

(No Model.)

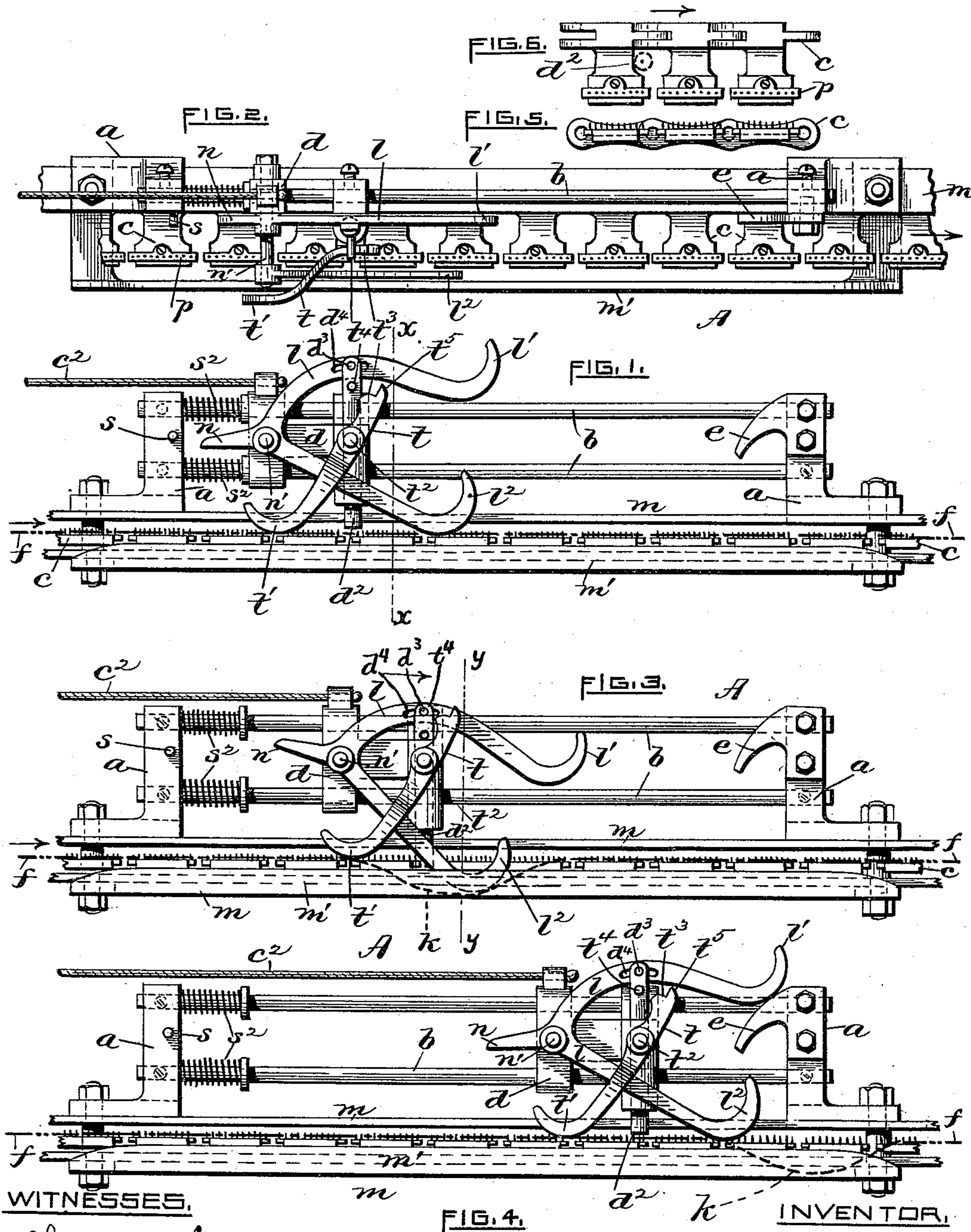
4 Sheets—Sheet 1.

L. HOLLINGWORTH.

AUTOMATIC STOP MOTION DEVICE FOR TENTERING OR DRYING MACHINES.

No. 450,511.

Patented Apr. 14, 1891.



WITNESSES,

Charles Hannigan.

H. Francis Tardiff

FIG. 4.

Louis Hollingworth

by Remington & A. H. H. H.

Atty.

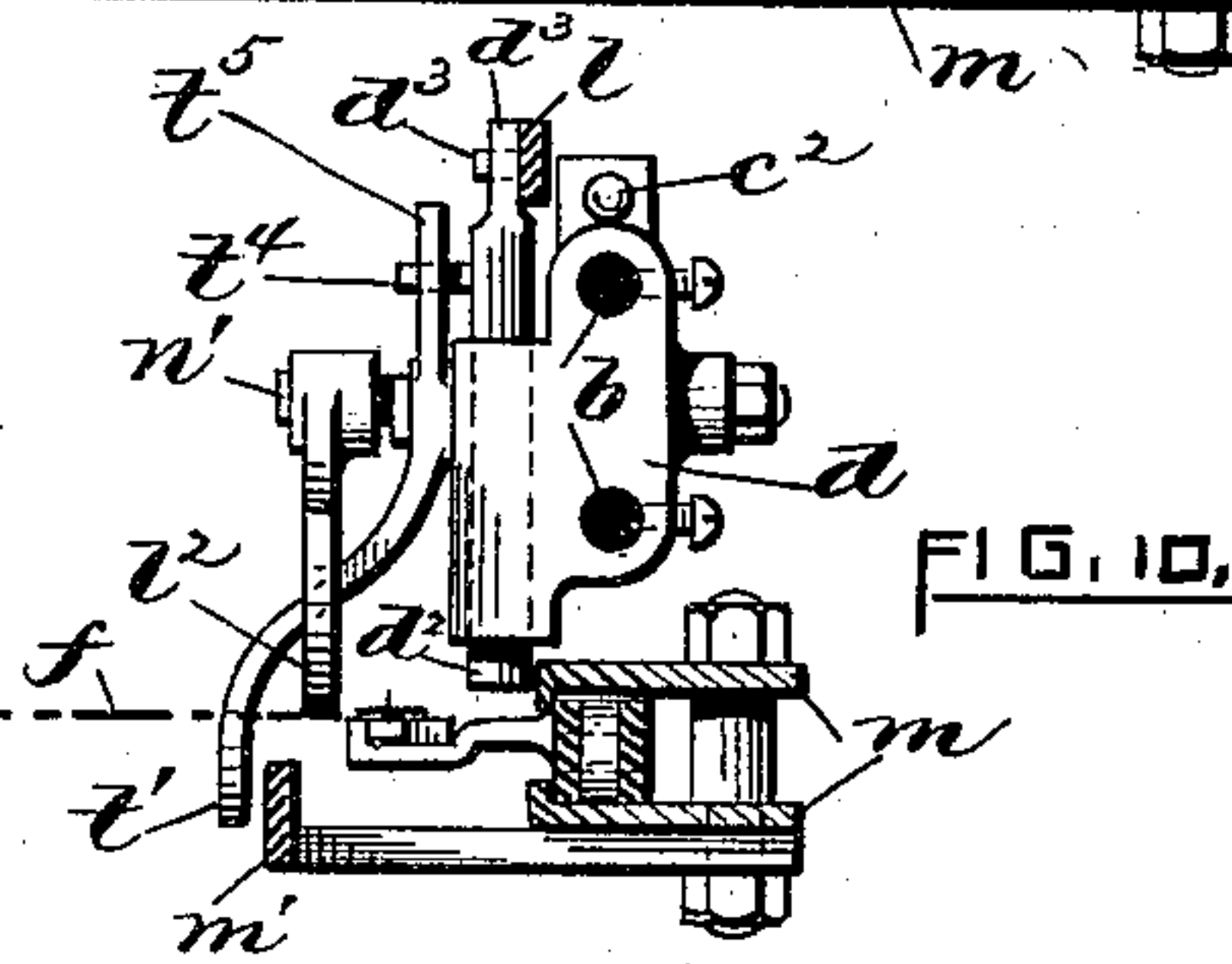
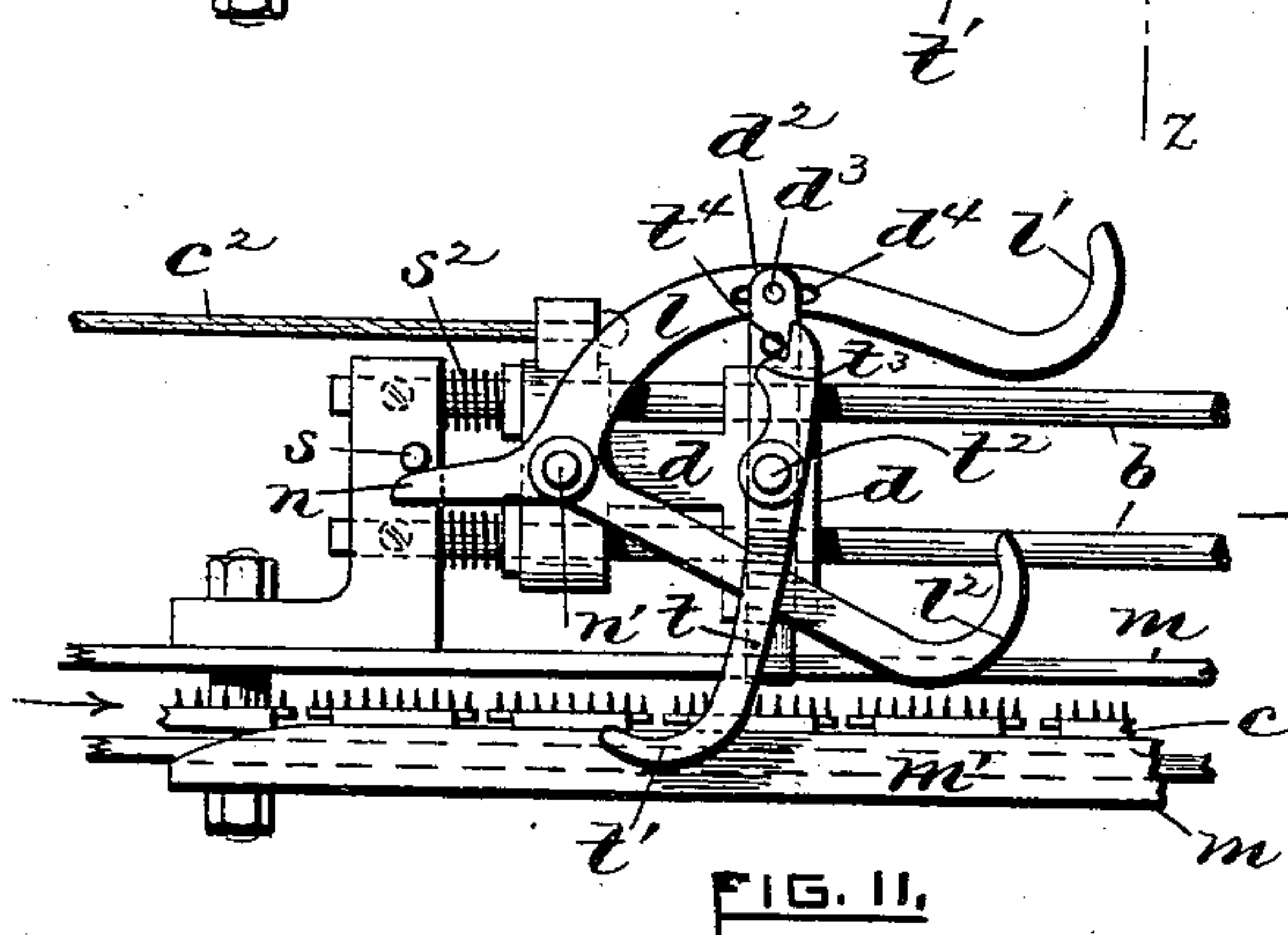
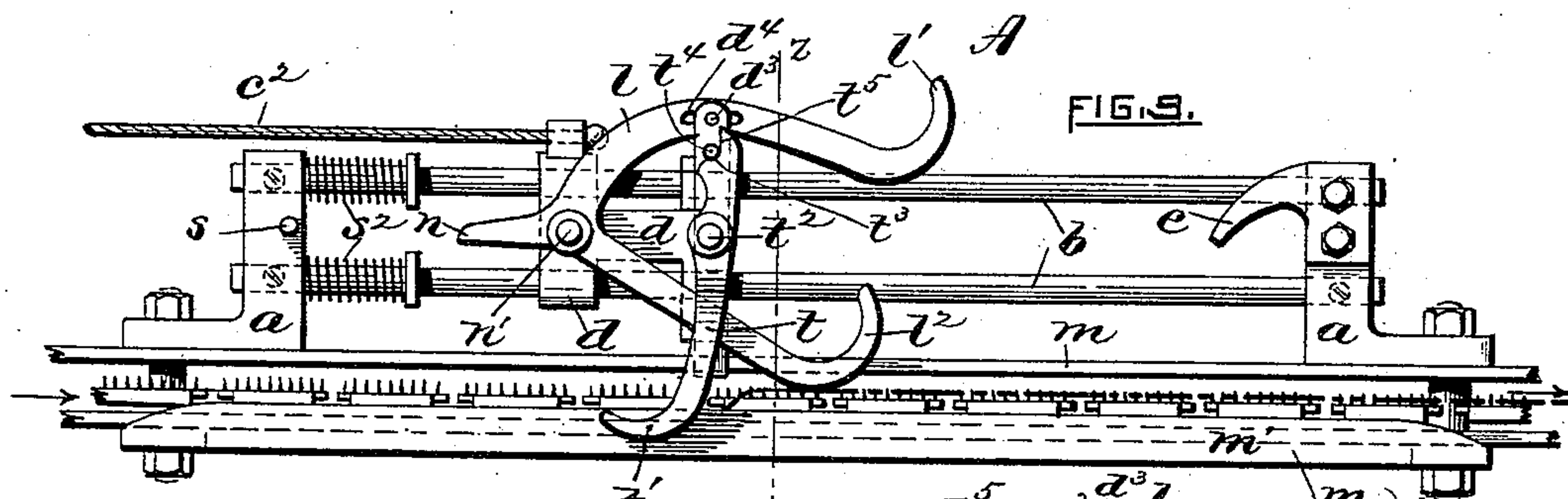
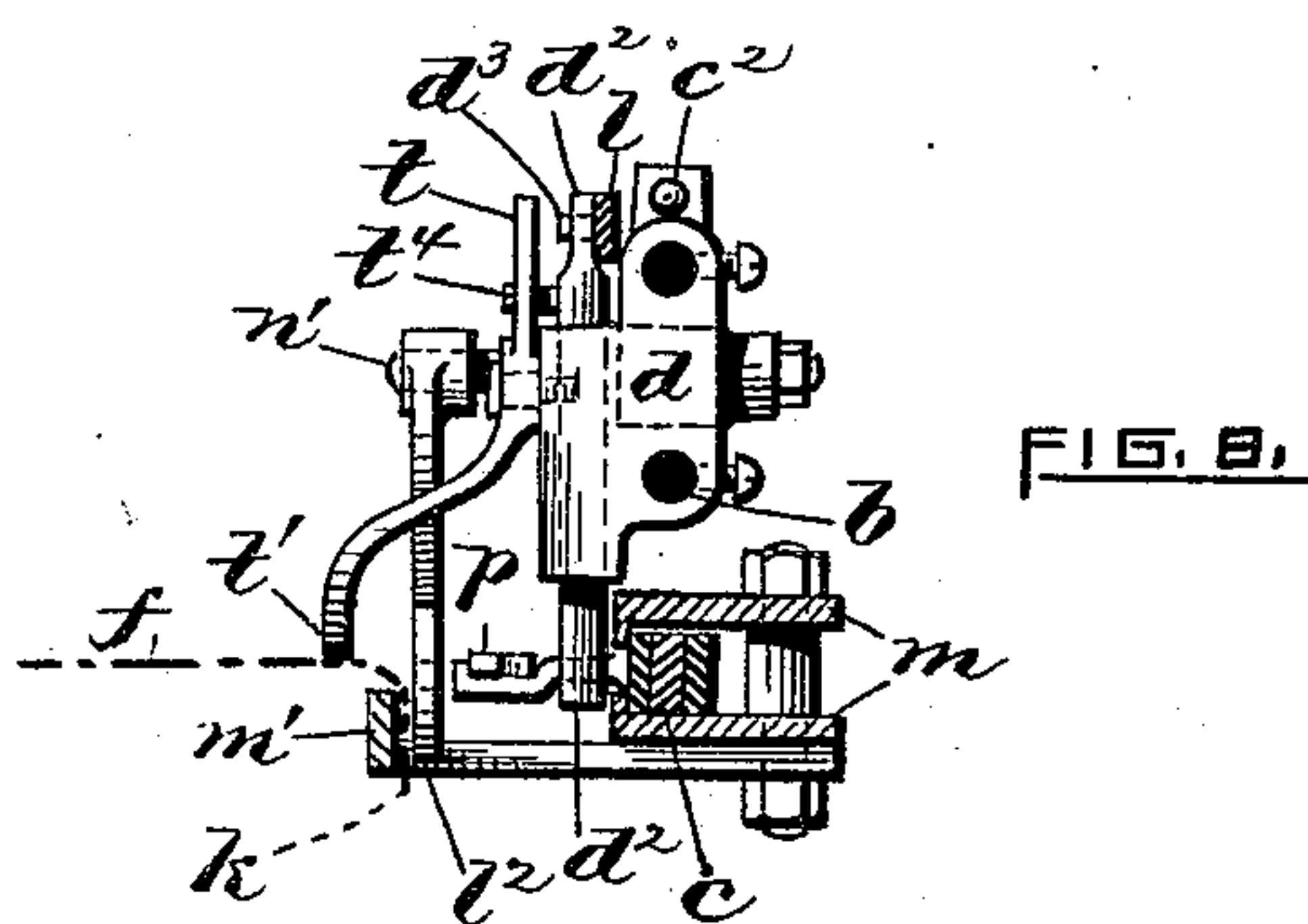
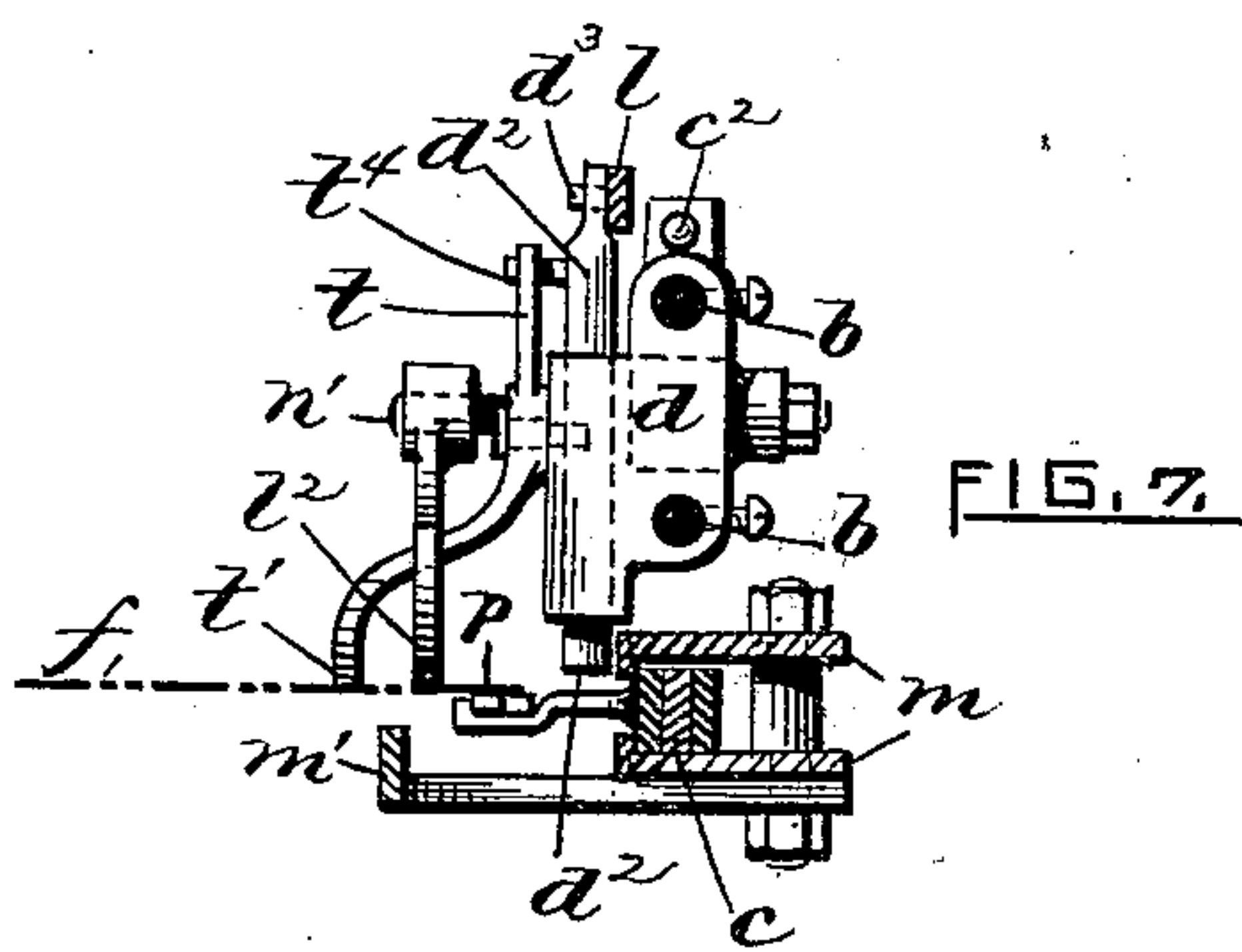
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4 Sheets—Sheet 2.

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WITNESSES.

Charles Hannigan  
H. Francis Tourtellot

INVENTOR.

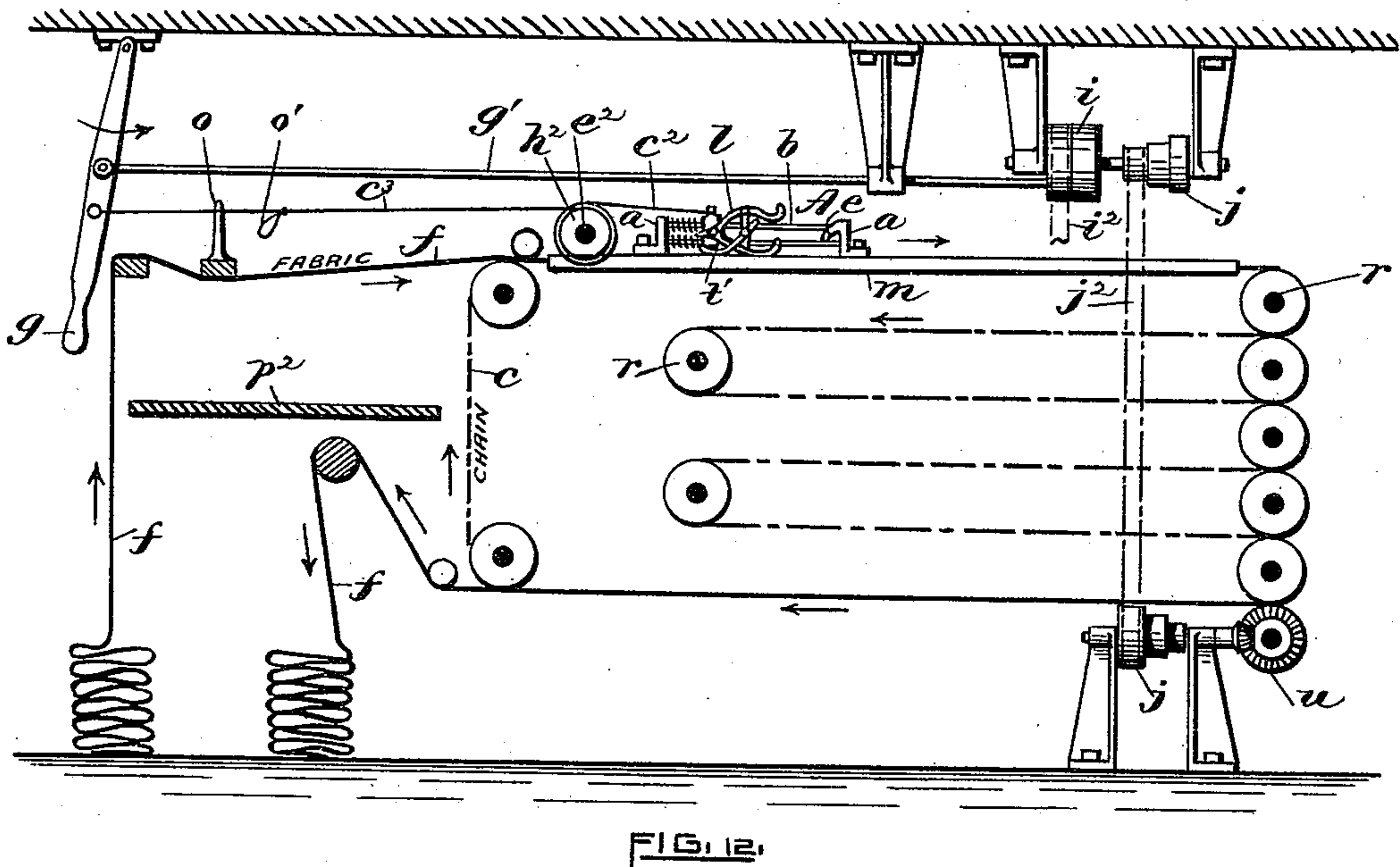
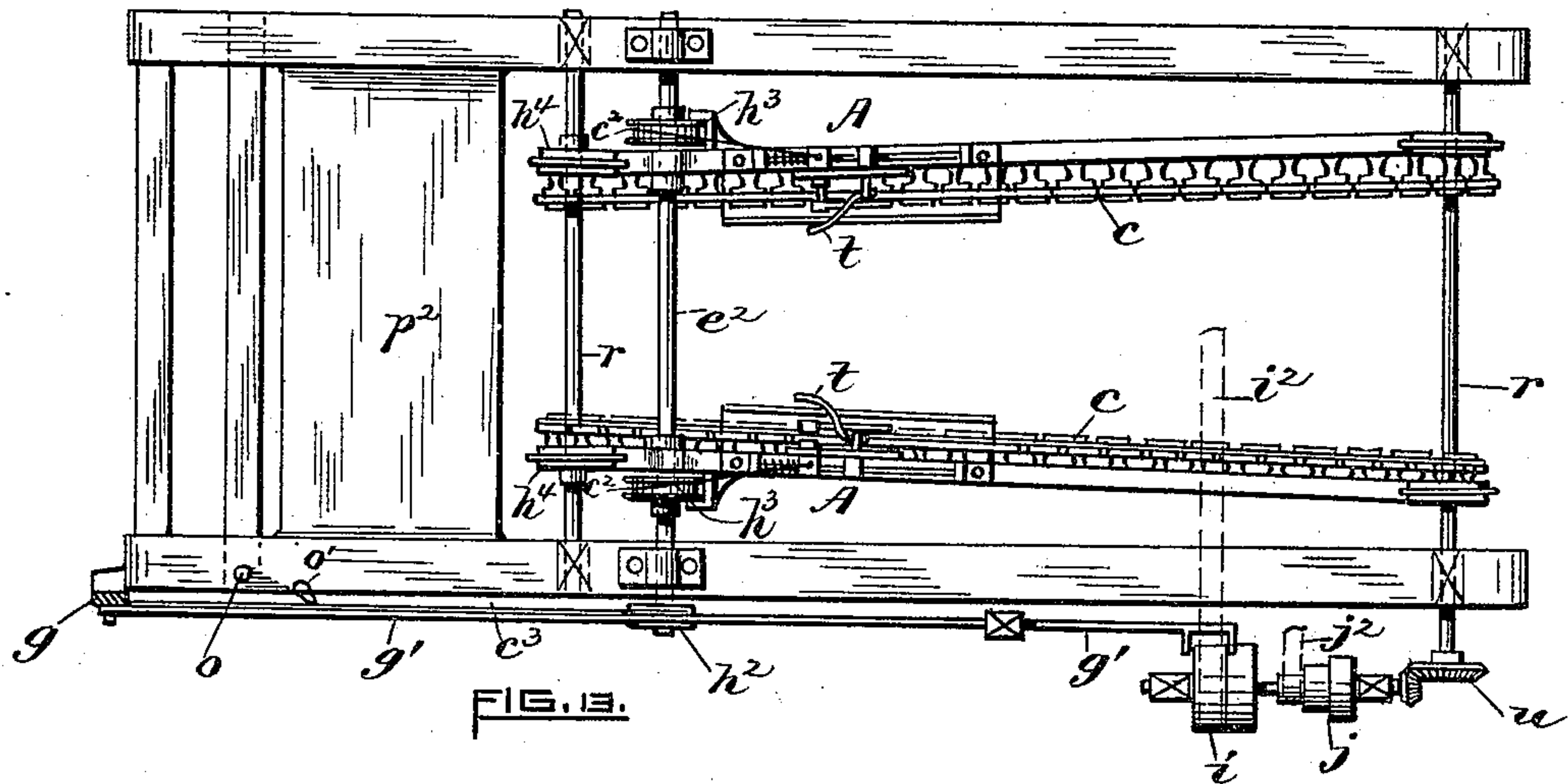
Louis Hollingworth  
By Remington & Benson  
Attys.



(No Model.)

4 Sheets—Sheet 3.

L. HOLLINGWORTH.  
AUTOMATIC STOP MOTION DEVICE FOR TENTERING OR DRYING MACHINES.  
No. 450,511.  
Patented Apr. 14, 1891.



WITNESSES,

*Charles Hennigan*  
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INVENTOR,

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*Attys.*

(No. Model.)

4 Sheets—Sheet 4.

L. HOLLINGWORTH.

AUTOMATIC STOP MOTION DEVICE FOR TENTERING OR DRYING MACHINES.

No. 450,511.

Patented Apr. 14, 1891.

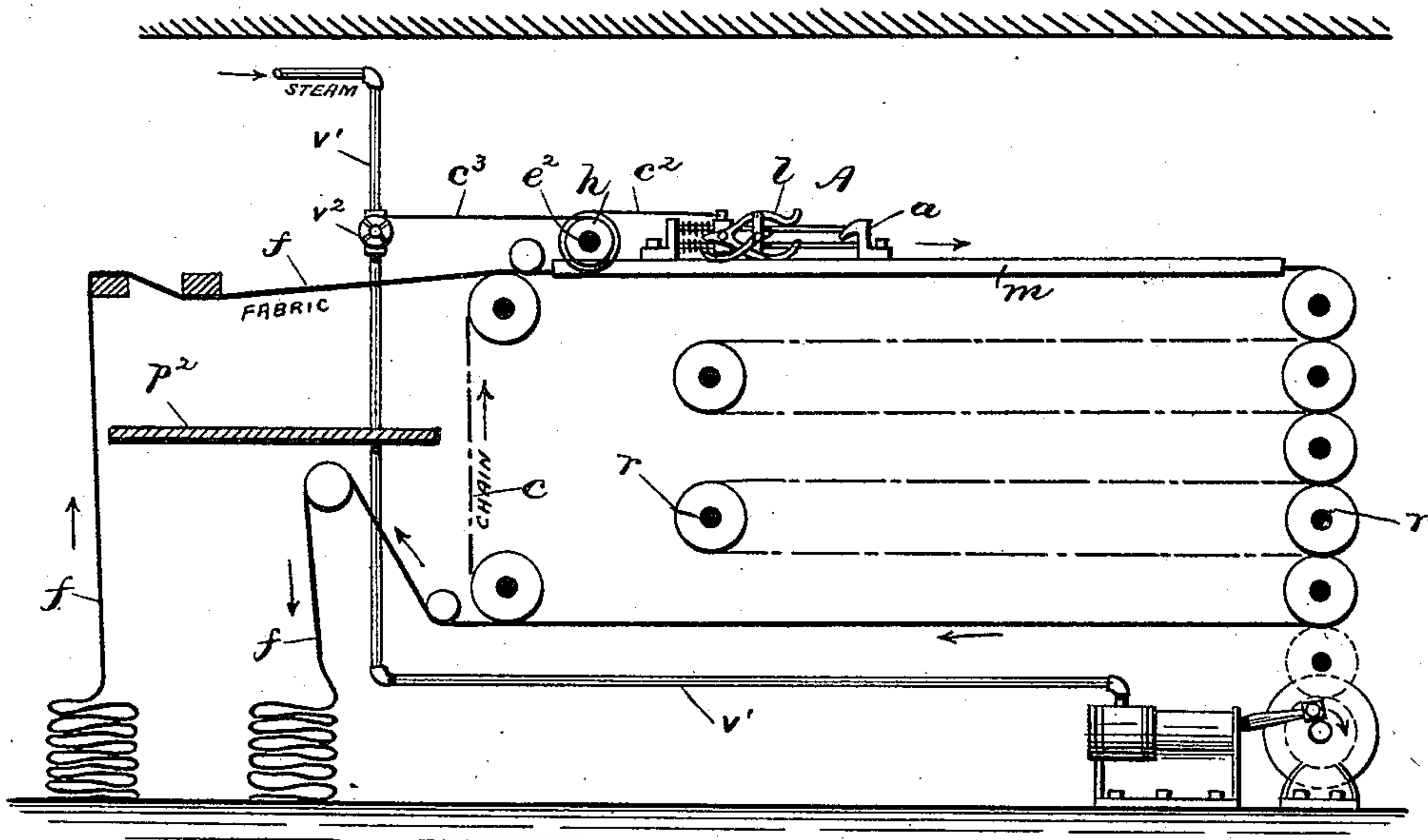


FIG. 14.

WITNESSES.

*Charles Hennigan*  
*W. Francis Loubello*

INVENTOR

*Louis Hollingworth*  
*By Remington & Henthorn*  
*Attys.*



# UNITED STATES PATENT OFFICE.

LOUIS HOLLINGWORTH, OF PROVIDENCE, RHODE ISLAND.

AUTOMATIC STOP-MOTION DEVICE FOR TENTERING OR DRYING MACHINES.

SPECIFICATION forming part of Letters Patent No. 450,511, dated April 14, 1891.

Application filed August 13, 1890. Serial No. 361,887. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS HOLLINGWORTH, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Automatic Stop-Motion Devices for Tentering or Drying Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to automatic "stop-motion" devices for textile or other machinery, the invention being more particularly adapted to be employed with tentering or drying machines.

Heretofore, so far as I am aware, tentering-machines have been unprovided with means for automatically stopping them in case the traveling fabric is not properly hooked onto the pins of the "tenter-chain." Owing to a lack of automatic stop mechanism the fabric is improperly or not uniformly stretched at such detached place, because the cloth fails to receive the necessary amount of lateral tension, thereby not only increasing the percentage of imperfect or unsalable goods, but at the same time correspondingly lessening the production or capacity of the machine. This results from the fact that the machine must necessarily remain idle until the fabric is properly readjusted thereon. The quantity of cloth thus failing to be caught onto the tenter-chain may be several yards in length before it is detected by the attendant. Sometimes the edge of the traveling cloth will miss the tenter-chain pins and after traveling a short distance thus unhooked will of itself again engage the pins and travel in unison therewith; but if then detected the whole must be taken off from the chain and the cloth carried back to the entering end of the machine, thereby causing a great loss of time before the mechanism can again be brought into its normal working condition.

The object I seek to attain by my present

invention is to overcome the objections or disadvantages just referred to, and to that end I provide each of the two sides of a tentering-machine at its forward end with a vertically-guided dog mounted in a longitudinally-guided frame connected with the belt-shifter or valve of the drying-machine, said dog being provided with jointed arms or fingers, whose free or lower ends bear normally upon the fabric hooked into and carried by the tenter-chain.

By means of my invention the traveling cloth itself automatically controls the action of the stop-motion mechanism—as, for example, assuming now the fabric to properly engage the pins of the traveling tenter-chain, as it (the fabric) passes onto them the device will then be in its normal working position—i. e., the dog is disconnected from the traveling chain by reason of the jointed fingers which bear against the upper surface of the fabric; but if from some cause the edge of the cloth fails to hook itself upon the tenter-chain, or even skips a link or two, then, as the lateral tension of the unhooked portion of the cloth is insufficient to maintain the fingers in their normal position when it arrives in juxtaposition therewith, the dog will immediately drop into engagement with one of the links of the tenter-chain and be carried along by it a short distance until it (the dog) is automatically released. Meanwhile the connection leading from the moving dog-carrying frame to the belt-shifter has reversed the belt and caused the machinery to stop running.

In the appended four sheets of drawings, Figure 1 is a side elevation of my improved stop-motion, the several parts being in the normal working relation corresponding to a perfect engagement of the fabric with the tenter-chain. Fig. 2 is a corresponding plan view. Fig. 3 is a side elevation, a portion of the fabric being disconnected from the tenter-chain, the latter traveling rearwardly and having the dog in engagement therewith, thereby, through the medium of the flexible connection attached to the traveling frame, causing the belt to be reversed. Fig. 4 is a similar view, the device, however, having traveled rearwardly to its limit, and also



showing the dog automatically withdrawn from the chain by means of a tripping device. Fig. 5 is a side view of a portion of the tenter-chain detached. Fig. 6 is a plan view. Figs. 7 and 8, Sheet 2, are transverse sectional views taken on lines  $xx$  and  $yy$  of Figs. 1 and 3, respectively. Fig. 9 is a side view showing the relation of the parts when an end of the fabric is passing the device. Fig. 10 is a cross-sectional view taken on line  $zz$  of Fig. 9. Fig. 11 is a partial side elevation showing the device adjusted, so that the tenter-machine will not be stopped when running empty or without the fabric. Fig. 12, Sheet 3, is a vertical sectional view in reduced scale, showing a piece of goods passing through a tentering-machine, and also showing a manner of attaching the stop-motion to the lever of a belt-shipper which controls the driving mechanism. Fig. 13 is a corresponding plan view; and Fig. 14, Sheet 4, shows a modification of the driving mechanism.

A more detailed description of my invention and the manner of its operation are substantially as follows. I would, however, first briefly describe the usual form of tentering-machine and its operation, as indicated by Figs. 12 and 13: The tenter-chain  $c$  is double and also endless, the links having a series of pin-carrying plates attached to them. The chain passes back and forth over wheels secured to axles  $r$ , mounted to revolve in suitable bearings. Motion is imparted to the machine by a driving belt  $i^2$ , passing around the driving-pulley  $i$ . The latter is mounted upon a counter-shaft having a cone-pulley  $j$ , from which a belt  $j^2$  leads down to a similar pulley  $j$ . The latter's shaft carries a bevel-pinion, which intergears with a larger gear  $u$ , which in turn simultaneously actuates the several shafts  $r$ , and thereby the tenter-chain.

In use an end of the fabric  $f$  is introduced to the machine, the pins or spurs of the traveling chains simultaneously engaging the two selvages of the cloth, thereby carrying it along back and forth until it passes from the chain fully stretched and dried, substantially as indicated in Fig. 12, wherein the cloth is being piled up as it leaves the machine. The upper portion of the chain travels in a guide or track  $m$ . To the upper portion of this track is secured my stop-motion device, the same being located at or near the front end of the tentering-machine.

The device as a whole is designated by  $A$ , the same being supported by end frames  $a$ , secured to the track  $m$ . (See Figs. 1, 2, &c.) These frames are separated a suitable distance—say ten or twelve inches—and are connected by two stationary parallel guide-rods  $b$ . A cross-head or dog-carrying frame  $d$  is fitted to move endwise along the rods  $b$ . To the front portion of the frame  $d$  is pivoted at  $n'$  a rearwardly-extending two-arm lever  $l$ , the free end  $l'$  of the upper arm being bent to engage a tripping-cam or reversely-bent arm  $e$ , secured to the rear frame  $a$ . The end

$l^2$  of the other or lower arm of the lever is also bent, but adapted to bear against the upper face of the edge of the fabric. The lever is further provided with a front extension  $n$ , having a beveled edge arranged to engage a laterally-projecting locking-pin  $s$ , secured to the front frame  $a$ . The cross-head  $d$  is provided with a rearward extension carrying a vertically-mounted dog  $d^2$ . The upper end of the dog is jointed to the lever  $l$ , the latter having a curved slot  $d^4$  therein, through which passes a small pin  $d^3$ , secured to the dog. (See Fig. 1.) Just below the joint-pin the dog is provided with a stop-pin  $t^4$ . This latter pin not only serves to limit the downward movement of the lever  $l$ , but when combined with the loose finger or lever  $t$ , about to be described, prevents the dog from dropping into engagement with the tenter-chain  $c$ . The chain as usually constructed is represented by Figs. 5 and 6, each link having a lateral extension provided with a pin or spur carrying plate  $p$ . These pins are vertical, and when in use are hooked into the edge of the fabric  $f$ , as shown in Fig. 7, &c. It will be seen, Fig. 6, that a space intervenes between the several chain-links. This space may be utilized to receive the lower end of the dog  $d^2$ . (See dotted lines.) When the dog is thus dropped into engagement with the chain, (see also Figs. 3 and 8,) the dog, levers, &c., are caused to travel in unison with it. It is obvious that the dog may be arranged to engage other parts of the traveling chain with the same result.

To the front side of the cross-head  $d$  at  $t^2$  a loose lever  $t$  is pivoted. This lever or finger is bent laterally and is well rounded at its lower end  $t'$  to engage the upper surface of the fabric. The upper end or edge of the lever  $t$  is slightly curved, as at  $t^3$ , and is further provided with a short extension  $t^5$ . By means of this construction the lever when in a substantially vertical position (see Figs. 9 and 11) prevents the dog from dropping into engagement with the chain, the pin  $t^4$  of the dog then resting upon the surface  $t^3$  of the lever. At the same time the extension  $t^5$  serves to maintain the parts in position.

In the several figures a flexible connection or cord  $c^2$  is represented as secured to the cross-head  $d$ . This cord passes from the cross-head to and around a wheel  $h^3$ , adjustably secured to a shaft  $e^2$ , transversely mounted at the front end of the machine. (See Fig. 13.) Usually the forward chain-wheels  $h^4$  and the said wheels  $h^3$  as well are fitted to move endwise on splines or keys formed in the respective shafts. By this arrangement the machine may be adjusted laterally at its front end to any desired width corresponding to the width and kind of fabric to be dried upon it, thereby at the same time properly stretching the cloth in a lateral direction. To one end of the wheel-shaft  $e^2$  is secured another wheel  $h^2$ . A cord  $c^3$  passes from this wheel and is secured to the shipper-



arm  $g$ , the latter being also provided with a guided rod or connection  $g'$ , arranged to engage and reverse or ship the driving-belt  $i^2$ , as usual.

5 By means of the lever  $g$  an attendant standing upon the platform  $p^2$ , Fig. 12, readily controls the machine, as in starting and stopping it.

10 In lieu of the driving mechanism shown, a direct-acting steam-engine may be substituted, substantially as shown in Fig. 14. In such case the operator controls the tentering-machine by simply opening and closing the steam-valve  $v^2$ , located in the steam-pipe  $v'$ , the valve having a wheel to which the cord  $c^3$  is attached, substantially as shown.

15 The operation of my automatic stop-motion device A is substantially as follows: The fabric  $f$  is first introduced by the attendant to the tenter-chain, which latter carries it along back and forth, at the same time stretching and drying it, until it falls to the floor at the end of the operation. In thus working the two edges of the fabric are continuously  
20 hooked onto the tenter-chain pins  $p$ , the device then being in its normal working position. (See Figs. 1, 7, 12, and 14.) Sometimes mechanism is employed for automatically guiding the cloth onto the pins. A device for this  
30 purpose forms the subject of another pending application for United States patent filed by me March 27, 1890. The stop-motion device when normally working has the lower ends  $l^2 t'$  of the levers or fingers  $l t$  respectively  
35 bearing upon the traveling fabric, as in Figs. 1 and 7. Now in case the fabric for some reason misses one or two links of the chain  $c$ , thereby failing to become hooked onto the pins, when such detached portion arrives opposite the piv-  
40 oted lever  $l$  the latter falls to its limit, thereby carrying down with it the connected dog  $d^2$ , which latter then engages the tenter-chain and is forced along rearwardly by it (see Figs. 3 and 8) until it is automatically re-  
45 leased from the chain by reason of the engagement of the upper arm  $l'$  of the lever with the stationary cam  $e$ . (See Fig. 4.) The rearward movement of the cross-head, &c., at the same time, by means of the flexible con-  
50 nection  $c^2 c^3$ , forces the shipper-lever  $g$ , Fig. 12, in the arrow direction, thereby shifting the driving-belt  $i^2$  and automatically stopping the machine. If an engine, Fig. 14, is employed in lieu of the belt, &c., the action of  
55 the said flexible connections is to turn the wheel of the valve  $v^2$ , thereby shutting off the steam from the engine and stopping the tentering-machine. The attendant next makes the necessary readjustment of the fabric and  
60 starts the machine. The act of moving the lever  $g$  or opening the valve  $v^2$  at the same time carries the levers  $l$ , &c., back to the normal position again. (See Fig. 1.) When the rear end of the piece of fabric has passed the  
65 forward lever  $t$ , the latter by its own weight or gravity instantly assumes a vertical position, thereby carrying the upper end of the lever

under and in contact with the stop-pin  $t^4$  of the dog, thus preventing the latter from falling when the fabric leaves the lever  $l$ . (See 70 Figs. 9 and 10.) By this arrangement it will be seen that the machine is not necessarily stopped during the interval required to intro-  
duce a new piece of fabric.

I sometimes find it desirable to "set" the 75 device so that for the time being it cannot act to automatically stop the machine. In such case I provide the cord  $c^3$ , Fig. 12, with a loop  $o'$ , which the attendant passes over the stationary pin  $o$ . In so doing the springs  $s^2$ , 80 interposed between the forward frame  $a$  and the cross-head, are compressed at the same time the forward end  $n$  of the lever  $l$  is forced under the locking-pin  $s$ , thereby preventing the dog from engaging the traveling chain, al- 85 though the other lever  $t$  may bear upon the fabric, (not shown,) assuming the latter to be passing through the machine. Upon releasing the loop from the pin  $o$  the springs auto-  
matically force the lever from the pin  $s$  to 90 the normal position represented by Fig. 1.

I claim as my invention—

1. The combination, with a tenter-chain and starting mechanism of a tentering or dry- 95 ing machine, of a stop-motion device connected with said starting mechanism and having a dog disconnected from the tenter-chain when normally working by dog-connected mechanism controlled by the traveling fabric 100 attached to said chain.

2. The combination, with the spur-carry- 105 ing endless chain of a tentering or analogous machine for drying web fabrics, of a mounted dog arranged to engage said chain and travel therewith, a lever connected with and con- 110 trolling the action of said dog and arranged to bear upon the fabric's surface, a locking-lever also arranged to bear upon the fabric and to automatically engage the dog to pre-  
vent the latter from engaging the tenter-chain 115 after the fabric has passed, and a stationary arm arranged to automatically disconnect the dog from the chain, substantially as herein-  
before described.

3. The stop-motion device, substantially as 115 hereinbefore described, consisting of a cross-head or frame mounted to move back and forth and connected with starting mechanism, a dog-controlling lever pivoted to said cross- 120 head and arranged to bear normally upon the fabric, a pivoted dog-locking lever adapted to bear freely upon the fabric and arranged to travel in unison with the cross-head, a dog adapted to engage the tenter-chain and con- 125 trolled by said levers, and a tripping-arm adapted to engage the lever to automatically disengage the dog from the tenter-chain.

4. A cross-head mounted to move back and forth, a dog vertically mounted therein, a main lever jointed to the said cross-head and 130 dog and arranged to rest upon the fabric, and an auxiliary or locking lever also bearing upon the fabric and adapted to engage the dog, in combination with starting mechanism



connected with said cross-head, and a tenter-chain arranged to carry wet fabrics and also adapted to engage said dog, substantially as hereinbefore described, and for the purpose  
5 set forth.

5. The combination, with a suitably mounted and driven tenter-chain and starting mechanism of a tentering machine, of a cross-head, a fabric-controlled main lever and dog, and a  
10 locking-lever and tripping-arm, all constructed and arranged whereby the device operates to automatically stop the machine in case the fabric is accidentally detached from the tenter-chain, substantially as hereinbefore set  
15 forth.

6. The combination of a movable member or lever having its lower end portion arranged to bear against the edge portion of a web of fabric mounted on a traveling tenter-chain, a  
20 dog or pin jointed to and controlled by said member and arranged to engage the tenter-chain, a member or lever arranged to engage said fabric and also arranged and adapted to lock the dog in position when desired to pre-

vent the latter from engaging the chain, a 25 longitudinally-guided cross-head carrying said members and dog and connected with the starting mechanism of the machine, and a tripping-arm arranged to disconnect the dog from the chain, substantially as and for 30 the purpose hereinbefore set forth.

7. The combination, with the fabric-controlled stop-motion device connected with the starting mechanism of a tentering or analogous machine and having a dog adapted to 35 engage the tenter-chain, substantially as hereinbefore described, of a dog-controlling pivoted lever having a point or extension, as *n*, a locking-pin, as *s*, arranged to engage with the point *n* to prevent said dog from chain con- 40 tact, and springs, as *s*<sup>2</sup>, adapted to automatically force the device from said pin.

In testimony whereof I have affixed my signature in presence of two witnesses.

LOUIS HOLLINGWORTH.

Witnesses:

CHARLES HANNIGAN,  
GEO. H. REMINGTON.