

(No Model.)

6 Sheets—Sheet 1.

L. LINDLEY.

MACHINE FOR FINISHING LACE OR OTHER FABRICS.

No. 408,492.

Patented Aug. 6, 1889.

FIG. 10.

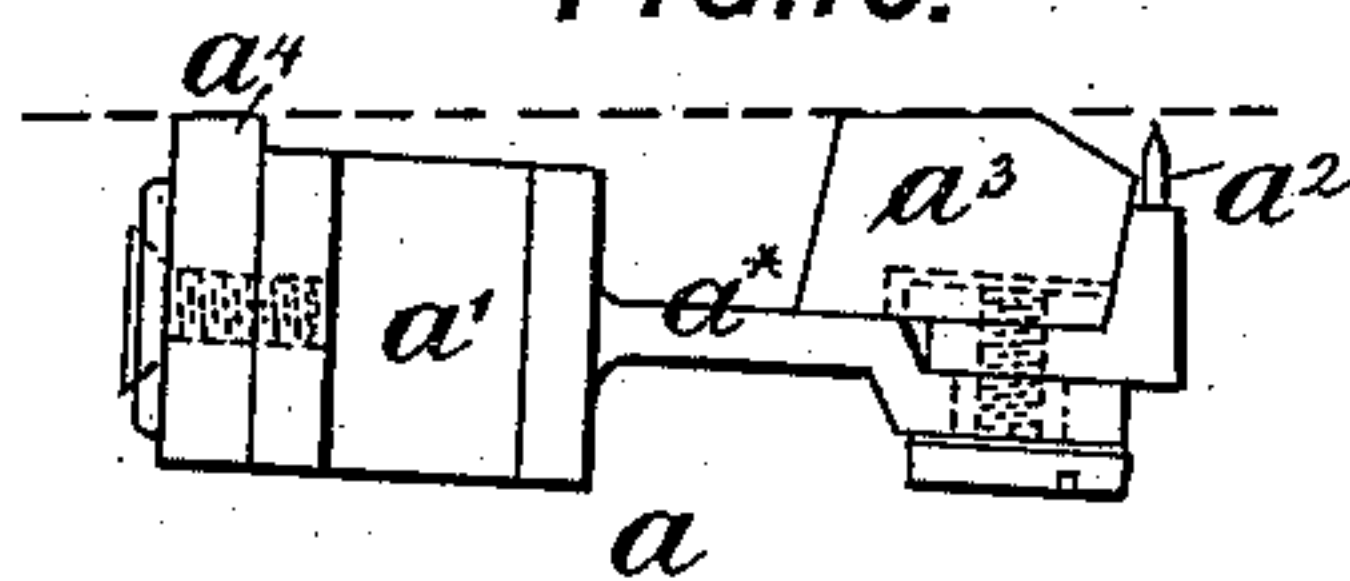
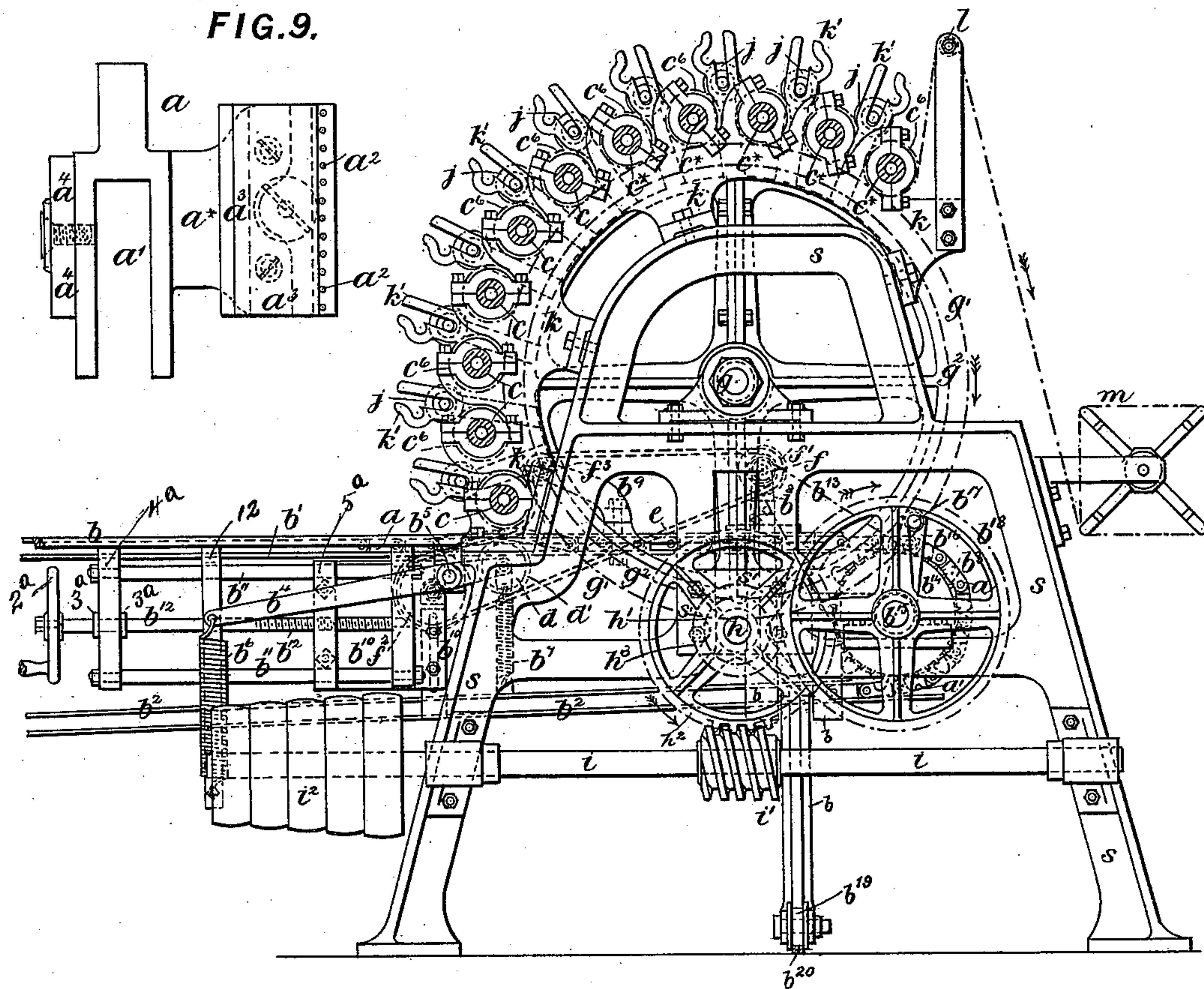


FIG. 1.

FIG. 9.



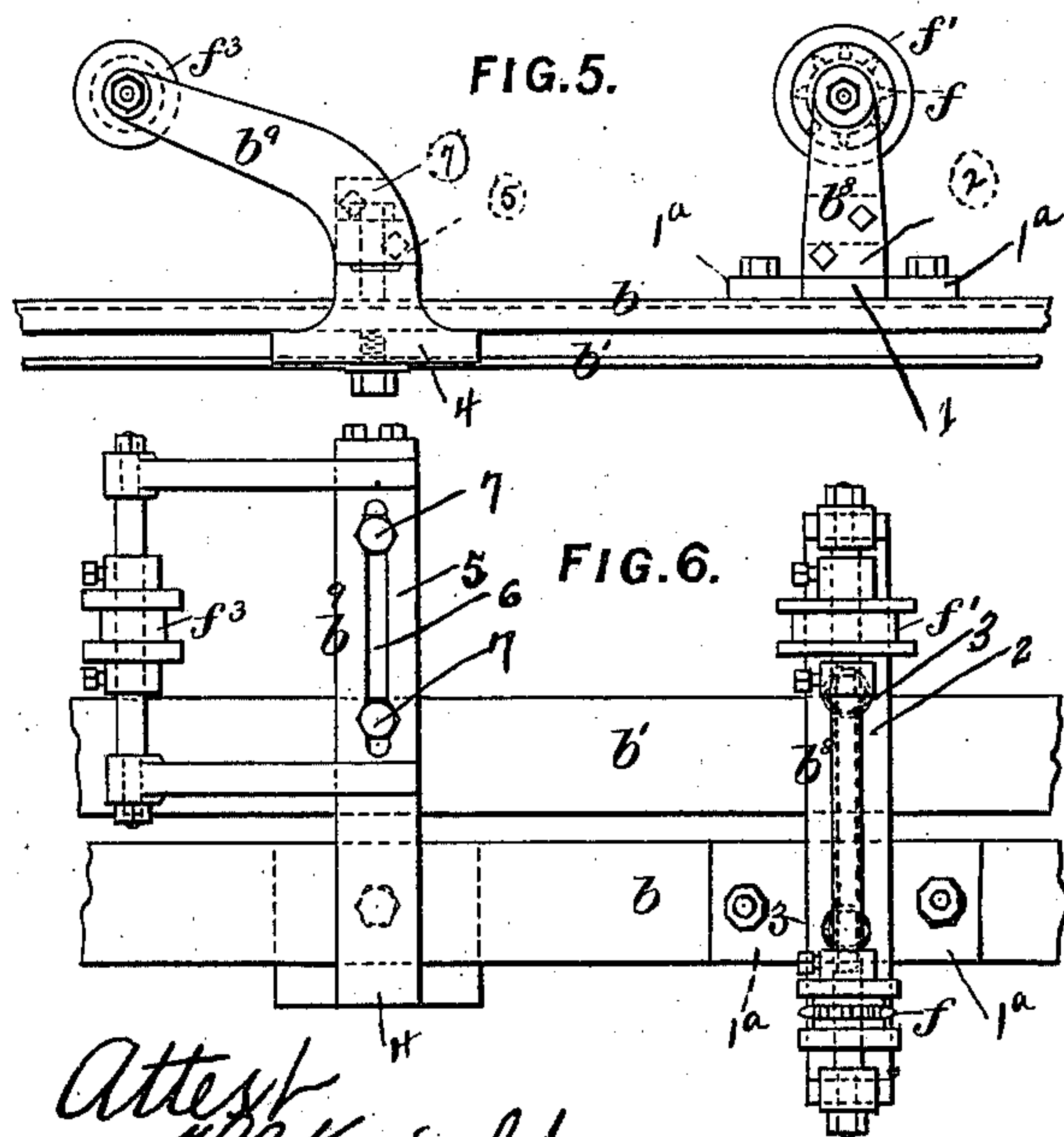
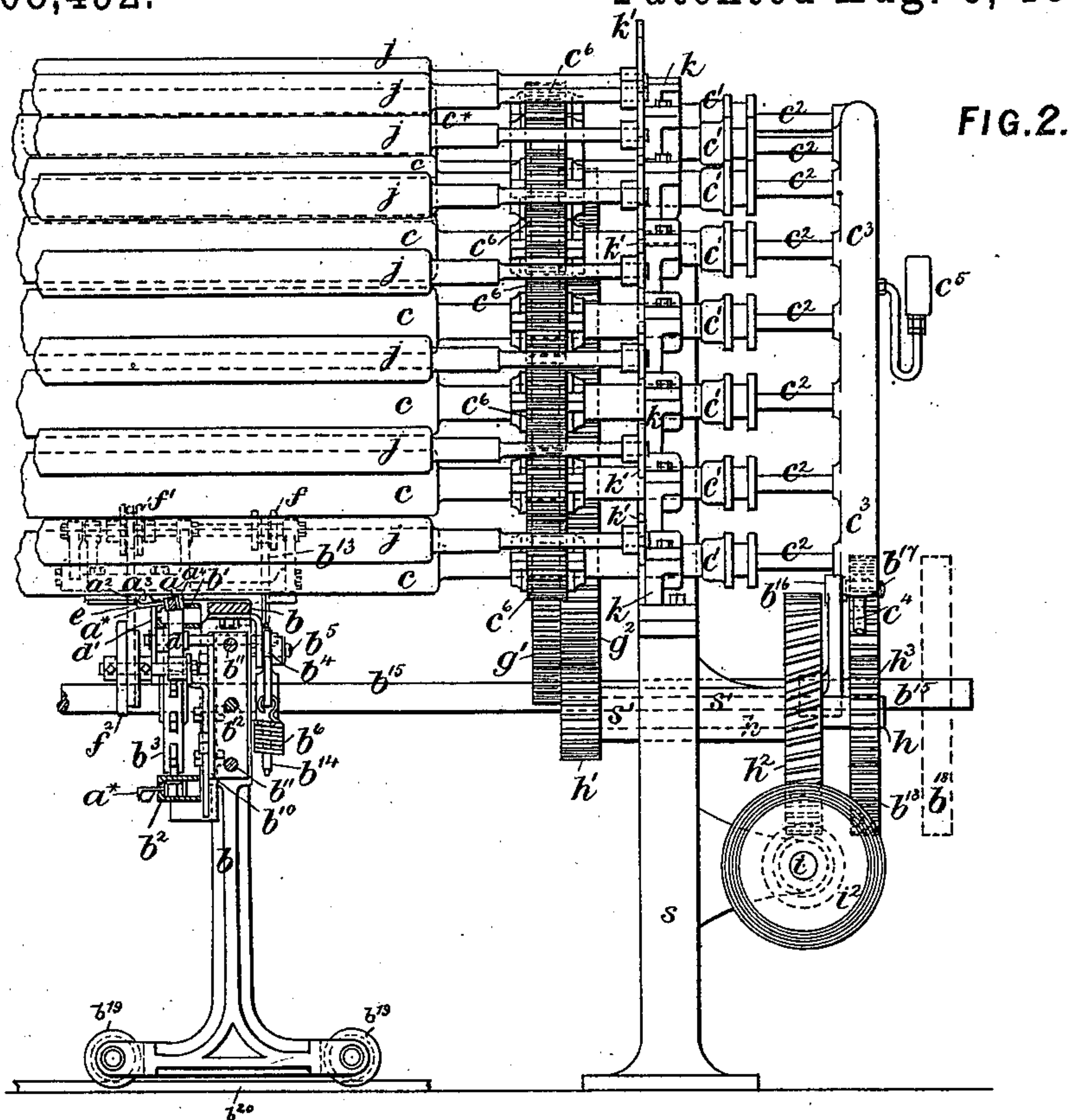
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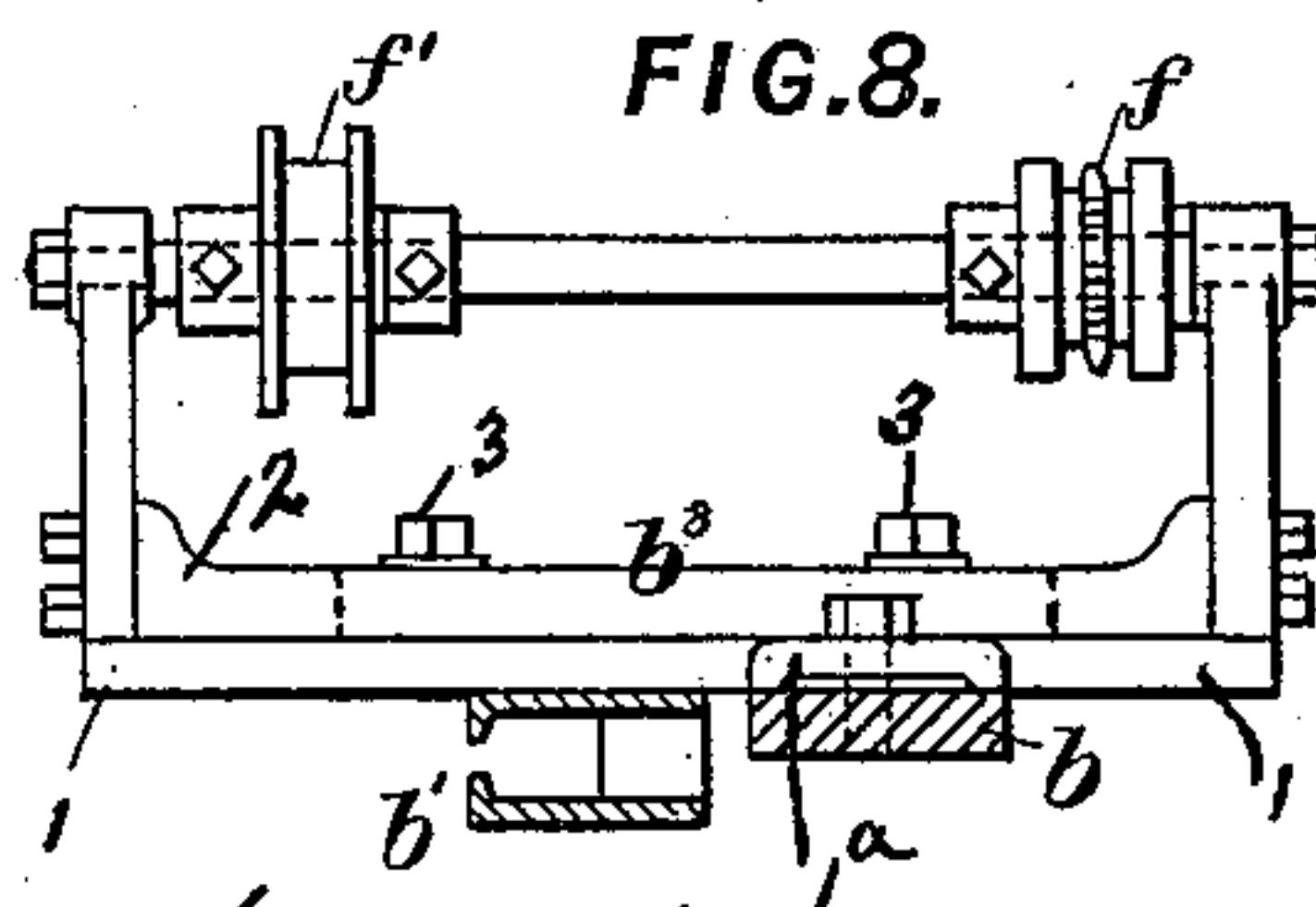
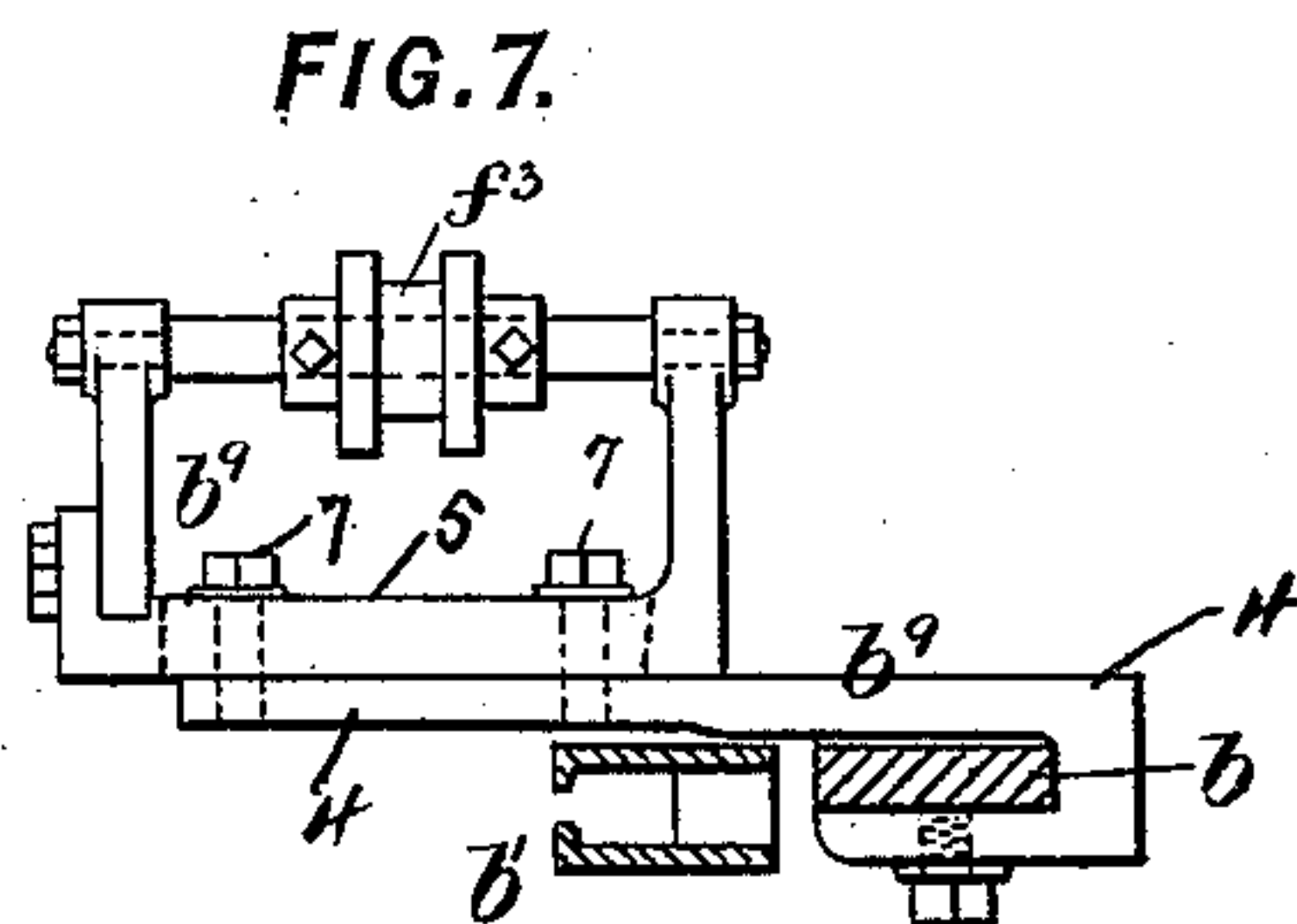
6 Sheets—Sheet 2.

MACHINE FOR FINISHING LACE OR OTHER FABRICS.

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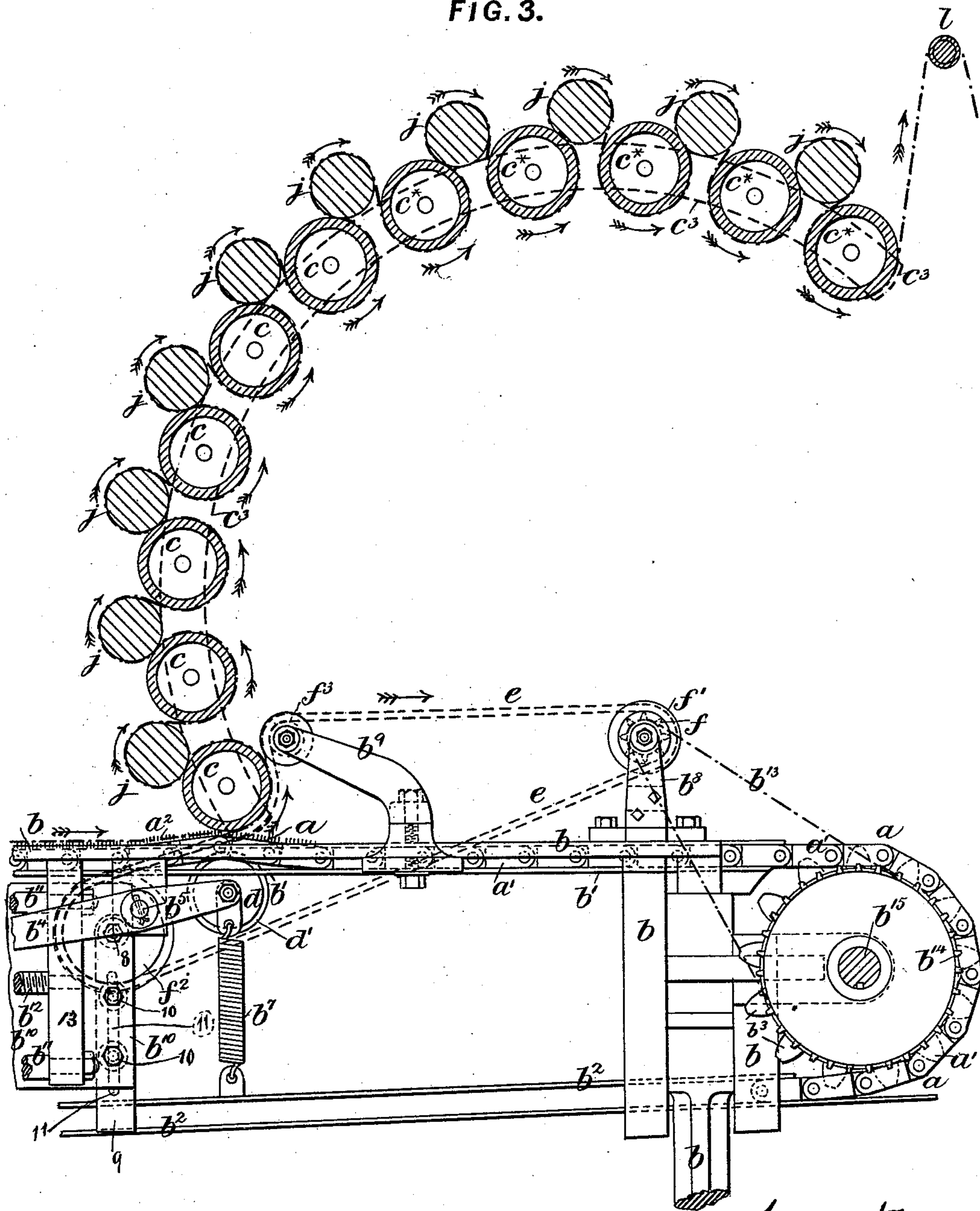
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6 Sheets—Sheet 3.

MACHINE FOR FINISHING LACE OR OTHER FABRICS.

Patented Aug. 6, 1889.

FIG. 3.



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(No Model.)

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MACHINE FOR FINISHING LACE OR OTHER FABRICS.

No. 408,492.

Patented Aug. 6, 1889.

FIG. 4.

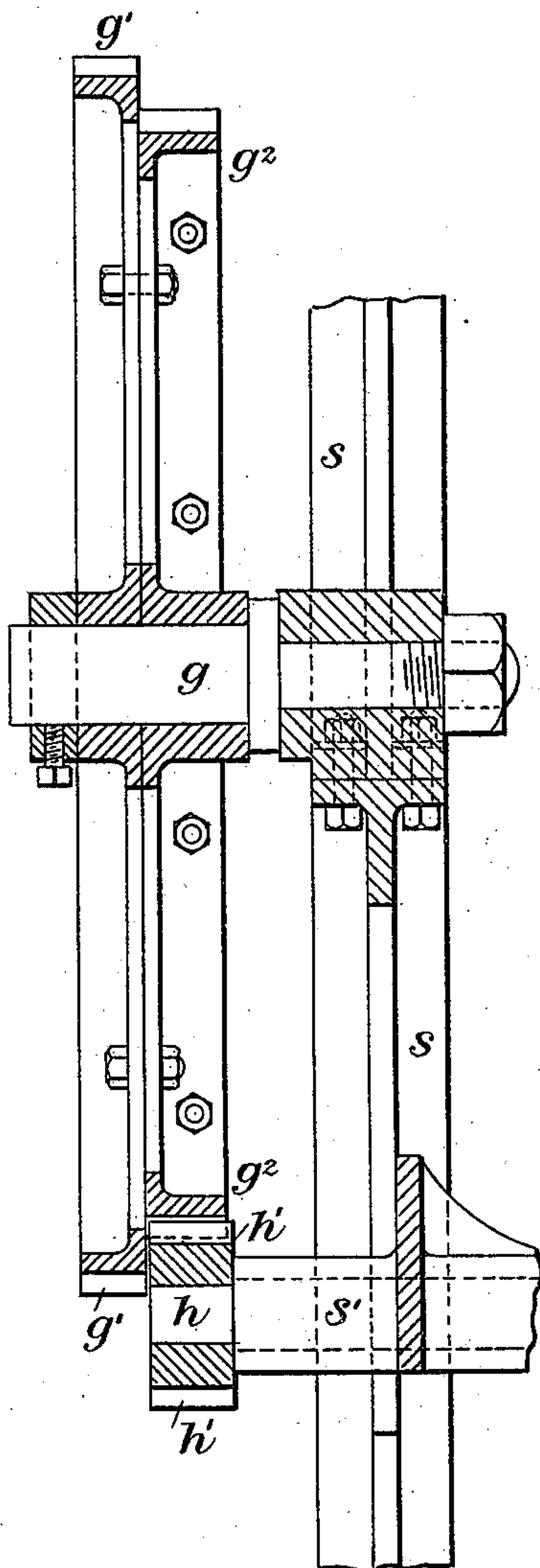


FIG. 15.

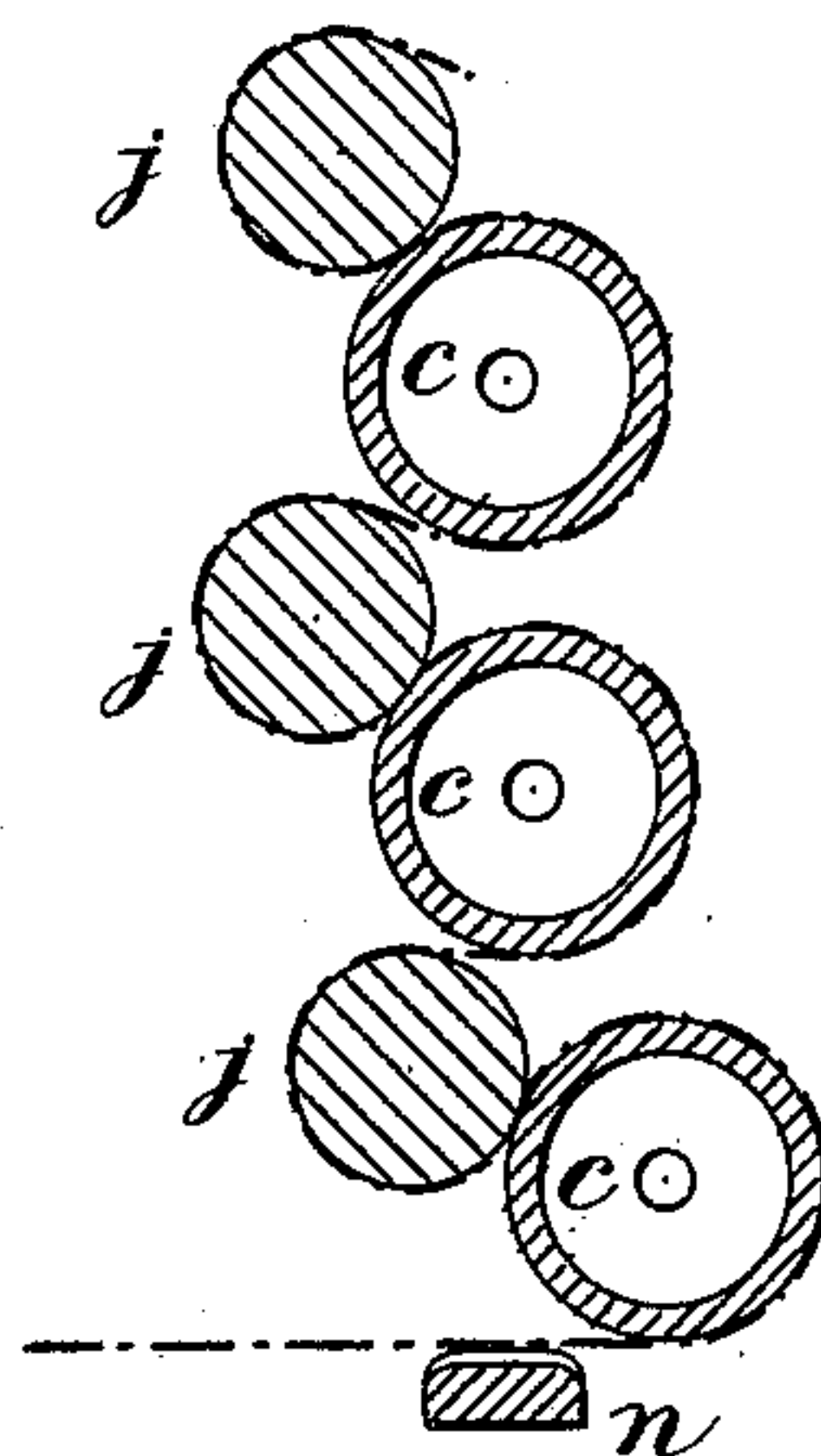
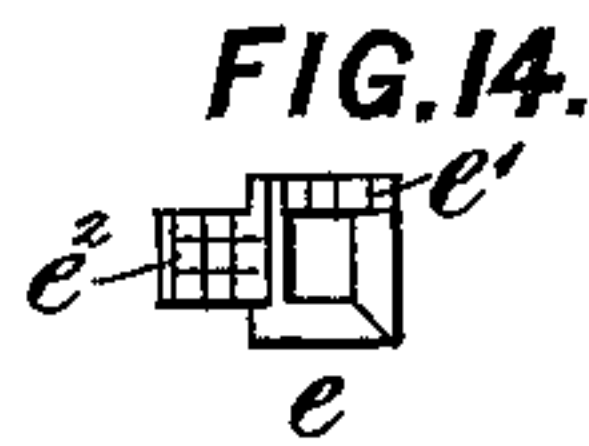
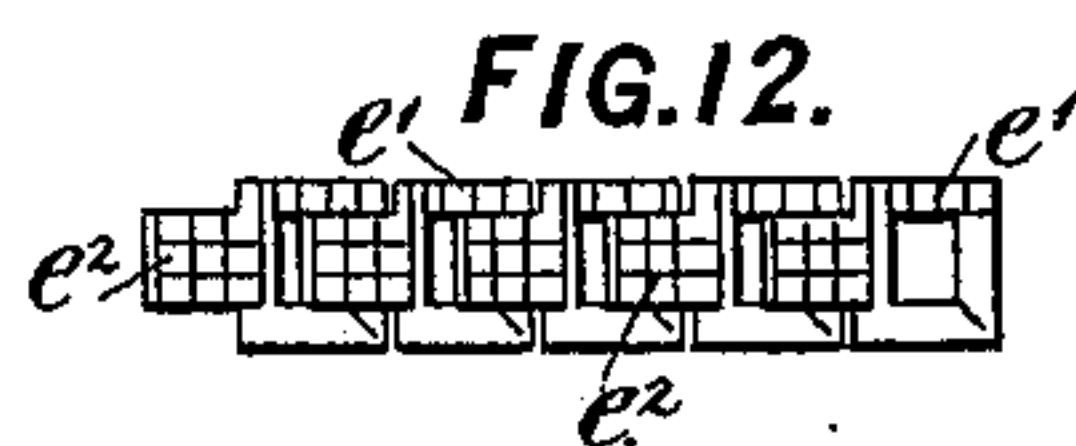
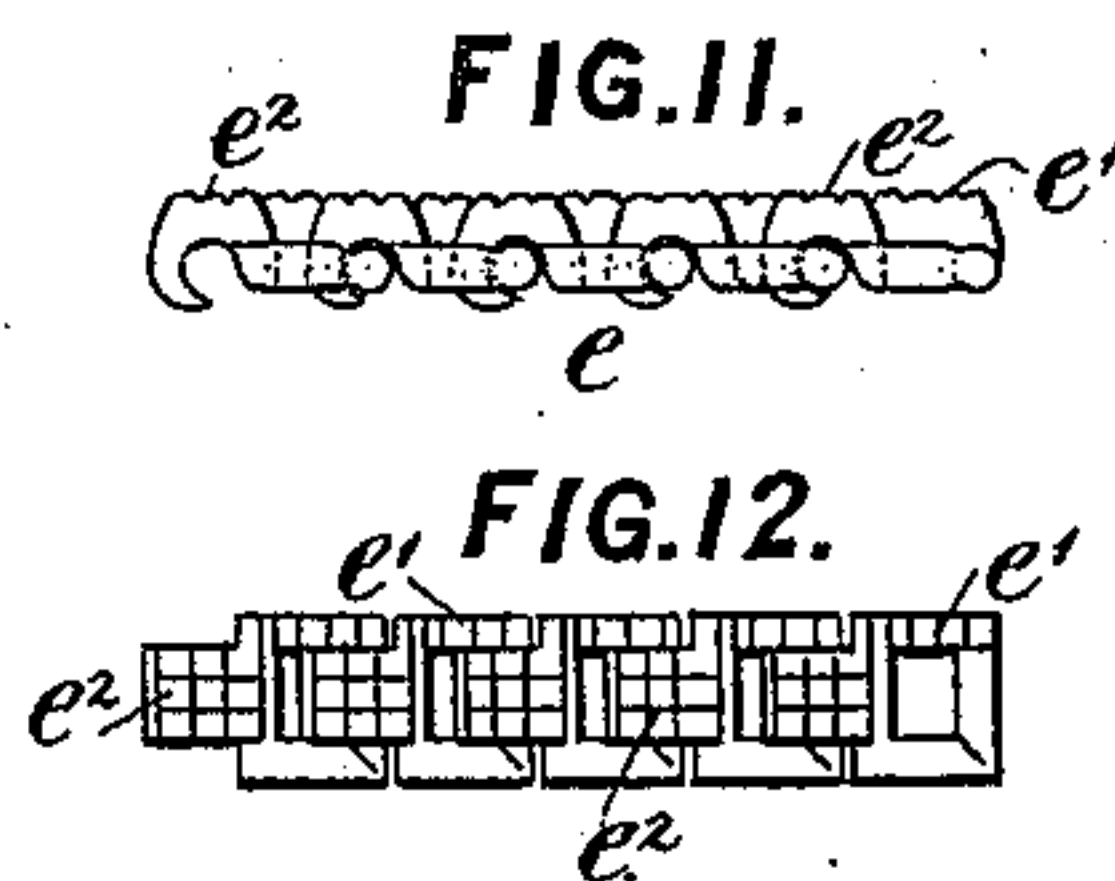


FIG. 16.



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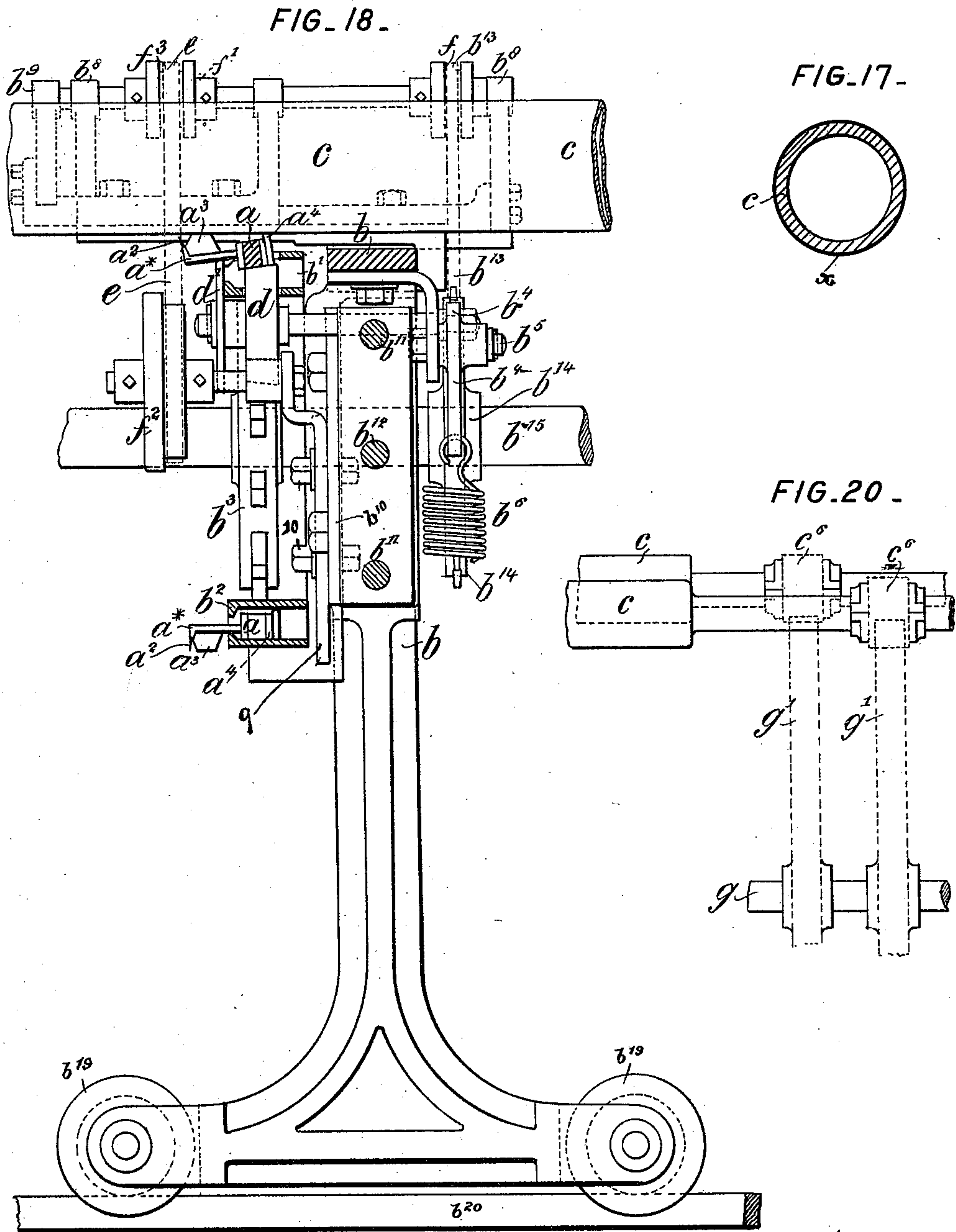
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MACHINE FOR FINISHING LACE OR OTHER FABRICS.

No. 408,492.

Patented Aug. 6, 1889.



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6 Sheets—Sheet 6.

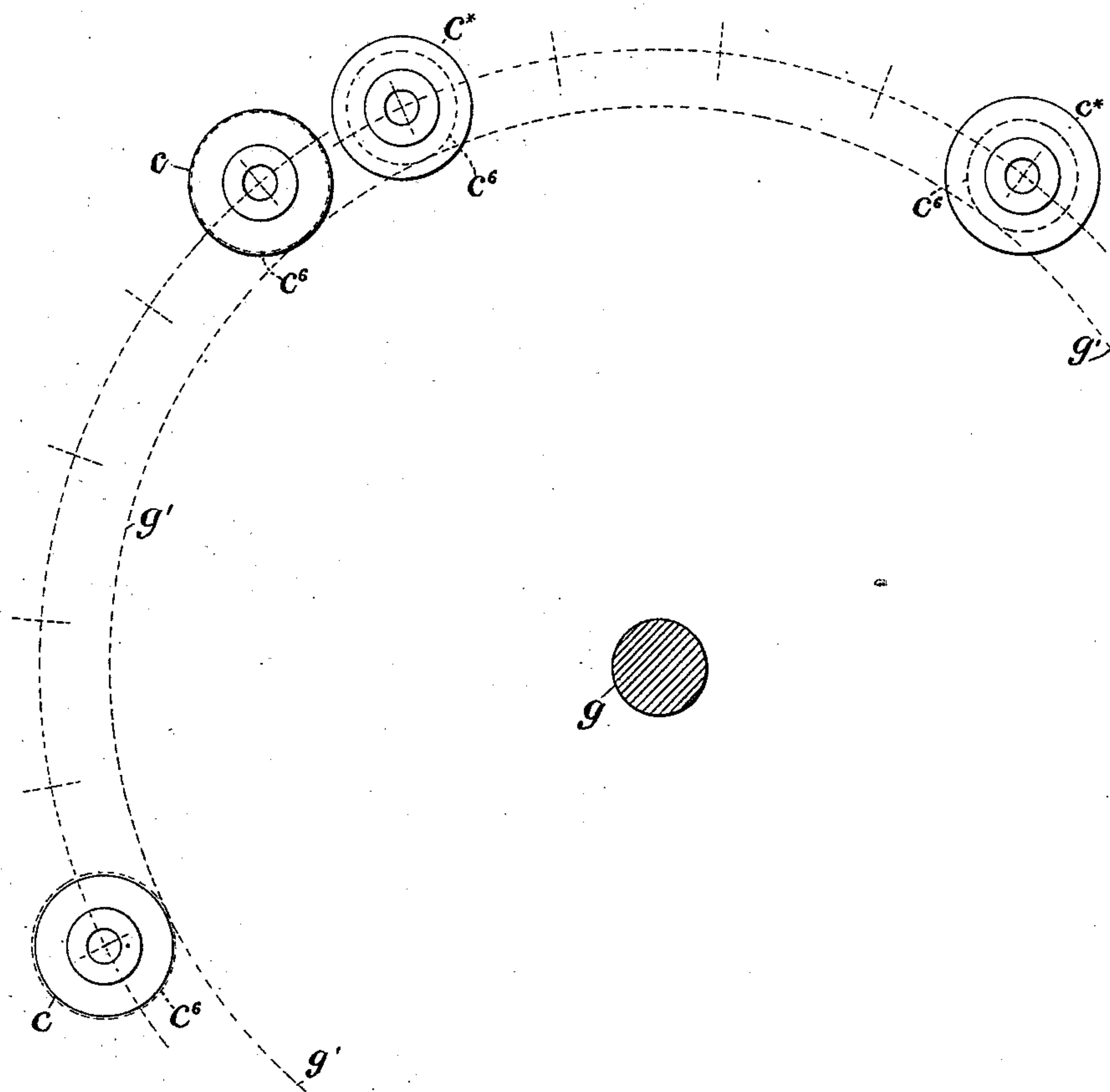
L. LINDLEY.

MACHINE FOR FINISHING LACE OR OTHER FABRICS.

No. 408,492.

Patented Aug. 6, 1889.

FIG. 19.



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UNITED STATES PATENT OFFICE.

LEONARD LINDLEY, OF NOTTINGHAM, ENGLAND.

MACHINE FOR FINISHING LACE OR OTHER FABRICS.

SPECIFICATION forming part of Letters Patent No. 408,492, dated August 6, 1889.

Application filed November 29, 1887. Serial No. 256,462. (No model.) Patented in England March 19, 1884, No. 5,160, and September 19, 1885, No. 11,152, and in France February 2, 1887, No. 178,809.

To all whom it may concern:

Be it known that I, LEONARD LINDLEY, lace-dresser, a subject of the Queen of Great Britain, residing at Nottingham, England, have invented certain new and useful Improvements in Machines for Finishing Lace or other Fabrics, (for which I have received Letters Patent in Great Britain, No. 5,160, dated March 19, 1884, and No. 11,152, dated September 19, 1885, and in France, No. 178,809, dated February 2, 1887,) of which the following is a specification.

The invention relates to that class of machinery employed in finishing lace and other fabrics in which the fabric is stretched in the direction of its width on endless chains of tentering hooks, pins, or clamps, and is delivered by them onto the first of a series of drying or ironing cylinders; and my present invention consists of a novel arrangement and combination of parts, whereby I obtain a simpler, lighter, and cheaper form of machine than heretofore, which permits of the ready introduction therein of the fabric to be finished, dispenses with a large amount of labor hitherto required in effecting such introduction, presents a clearer view of the fabric as it passes therethrough, is less liable to injure the fabric, and obviates the necessity existing in such class of machines as hitherto constructed for using more than one pressure-gage to each machine.

My invention is represented in the accompanying drawings, in which—

Figure 1 is an end view, partly in section, and Fig. 2 a front view, partly in section, of one side of the machine. Fig. 3 is a cross-section of the ironing-rollers, other parts connected therewith being also shown. Figs. 4 to 8 are views in detail of parts. Fig. 9 is a plan, and Fig. 10 is an end view, of one link of the tentering-chain. Fig. 11 is a side view, and Fig. 12 is a plan, of a portion of one of the endless chains used at each edge of the fabric. Figs. 13 and 14 are respectively a side view and a plan of one of the links thereof separately; and Figs. 15 and 16 are respectively a vertical section and a plan of parts, showing a slight modification. Fig. 17 is a cross-sectional view of one of the rollers, showing the same covered with cloth, as hereinafter described. Fig. 18 is an en-

larged detail view of parts hereinafter fully explained. Fig. 19 is a diagrammatic view of the first and last rollers in each of the series, illustrating the difference in size hereinafter referred to. Fig. 20 is a detail view of a modification hereinafter explained.

In all the figures like parts are marked with similar letters of reference.

a is one of a pair of chains of tentering hooks, pins, or clamps which run in troughs or guides b' b^2 , and pass over chain-wheels b^3 , by which they are caused gradually to move forward toward the first of a series of ironing or drying rollers c . One of these chains a is employed at each side of the machine, and the troughs or guides b' b^2 and wheels b^3 , carrying and giving motion to the same, are carried by frames b , which are provided with wheels b^{19} , supported on cross ways or rails b^{20} , in such manner as to be capable of being moved toward or from each other according to the width of the fabric under treatment, and the frames b , and consequently the chains, are so arranged as to stretch the fabric to the desired extent before its delivery to the first of the series of ironing or drying rollers c c^* , which is driven at the same surface speed as the chains a by suitable gearing, as hereinafter described. Each frame b has a leg or foot, as shown at Figs. 1, 2, and 18, in which are suitably journaled wheels b^{19} , having grooves which adapt them to run upon the cross way or rail b^{20} .

The ironing or drying rollers c c^* are heated by steam, which is supplied to them by pipes c^2 , passing axially into them through stuffing-boxes c' , and connected at their outer ends with a common steam-chamber c^3 , which, by a steam-pipe c^4 , provided with a suitable stop-cock, is connected with a steam-boiler.

c^5 is a steam-gage attached to the chamber c^3 to indicate the pressure of steam therein and in the rollers c .

The steam-chamber c^3 , as shown by dotted lines in Fig. 3, is of curved form corresponding with the curve in which the rollers c are preferably placed.

The large heated ironing or drying cylinder formerly employed in this class of machine required a separate steam-gage to be used therewith, on account of the difference

in strength between the same and the smaller heated rollers *c*. By dispensing with such large heated cylinder I also dispense with the said separate steam-gage used therewith, and as the ironing or drying rollers *c c**, are all of nearly the same strength a single pressure-gage *c⁵*, attached to the steam-chamber *c³*, is all that is required on the machine. The ironing or drying rollers *c c** may, some or all of them, be covered with cloth or felt *x* in the manner illustrated in Fig. 17, or they may be used without such covering.

The lowest of the series of rollers *c* is placed as close as possible to the chains *a* of tentering hooks, pins, or clamps, which deliver the fabric to be finished directly to such lowermost roller *c*, and in order to maintain the chains *a* always within a given distance of the surface of the said lowermost roller *c*, I cause each of the chains *a* to pass over a pair of rollers *d d'*, carried at one end of an arm or lever *b⁴*, which is mounted on an axis *b⁵*, carried by the frame *b*, and such arm or lever *b⁴* is acted on at one end by a spring *b⁶*, which causes the rollers *d d'* to be borne upward toward the lowermost heated roller *c*. The links of the chains *a* pass over the roller *d*, and the extensions *a** thereof, carrying the tentering hooks, pins, or clamps, pass over the roller *d'*. I also attach to the chains *a* wood or other non-metallic blocks *a³ a⁴*, which rise a short distance above the points of the hooks or pins *a²*, or it may be clamps, and the links *a'* of the chains and these blocks *a³ a⁴* are pressed against the lowermost roller *c* by the rollers *d d'*, which latter support the chains *a* at such an angle as to facilitate the release of the fabric from the hooks, pins, or clamps *a²*. By these means the tentering-chains *a* are always maintained in the same relation to the lowermost roller *c*, and the tentering hooks, pins, or clamps are prevented, by the wood or other non-metallic blocks *a³ a⁴*, from catching against the said lowermost roller *c*, or against the fabric thereon, while by the use of such non-metallic blocks *a³ a⁴*, I avoid soiling such roller *c*.

When adjusting the traversing frames *b* to a new width of fabric, each spring *b⁶* is unhooked from the arm or lever *b⁴*, at which time the smaller spring *b⁷*, which always remains attached to the opposite end of such arm or lever *b⁴*, acts to draw down such end, and consequently the rollers *d d'*, thereby causing the blocks *a³ a⁴* of the chains *a* to fall out of contact with the lowermost roller *c*, and thus prevent injury to such roller or to the cloth or other covering thereon in the traverse of the chains in the direction of the length of such roller *c*. This mechanism of course is duplicated at the opposite side of the machine, (not shown,) and therefore the description of the one side just given will suffice for both.

In order to prevent contraction or distortion of the fabric operated upon when it is transferred from the tentering hooks, pins,

or clamps to the lowermost drying-roller *c*, I employ two endless chains *e* to act at the edges of the fabric to assist in liberating the fabric from the tentering hooks, pins, or clamps and to bring the edges thereof immediately into contact with the said lowermost roller *c*. I also form such chains *e* with narrow bearing-surfaces *e'*, so formed as to present an almost continuous bearing-surface to the lowermost heated roller *c*, and I supplement such narrow bearing-surfaces *e'* with a bearing-surface *e²*, formed upon the solid part of the links of such endless chains *e*, and I preferably form such bearing-surfaces *e' e²* roughened, in order to enable them to obtain a firm hold of the fabric under treatment. These endless chains *e* are caused to remain in contact with the edges of the fabric and to press them against the heated surface of the lowermost heated roller *c* as far as possible around the same. For this purpose the endless chains *e* are mounted on chain wheels or pulleys *f' f² f³*. The pulleys or wheels *f' f²* at each side of the machine are each carried by an adjustable bracket *b⁸*, fixed to one of the frames *b*. The pulleys or wheels *f³* are each carried by an adjustable bracket *b⁹*, fixed to the top bar of the frame *b*, and the pulleys or wheels *f²* are each carried by a frame *b¹⁰*, which is mounted with capability of sliding upon rods or bars *b¹¹*, carried by the frame *b*, and such frame *b¹⁰* is capable of being acted upon by a screw *b¹²* when required to put strain on the endless chains *e*.

The adjustable bracket *b⁸* has its base formed in two parts 1 2, the lower part 1 being rigidly fixed by the wings 1^a to the top bar of the frame *b*, and the upper part 2 being fixed to the lower part 1 by screws 3, passing through a slot in part 2 and screwing into part 1. The adjustable bracket *b⁹* has its base formed in two parts 4 5, the lower part 4 being rigidly fixed to the upper bar of the frame *b* and extending over the trough *b'*, while the part 5 is formed with a slot 6, through which screws 7 are passed, which screw into the part 4.

The pulleys or wheels *f²* (see Fig. 18) are each carried by a pintle or axis 8, fixed rigidly to a bracket 9, which latter is adjustably fixed to the frame *b¹⁰* by bolts 10, passing through holes in the frame *b¹⁰* and through a slot 11 in said bracket 9. This frame *b¹⁰* consists of a broad flat member, as shown in Figs. 1 and 3, to one end of which is secured the member 5^a, in which the screw *b¹²* engages, and at its other end is secured the pulley *f²*, in the manner above described. The said bracket *b¹⁰* is supported by the bars *b¹¹*, while such bars are supported by the members 4^a, 12, and 13 from the main frame of the machine.

As shown, the screw *b¹²* is provided with a hand-wheel 2^a for operating it, and with collars or shoulders 3^a, which abut against both sides of the upright stationary member 4^a, while, as before remarked, its screw-threaded

end engages in the sliding member 5^a of the frame b^{10} , upon which the wheel f^2 is mounted, thus causing the said frame b^{10} to go and come on the bars b^{11} when the wheel 2^a is turned.

Motion is given to each of the endless chains e at the same surface speed as the chains a by an endless chain b^{13} , passing partly around a chain-wheel b^{14} , fixed on the axis b^{15} of the chain-wheel b^3 , giving motion to the tentering-chains a , and partly around a chain-wheel f , fixed on the axis of the chain-wheel or pulley f' .

The ironing or drying rollers c , according to the arrangement shown in the drawings, are arranged in two similar series, and preferably in an arc of a circle drawn around the axis g . Each of such rollers c or c^* is of slightly-greater diameter than the next preceding or lower roller c or c^* . This difference in size is very slight, and therefore hardly perceptible; but it is plainly shown in Fig. 19 that there is considerable difference between the size of the first and that of the last roller of each series. As shown by dotted lines in this same figure, the first series c are all driven at the same number of revolutions by means of toothed pinions c^6 , and the second series of rollers c^* are driven at a slightly-accelerated speed by means of smaller toothed pinions fixed on the axes thereof, as represented in diagram in Fig. 19, all of which are driven by a toothed wheel g' , rotating on the axis g , which wheel g' is driven at the same surface speed as that of the tentering-chains a by the following means: Fixed to the wheel g' and rotating therewith is a toothed wheel g^2 , which is driven by a pinion h' , fixed on a shaft h , working in a bracket s' , fixed to the frame s of the machine. On this shaft h is a worm-wheel h^2 , which is driven by a worm i' , fixed on the shaft i , which latter is driven by a cone-speed i^2 on the same, to which motion is given by belting from any suitable source of power.

For giving motion to the tentering-chains a , driving-lever b^{16} , provided with a pin b^{17} , is fixed on the shaft b^{15} , and is driven by one of the arms of a wheel b^{18} , which in its turn is driven by a pinion h^3 , fixed on the shaft h . The wheel b^{18} is mounted loosely on the shaft b^{15} , and by sliding it along the said shaft it can be disconnected from both the pinion h^3 and the driving-lever b^{16} , when for any purpose the tentering-chains are required to be stopped.

By the above-described arrangement of parts the lowermost roller of the lower series of ironing or drying rollers c is caused to rotate at the same surface speed as that of the tentering-chains a ; but on account of the increased diameters of the following rollers in this series the surface speed of each succeeding roller is slightly greater than that of the next preceding or lower roller, and also by the above means I cause the second series of

rollers c^* to rotate slightly faster than the first, thus obviating the necessity for using so large a number of rollers of different diameters as would be required if they were all in one series of different diameters. In some cases, however, instead of using two series of such rollers only one may be used. The rollers c may, however, be all of the same diameter, in which case the increased surface speed of each succeeding roller may be obtained by means of suitable gearing, the arrangement I prefer to use for such purpose being shown in Fig. 20, which consists of a separate toothed wheel g' , to gear into the pinion c^6 of each roller c , such toothed wheel g' and pinions c^6 being so proportioned as to give to the said rollers c the required increase of surface speed.

By the use of ironing or drying rollers of gradually-increasing surface speeds I am enabled to efficiently finish cotton and other goods which are liable to extension on drying, as any extension of the fabric under treatment, after passing from the first ironing or drying roller, is taken up by the increased surface speed of the succeeding rollers, by which means it is kept in a constant tension until it is completely dried, thereby securing its continuous contact with the various rollers, and consequently producing a better finish than has heretofore been attained in the classes of goods which are liable to such extension on drying. When, however, it is desired to finish fabrics which are not liable to such extension on drying, I employ heated rollers which have all the same surface speed. I place outside and intermediate of these ironing or drying rollers c guide or conducting rollers j , which, by gravity, aided by suitable guides k' , fixed to the framing k , carrying the bearings of such rollers c , always remain in contact therewith.

The fabric is first placed on the tentering hooks, pins, or clamps in the usual way, and is conducted by the tentering-chains to the lowermost of the heated or ironing rollers c . The endless chains e assist in delivering the fabric to such roller c and then hold it firmly and as far as possible around the same. It then passes from such first roller c to and partly around a guide or conducting roller j , and thence to the second roller c , and so on until it arrives at the last of the ironing or drying rollers c^* , from which it is passed over a guide bar or roller l , and is thence conducted directly to the winding-on beam or roller m , which by preference is rotated by hand.

Any required number of the ironing or drying rollers c of increasing surface speeds may be employed, either in combination or without other similar rollers revolving at equal surface speeds with each other.

By the peculiar arrangement and combination of parts above described I am enabled to conduct the fabric in a continuously-forward course through the machine, and thereby

avoid the undue strain which is put thereon when using a large ironing or drying cylinder in combination with the rollers *c*, as here-
 inbefore described, which latter arrangement
 5 or combination necessitates the fabric to be conducted in a very circuitous course—that is to say, first around the said large ironing or drying cylinder until it arrives at the up-
 10 permost of the heated rollers *c*, after which it is led around the said rollers *c* and guide or conducting rollers *j* until it arrives at the low-
 ermost of such rollers *c*, whence it passes partly around a guide-roller, and is thence
 15 over other guide-rollers to the back of the machine, where it is wound onto the winding-on drum or roller. I also, according to my present invention, by causing the fabric to pass through the machine in a continu-
 20 ously-forward direction, avoid the necessity of using the conducting-rollers hitherto necessary for conducting the fabric from the last or lowermost of the said rollers *c* backward to the winding-on beam or drum, as also the
 25 driving arrangements necessary for giving motion to such conducting-rollers. I also avoid the necessity of using movable conducting-rollers for conducting the fabric from the large cylinder to the first of the said roll-
 30 ers *c* and for facilitating the entry of the fabric between the cylinder and said first conducting-roller.

When finishing some classes of fabrics, the tentering-chains will not be required, but the
 35 fabric will be passed over a breadthener-bar *n*, (see Figs. 15 and 16,) or bars, roller or rollers, which will suitably extend it or smooth it out. When this arrangement is employed, the chain belts *e* are not necessary, but still
 40 they may be employed, if desired.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be per-
 45 formed, I declare that what I claim is—

1. The combination of tentering-chains *a*, chain-wheels for driving said chains, a series of ironing-rollers arranged in an arc, pinions on said rollers, a gear-wheel engaging said
 50 pinions, and gearing connecting said gear-wheel with said chain-wheels, whereby the latter and said rollers will operate in unison, substantially as and for the purposes set forth.

2. In combination with the driving-shaft, tentering-chains *a*, and chain-wheels for driv-
 55 ing said chains geared to said shaft, a series of ironing rollers, gearing connecting said rollers with said chain-wheels, whereby the latter and said rollers will operate in unison, pulleys, endless belts *e*, running over said
 60 pulleys and bearing against one of said ironing-rollers, and gearing connecting said pulleys with said driving-shaft, substantially as set forth.

3. In combination with the tentering-chains
 65 *a* and chain-wheels for driving said chains, a series of ironing-rollers, gearing connecting

said rollers with said chain-wheels, so that the latter will operate in unison with said rollers, endless chains *e*, arranged to run against the first roller of the series, pulleys over which
 70 said chains *e* travel, and a belt imparting motion from one of said chain-wheels to one of said pulleys, substantially as set forth.

4. The combination, with the tentering-chains *a* and chain-wheels for driving said
 75 chains, of a series of ironing or drying rollers, pinions on said rollers, a common gear-wheel meshing with said pinions, and said gear-wheel being geared to one of said chain-wheels, the endless chains *e*, bearing upon
 80 one of said ironing-rollers, pulleys over which said chains *e* travel, a belt connecting one of said pulleys with one of said chain-wheels, and the conducting-rollers *j*, substantially as set forth.

5. The combination, with the driving-shaft, the tentering-chains *a*, and chain-wheels for driving them geared with said driving-shaft, of a series of ironing-rollers of different di-
 90 ameters, pinions on said rollers, a common gear-wheel meshing with said pinions, and said gear-wheel being geared to one of said chain-wheels, the belts *e*, running against one of said rollers, pulleys over which said belts travel geared with said driving-shaft, and the
 95 conducting-rollers *j*, as set forth.

6. The combination, with the driving-shaft, the tentering-chains *a*, and chain-wheels for driving them geared with said shaft, of a series of ironing-rollers of different diameters
 100 increasing successively, gears for driving said rollers, a common gear-wheel meshing with said gears, and said gear-wheel being geared with one of the said chain-wheels, the conducting-rollers *j*, the endless chain belts *e*,
 105 bearing upon one of said ironing-rollers, and pulleys over which said chains travel, geared with said driving-shaft, as set forth.

7. The combination, with the driving-shaft, the tentering-chains *a*, and chain-wheels for
 110 driving them geared with said driving-shaft, of two series of ironing-rollers *c c**, respectively, pinions for driving both of said series, the pinions of one series being smaller than those of the other, a common gear-wheel, and
 115 all of said pinions being geared with said common gear-wheel, and said gear-wheel being geared to said chain-wheels, the conducting-rollers *j*, the endless belts *e*, bearing upon one of said ironing-rollers, and pulleys over
 120 which said belts *e* travel, geared with said driving-shaft, as set forth.

8. The combination, with the driving-shaft, the tentering-chains *a*, and chain-wheels for driving them geared with said shaft, of two
 125 series of ironing-rollers *c c**, respectively, arranged above said tentering-chains, pinions for driving said rollers, the pinions of the series remote from the tentering-chains being smaller than the others, gearing connecting
 130 said pinions with one of said chain-wheels, the conducting-rollers *j*, the endless belts *e*,

bearing upon the end ironing-roller of the series, and pulleys over which said belts *e* travel, geared with said shaft, as set forth.

9. The combination, with the driving-shaft, the tentering-chains *a*, and chain-wheels for driving them geared with said shaft, of two series of ironing-rollers *c c**, respectively, arranged in an arc above said tentering-chains, said rollers being of increasing diameters throughout the series, pinions for driving said rollers, the pinions of the series remote from the tentering-chains being of smaller diameter than the others, gearing connecting said pinions with one of the said chain-wheels, the conducting-rollers *j*, arranged alternately with the ironing-rollers, the chains *e*, bearing upon one of the ironing-rollers, and pulleys over which said chains *e* travel, geared with said shaft, as set forth.

10. The combination, with the driving-shaft, the tentering-chains *a*, and chain-wheels for driving them geared with said shaft, of a series of ironing-rollers, gear-wheels for driving said rollers geared with said chain-wheels, endless belts *e*, bearing against one of said rollers, pulleys for driving said belts *e*, geared with said shaft, conducting-rollers *j*, guide-roller *l*, and winding-on roller *m*, substantially as set forth.

11. The combination, with the driving-shaft, the tentering-chains *a*, chain-wheels for driving them geared with said shaft, and a series of ironing-rollers geared to said chain-wheels, of endless chain belts *e*, bearing against one of said ironing-rollers and having roughened surfaces *e' e²*, and pulleys for driving said chain belts *e*, geared with said shaft, substantially as and for the purposes set forth.

12. In combination with the driving-shaft, the tentering-chains *a*, and chain-wheels for driving them geared with said shaft, of a number of ironing-rollers of different diameters, pinions of different diameters for driving said rollers, gearing connecting said pinions with one of said chain-wheels, the endless chains *e*, bearing against one of said rollers, and pulleys for said chains *e*, geared with said driving-shaft, as and for the purposes set forth.

13. The combination, with the ironing-rollers, of tentering-chains *a*, provided with non-metallic blocks *a³ a⁴*, adapted to bear against one of such rollers, substantially as set forth.

14. The chain *a*, having the points *a²*, and the non-metallic blocks *a³ a⁴*, projecting above said points, as set forth.

15. The combination, with the driving-shaft and the lowermost ironing-roller having suitable driving mechanism, of the endless belts *e*, pulleys over which said belts travel, geared with said driving-shaft, adjustable brackets in which a pulley of each chain is mounted,

and a screw for adjusting said brackets, substantially as set forth.

16. The combination, with the lower roller *c*, gearing for driving said roller, the tentering-chains *a*, having links and extensions *a**, and chain-wheels for driving said chains geared with said gearing, of levers, springs attached to said levers, and rollers *d d'*, journaled to said levers, all adapted to support said links and extensions of the chains, respectively, and bear said chains against the roller *c*, substantially as set forth.

17. The combination, with the lower ironing-roller *c*, having suitable means for driving it, of the pulleys *f' f²*, chain belts *e*, running over said pulleys *f' f²*, the brackets *b³*, rollers *f³*, mounted in said brackets and bearing chains *e* against roller *c*, and suitable means for driving said belts *e*, substantially as set forth.

18. The combination, with the driving-shaft, the tentering-chains, chain-wheels for driving said chains geared with said shaft, the ironing-rollers having gear-wheels geared with said chain-wheels, and the frame *b*, of the endless chain belts *e*, bearing against one of said rollers, pulleys over which said chains *e* travel, a belt connecting one of said pulleys with the chain-wheels, and brackets in which said pulleys are mounted, secured to the frame *b*, substantially as set forth.

19. The combination, with the ironing-rollers arranged in an arc, and pinions on said rollers, of a gear-wheel *g'*, engaging said pinions, the shaft *h*, a pinion on said shaft for revolving said wheel *g'*, a worm, a worm-wheel on said shaft *h*, engaged by said worm, tentering-chains *a*, chain-wheels over which said chains travel, a gear-wheel *b¹⁸*, means, substantially as described, whereby said wheel *b¹⁸* is detachably connected to one of said chain-wheels, and a pinion on shaft *h* engaging wheel *b¹⁸*, as set forth.

20. The combination, with the ironing-rollers arranged in an arc, and pinions on said rollers, of a gear-wheel *g'*, engaging said pinions, the shaft *h*, geared with the wheel *g'*, for revolving it, a worm, a worm-wheel on said shaft engaged by said worm, tentering-chains *a*, shaft *b¹⁵*, chain-wheels on said shaft *b¹⁵*, over which said chains travel, a projecting pin affixed to the shaft *b¹⁵*, a pinion *h³* on the shaft *h*, and a gear-wheel *b¹⁸*, movable longitudinally on the shaft *b¹⁵* and adapted to engage said projecting pin and pinion *h³*, substantially as and for the purposes set forth.

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