model.)

6 Sheets—Sheet 5.

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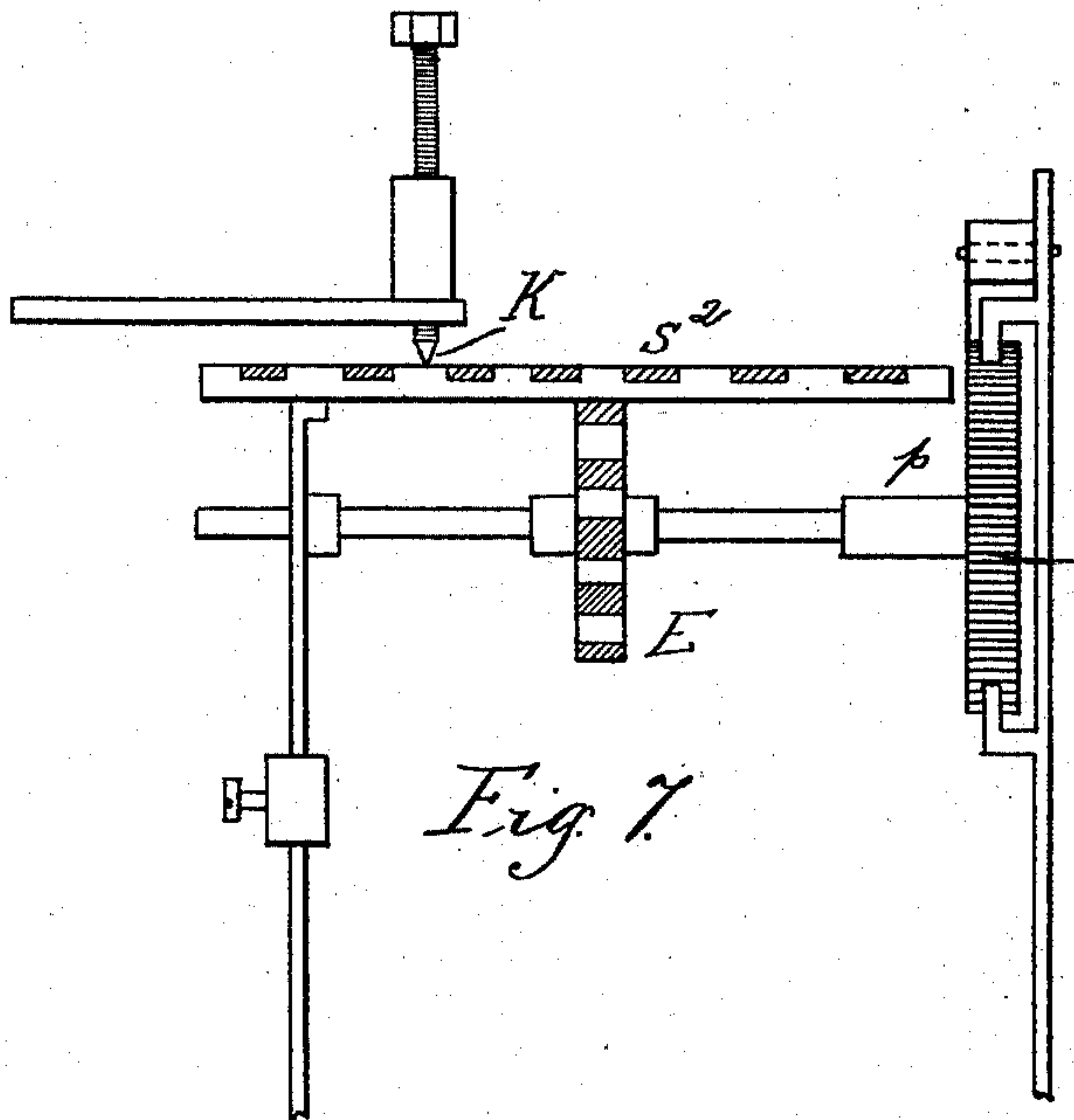


Fig. 7.

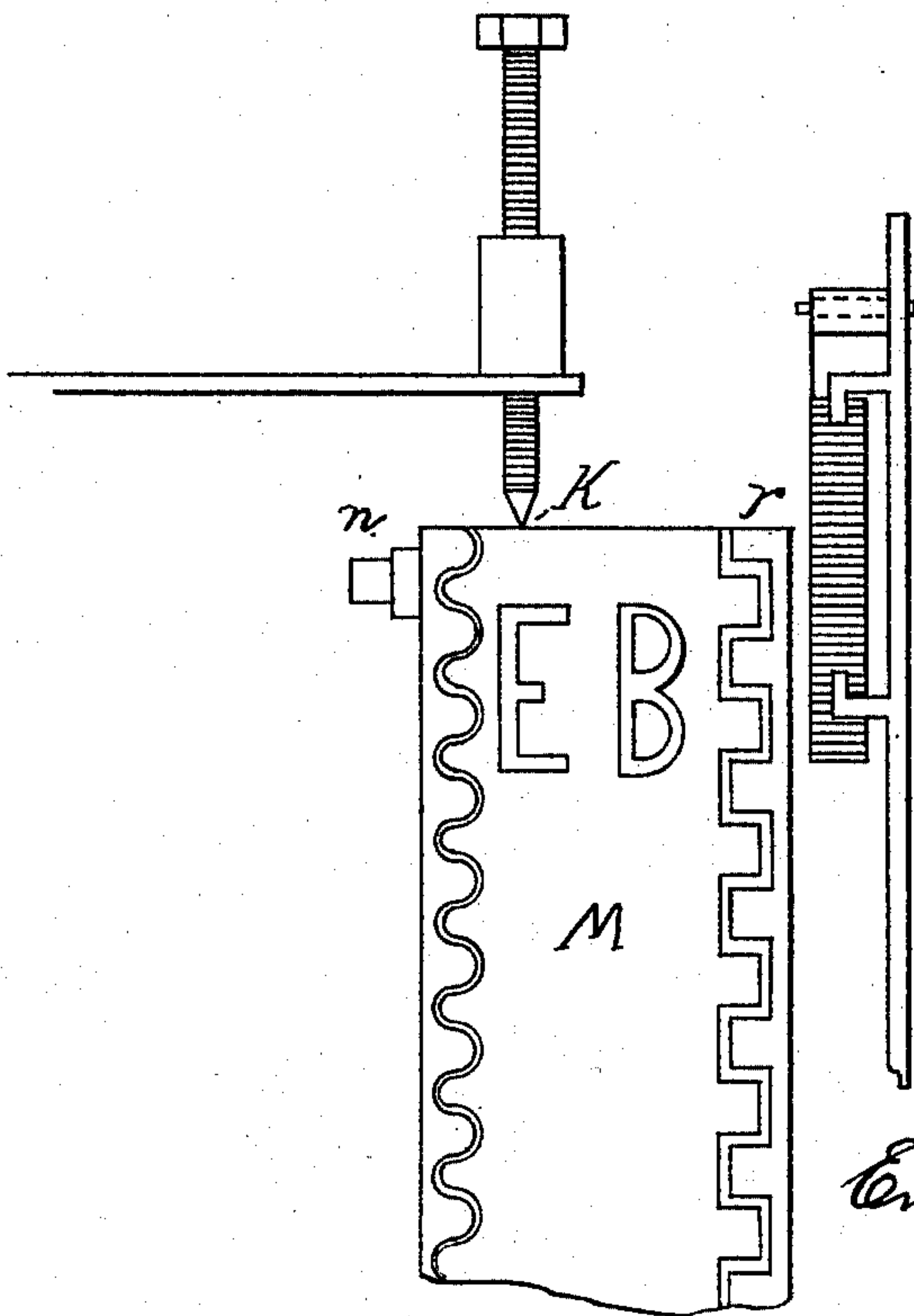


Fig. 6.

Witnesses

Franklin Moore
R. S. Ames

Emanuel Buxtorf
Inventor

W. J. Hallock
Attorney

(No Model.)

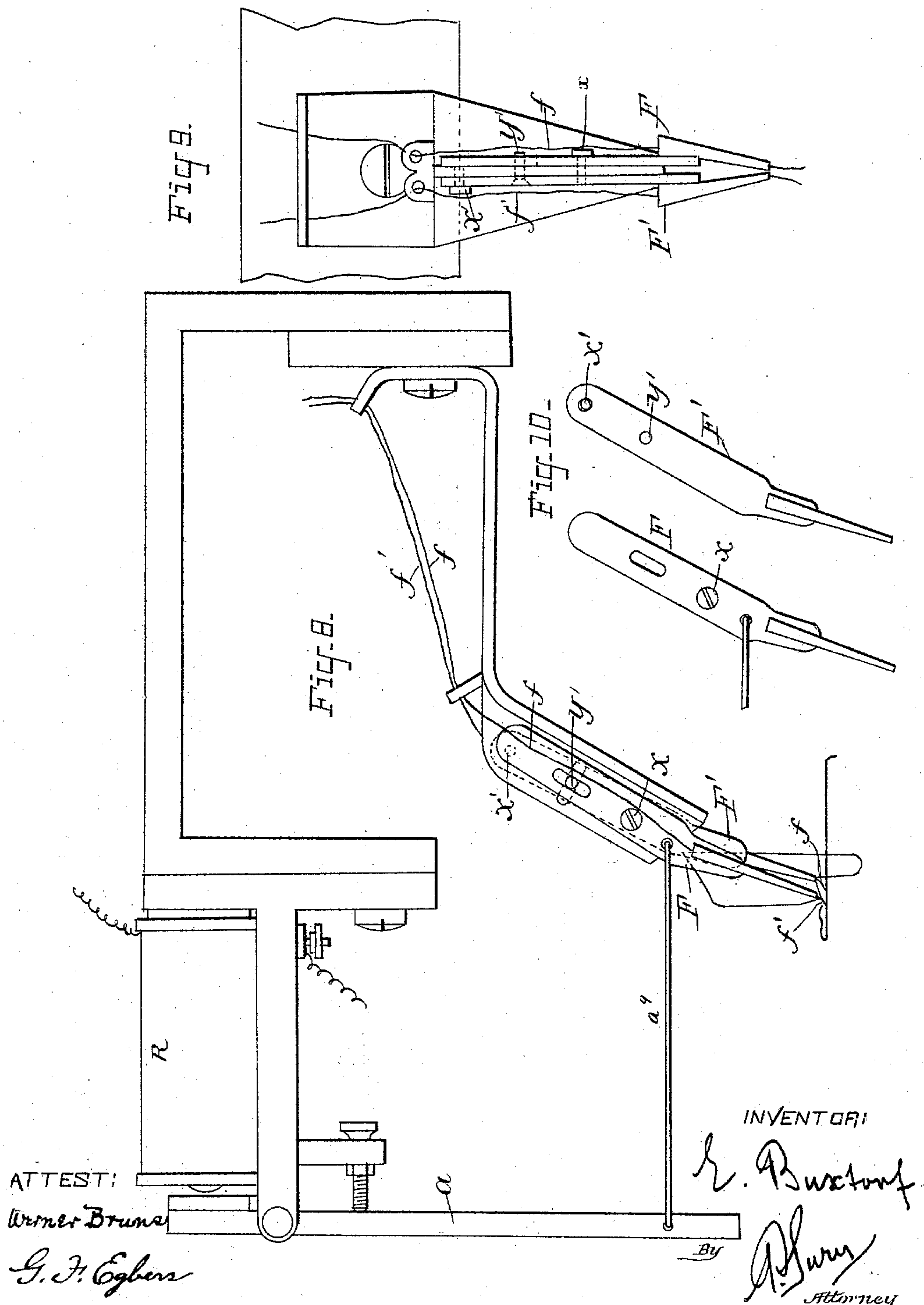
6 Sheets—Sheet 6.

E. BUXTORF.

YARN FEEDING DEVICE FOR KNITTING MACHINES.

No. 495,472.

Patented Apr. 18, 1893.



UNITED STATES PATENT OFFICE.

EMANUEL BUXTORF, OF PARIS, FRANCE.

YARN-FEEDING DEVICE FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 495,472, dated April 18, 1893.

Application filed January 8, 1890. Serial No. 336,323. (No model.) Patented in France May 23, 1888, No. 190,750; in Germany October 16, 1888, No. 48,893; in England August 14, 1889, No. 12,808, and in Switzerland February 1, 1890, No. 2,089.

To all whom it may concern:

Be it known that I, EMANUEL BUXTORF, a citizen of the French Republic, residing at Paris, France, have invented certain new and useful Improvements in Yarn-Feeding Devices for Knitting-Machines, (for which I have received a patent in Great Britain, No. 12,808, dated August 14, 1889; in Germany, October 16, 1888, No. 48,893; in Switzerland, February 1, 1890, No. 2,089, and in France, May 23, 1888, No. 190,750,) of which the following is a specification.

In the manufacture of plaited figured goods in knitting frames the positions of the two thread guides must be relatively changed according to the pattern being produced, so that the thread which at one time forms the inner surface of the meshes is at another time utilized in forming the outer surface and vice versa.

Hitherto the necessary movements of the thread guides for the purpose of changing their relative positions have been effected to a limited extent by purely mechanical means, and every new pattern involves expensive preparations for its reproduction, while in circular machines the types of patterns which can be produced are very limited in number and character. According to these improvements the necessary changes in the relative positions of the thread guides for the purpose of producing the patterns are effected by means of electro-magnetic devices. These electro-magnetic devices are so constructed and arranged as to have the energizing electric current controlled by a pattern chain, a pattern wheel, pattern cards, or an equivalent apparatus, in such a manner that the magnets operate the thread guides as and when required by the exigences of the pattern. These improvements are especially applicable to circular machines but they may also be applied to straight bar and other knitting machines.

The accompanying drawings to which reference is hereinafter made will illustrate in what manner these improvements may be carried into practical effect.

Figures 1, 1^a, 2, 2^a, 3, 4, and 4^a, show in what manner these improvements are applied to a circular machine and will be first hereinafter described. Figs. 5, 5^a, 5^b, 6 and 7 relate to

straight bar machines. Figs. 8, 9 and 10 are enlarged detail views of thread guides. Figs. 9^b, 9^c, 9^d, are enlarged detail views of the thread guides.

Referring first to Figs. 1 and 1^a, *f f'* are two threads of different colors or otherwise different which are respectively conducted to the needles *n* by means of the thread guides *F F'* which are made as flat as is possible while preserving the required amount of strength and rigidity.

The thread guides *F F'* are so arranged that they may readily pass one below the other as indicated in Fig. 1, and they are secured upon the lower ends of two vertical rods *l l'* which pass upward through the two tubes *A A*, the latter serving as guides for the rods *l l'* afore-said. Said tubes *A, A*, are secured to a bracket *K*, the latter of which may be integral or otherwise connected with the frame of the machine. The rods *l l'* have secured upon their upper ends two small spur pinions *r r'*, one pinion being mounted upon each rod and the two pinions gearing together. Upon one of the vertical rods *l, l'*, there is mounted above the tubes *A, A*, a helical spring *s* arranged in a manner that it will tend to twist or turn the thread guides *F, F'*, which are connected to the lower ends of the said vertical rods. It will be obvious that with this construction the said thread guides *F, F'*, will be turned each in one direction and relatively in an opposite direction.

To effect a change in the relative positions of the thread guides it will be obvious from the described construction and arrangement that it will only be necessary to turn one of the rods *l l'* through a comparatively small angle. This angular motion is effected by means of the electro-magnet *R* which attracts the armature *a* as soon as the circuit through the coils of the magnet is closed. The armature being pivoted at *a'* and having attached to it a light lever *a²* the motion of the armature pulls the cord, wire, or light rod *b* which is connected to lever *a²* and to one of the vertical rods *l l'*. The wire or similar means of connection between the lever *a²* and the rod *l'* is attached to a projection *d'* on rod *l'* so that when rod *b* is pulled by the action of the magnet upon the armature, rod *l'* will be

turned through part of a revolution; and, since the rod l is geared by the wheels r r' to the rod l' , it follows that rotation of the rod l' in one direction involves a corresponding rotation of the rod l in the opposite direction. The thread guides being as hereinbefore described attached to the rods l l' , the motion of the rods is communicated to the thread guides.

The electro-magnet R may be operated by a variety of means according to the nature of the design which it is desired to produce. I have illustrated the circuit in Fig. 1 as being supplied by the battery B^5 .

As represented in Figs. 1 and 1^a of which Fig. 1 is an elevation and Fig. 1^a a plan, the pattern wheel, contact point, and battery being omitted in the latter figure, the design is produced by means of a pattern wheel c coaxial with and secured to the toothed wheel T the teeth of which engage with the needles of the machine. The pattern wheel has incisions or grooves c upon its periphery which may either be left open or be filled with an insulating material c' and it or its metallic surface is electrically connected with one end of a wire forming part of the circuit in which the magnet R is included. A brush or spring contact K is arranged to press upon the ungrooved portions of the wheel C , and, this contact K being electrically connected with the other end of the wire forming the circuit within which the magnet R is included, it follows that when K is in contact with C the circuit will be closed and the magnet be energized, and that when K is in contact with the insulating material or is over one of grooves in C the magnet will cease to be energized. It follows therefore that the thread guides are operated through the electro-magnet R by the rotation of the pattern wheel and that the periods of this operation will be governed by the nature and extent of the incisions or grooves in the periphery of the pattern wheel.

Figs. 2 and 2^a show a pattern chain M , which may be substituted for the pattern wheel. This pattern chain may resemble the pattern chains used for looms, but the projections, m being required to close an electric circuit only, may be much lighter.

Fig. 3 represents a modification of the pattern wheel arrangement. In this modification the teeth of the wheel E are arranged to press the needles n of the machine against the contact K and thus close the circuit including the electro-magnet. A certain number of the teeth of the wheel are cut away according to the nature of the pattern to be produced, and as indicated in the drawings, so that when the parts cut away come opposite to the contact K the needles will not be displaced and the circuit will not be closed.

The thread guides may be operated through the agency of an engraved roller or a roller having a design in intaglio or relief upon its surface instead of a pattern wheel or pattern chain as hereinbefore described. Such a roller is indicated at Y Figs. 4 and 4^a. This

roller, which must have a metallic contact surface, is mounted upon a mandrel which carries the toothed wheel T engaging with the machine needles. The surface of the roller is connected to one end of the circuit and the contact K with the other end of the circuit in which the magnet R is included as already hereinbefore described. The contact K is mounted upon a nut carried upon the screw spindle in g' such a manner that the contact K traverses the spindle roller. The rotation of the screw carrying the tracing point K , is effected by means of a wheel W^4 connected with one end thereof. Said wheel is provided with a series of radially projecting pins P^4 which are adapted to engage with the rotating wheel of the frame in an obvious manner. It will be seen that when the contact K is above a depressed or insulated part of the roller, the electric circuit will be opened, the electro-magnet will be inert, and the thread guides will occupy one position relatively to each other; as soon however as the point K comes into contact with the metallic contact surface of the roller, the circuit will be closed, the magnet will be energized, and the relative positions of the thread guides will be reversed. Thus the design on the roller will be reproduced in the fabric whatever its intricacy and the hitherto insuperable difficulty of producing such patterns on a circular frame has thus been overcome.

Figs. 5, 5^a and 5^b illustrate in side view, end view and plan respectively, in what manner the hereinbefore described improvements may be applied to a straight machine, and the thread guides F F' for a straight machine as shown in Figs. 8, 9, and 10, may be arranged to move in opposite directions as described with respect to the circular machine, or one of the thread guides may be fixed and the other be movable. In either case, the positions of the threads upon the needles must be changed when the electro-magnet R becomes energized and again when it becomes inert. In the arrangement represented the pattern in the fabric is supposed to be produced from an engraved or similar roller y as hereinbefore described with reference to Figs. 4 and 4^a. This roller is rotated through a small angle, the extent of which will be determined in each case by the nature of the work, by means of a ratchet p^2 and ratchet wheel r^2 mounted upon the axis of the engraved roller and which may be operated by a lever r^4 and cam r^5 . The contact point K by means of which the electric circuit is closed and opened is mounted upon the thread guide carrier h so that the point K slides along the surface of the engraved roller by the motion of the thread guide carrier to which it is attached. The thread guides will accordingly be operated by the electro-magnet consequent on the opening and closing of its circuit in such a manner that the lengths of the threads f f' on the needles correspondingly change and a figured fabric is produced.

In substitution for the engraved roller y other devices may be employed; for example, an endless pattern chain or band M Fig. 6 may be laid over a smooth or suitable roller 5 which occupies the position represented as being occupied by the roller y in Figs. 5, 5^a, and 5^b. This roller is similarly rotated by means of the ratchet wheel r and the point K is traversed over the design on the band 10 as and for the purpose described with reference to the engraved or similar roller.

In Fig. 7 a metallic bar s^2 is substituted for the engraved or similar roller or the pattern band already described. This bar has formed 15 upon its upper surface metallic and non-metallic transverse portions, the respective portions m^1, m^2 being proportioned as may be required by the pattern. The bar is electrically connected with the end of one of the wires of 20 the circuit in which the electro-magnet is included, the contact K being connected with the other end of the circuit wire. The threads will be changed as hereinbefore described when the contact K comes over the metallic 25 or a non-metallic part of s^2 and thus closes and opens the circuit. Under the bar s^2 there may be mounted upon a suitable spindle a wheel E' having metallic and non-metallic parts on its periphery. The end of the elec- 30 tric circuit instead of being connected to s^2 as before described is in this case connected to the metallic part of the wheel E which rotates in electrical contact with the bar s^2 . In this arrangement the circuit can only be 35 closed when both the point K is in contact with a metallic part of s^2 and s^2 is in contact with a metallic part of E' . The metallic parts of s^2 and E' are therefore arranged and proportioned so as to produce the desired design. 40 The wheel E' may be rotated by the ratchet wheel r^2 as described for the engraved roller.

Figs. 8, 9 and 10 illustrate the arrangement adapted for a cotton frame. In this arrange- 45 ment the thread guide F is pivoted at x and the thread guide F' at x' . At an intermediate point the thread guides are connected by a screw y' and slot as shown. From this arrangement it follows that a motion of one of the thread guides in one direction involves a 50 corresponding motion of the other thread guide in the other direction. The lever a of the armature of the electro-magnet R is connected to one of the thread guides by means of a pitman or rod a^9 and the opening or closing 55 of the circuit therefore involves a change in the position of each of the thread guides, and a corresponding change in the positions of the threads.

The modifications and arrangements which 60 are hereinbefore described and illustrated by the accompanying drawings are intended to be typical only of the large variety of ways in which these improvements may be carried into effect in connection with knitting ma- 65 chines of all kinds. The application of these improvements will, with the description here-

inbefore given, be sufficiently obvious in all cases.

Having now particularly described and as- 70 certained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination with a vibrating yarn guide of an electro magnet, its armature con- 75 nected with the said guide, and a contact point and pattern device placed in an electric circuit embracing the said magnet, the circuit being completed by contact of the point with portions of the pattern surface and the magnet by attracting its armature serv- 80 ing to effect the vibration of the yarn guide, substantially as described.

2. The combination with two yarn guides connected to move simultaneously in oppo- 85 site directions, of an electro-magnet, its armature connected with the guides to move the same, and a contact point and pattern device placed in an electric circuit embrac- ing the said magnet, the circuit being com- 90 pleted by contact of the point with portions of the pattern surface, and the magnet by at- tracting its armature serving to effect the vi- bration of the yarn guides, substantially as described.

3. The combination with the two yarn 95 guides geared together, as described, of an electro-magnet, its armature connected with one of said guides to vibrate the same, and a contact point and pattern device placed in an electric circuit embracing the said mag- 100 net, the circuit being completed by contact of the point with portions of the pattern sur- face and the magnet by attracting its arma- ture serving to effect the vibration of the yarn guides, substantially as described. 105

4. The combination with a vibrating yarn guide, of an electro-magnet, its armature con- 110 nected with said guide, and a contact point and pattern device placed in an electric cir- cuit embracing the said magnet, the pattern device deriving movement from the needles 115 of the knitting machine to which the devices are applied, the circuit being completed by contact of the point with portions of the pat- tern surface, and the magnet, by attracting 120 its armature, serving to effect the vibration of the yarn guide, substantially as described.

5. The combination with two yarn guides connected to move simultaneously in oppo- 125 site directions, of an electro-magnet, its armature connected with the guides to move the same, and a contact point and pattern device placed in an electric circuit embrac- ing the said magnet, the pattern device de- 130 riving movement from the needles of the knit- ting machine to which the devices are applied, the circuit being completed by contact of the point with portions of the pattern surface and the magnet by attracting its armature serv- 135 ing to effect the vibration of the yarn guide, substantially as described.

6. The combination with guides F, F', their

stems, gearing connecting said stems, and a
spring for causing rotation of said stems, of
an electro-magnet, its armature connected
with one of the said stems, and a contact
5 point and pattern device placed in an electric
circuit embracing the said magnet, the pat-
tern device deriving movement from the nee-
dles of the knitting machine to which the de-
vices are applied, the circuit being completed
10 by contact of the point with portions of the
pattern surface and the magnet by attract-

ing its armature serving to effect the vibra-
tion of the yarn guide, substantially as de-
scribed.

In testimony that I claim the foregoing as 15
my invention I have signed my name, in pres-
ence of two witnesses, this 27th day of No-
vember, 1889.

EMANUEL BUXTORF.

Witnesses:

HENRY DANZER,

EDWARD P. MACLEAN.