

No. 618,379.

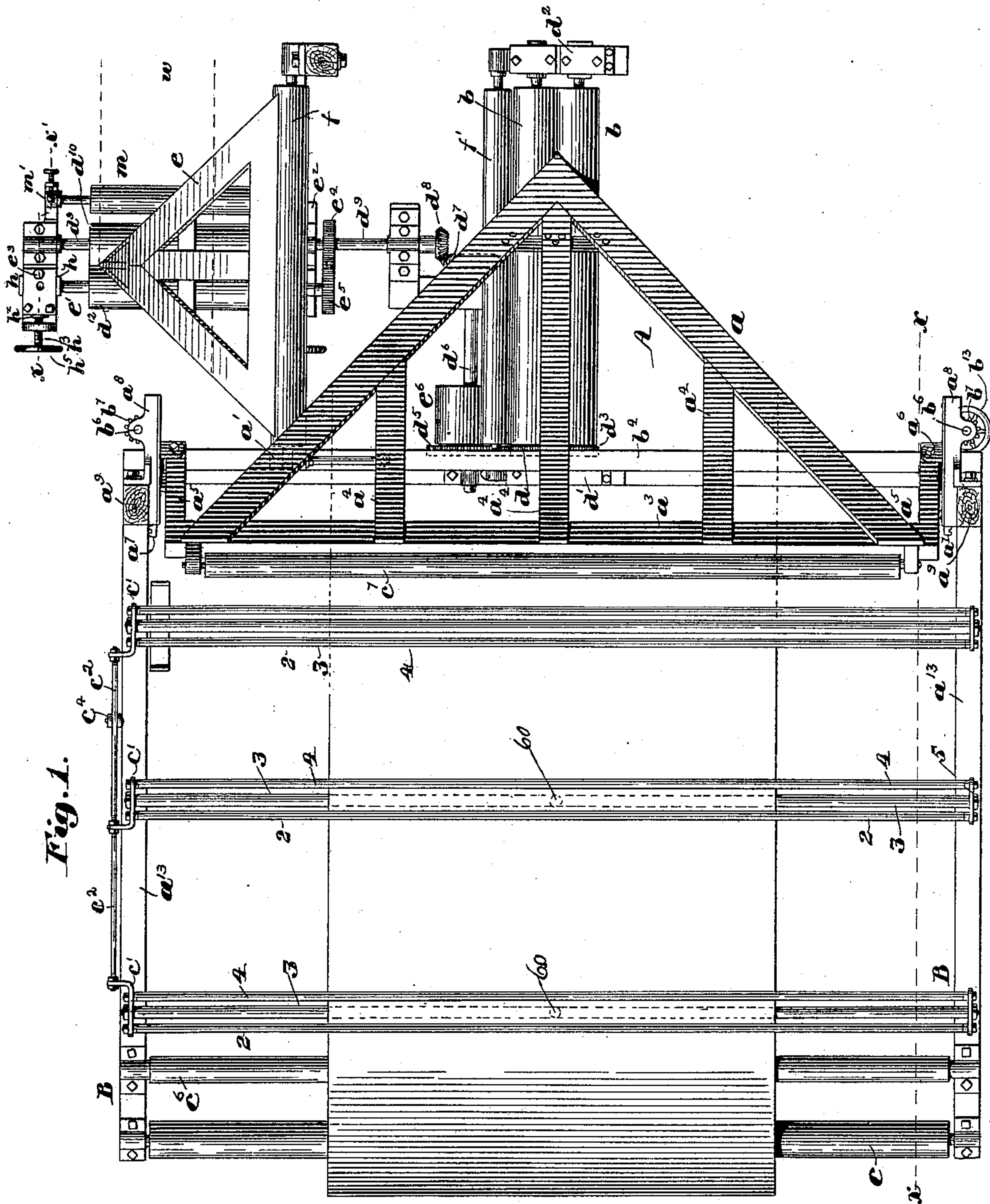
Patented Jan. 24, 1899.

J. EDMUNDS.
CLOTH DOUBLING MACHINE.

(Application filed Dec. 31, 1897.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:
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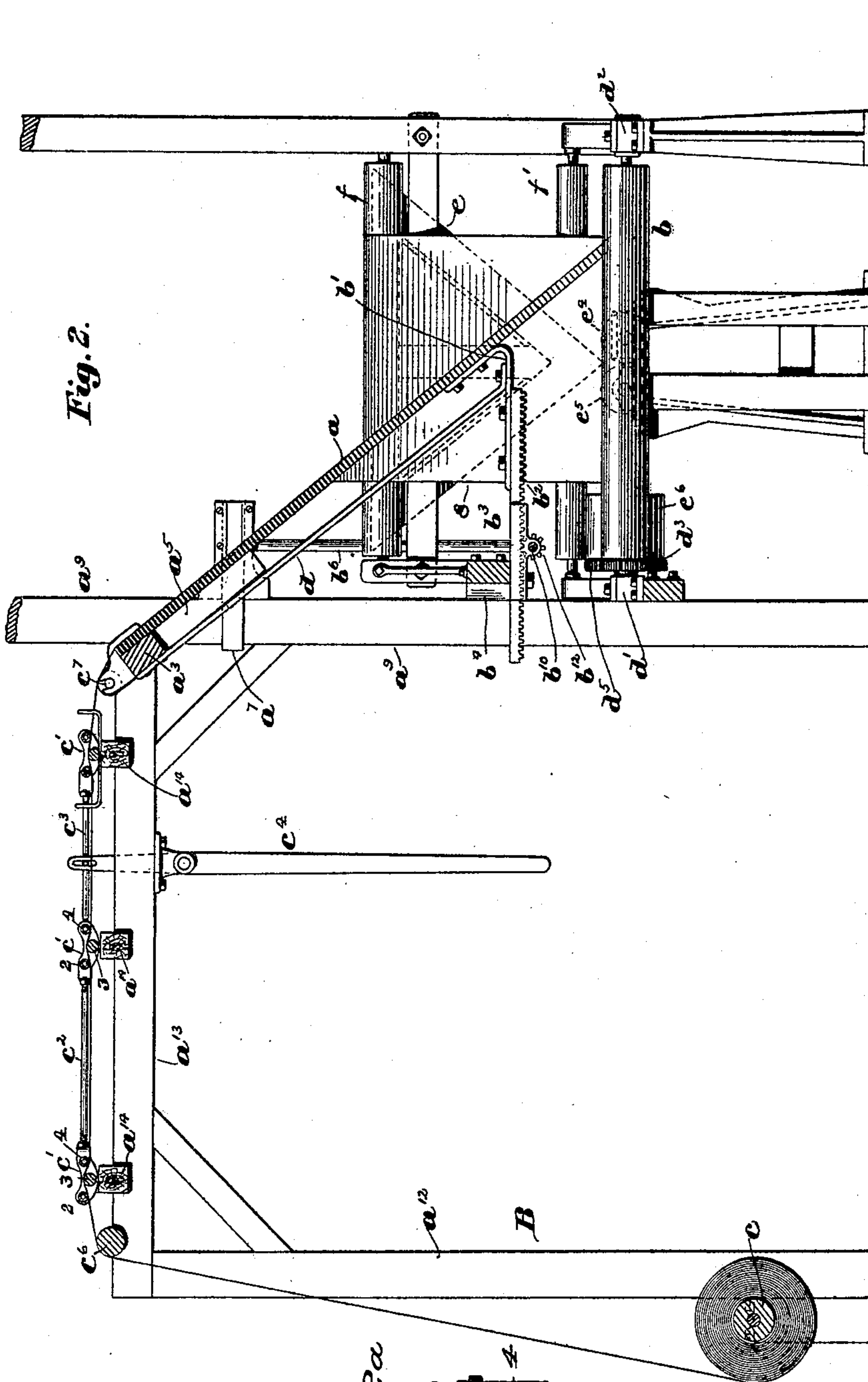
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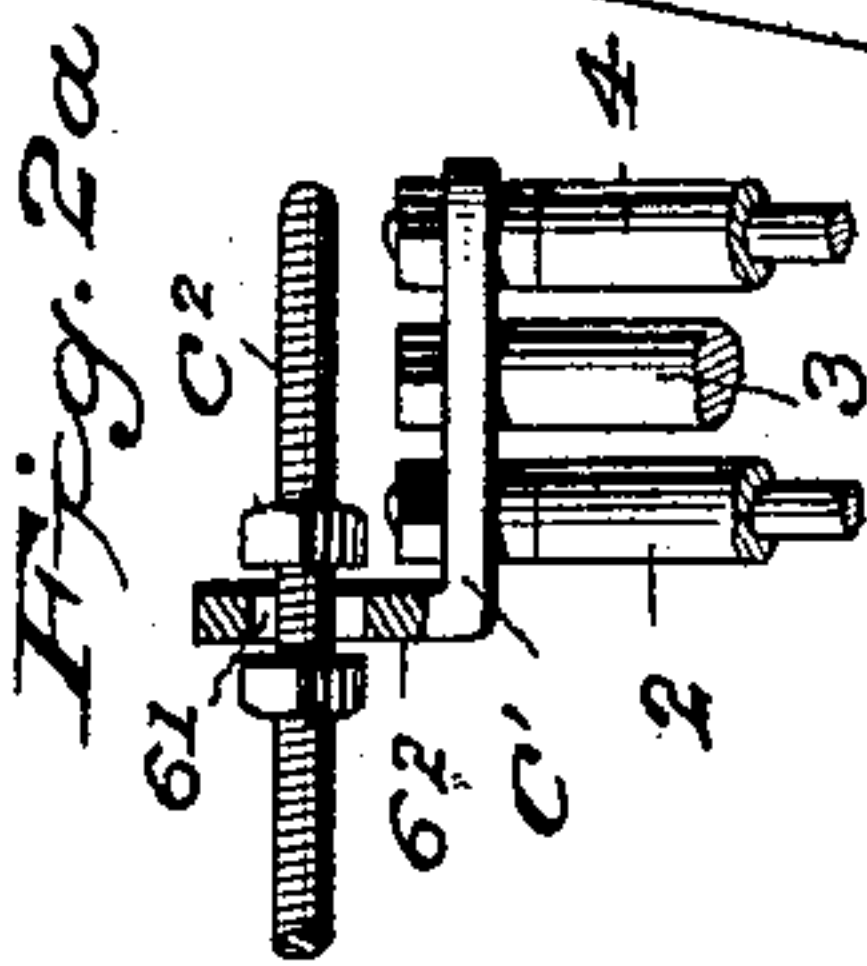
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4 Sheets—Sheet 2.



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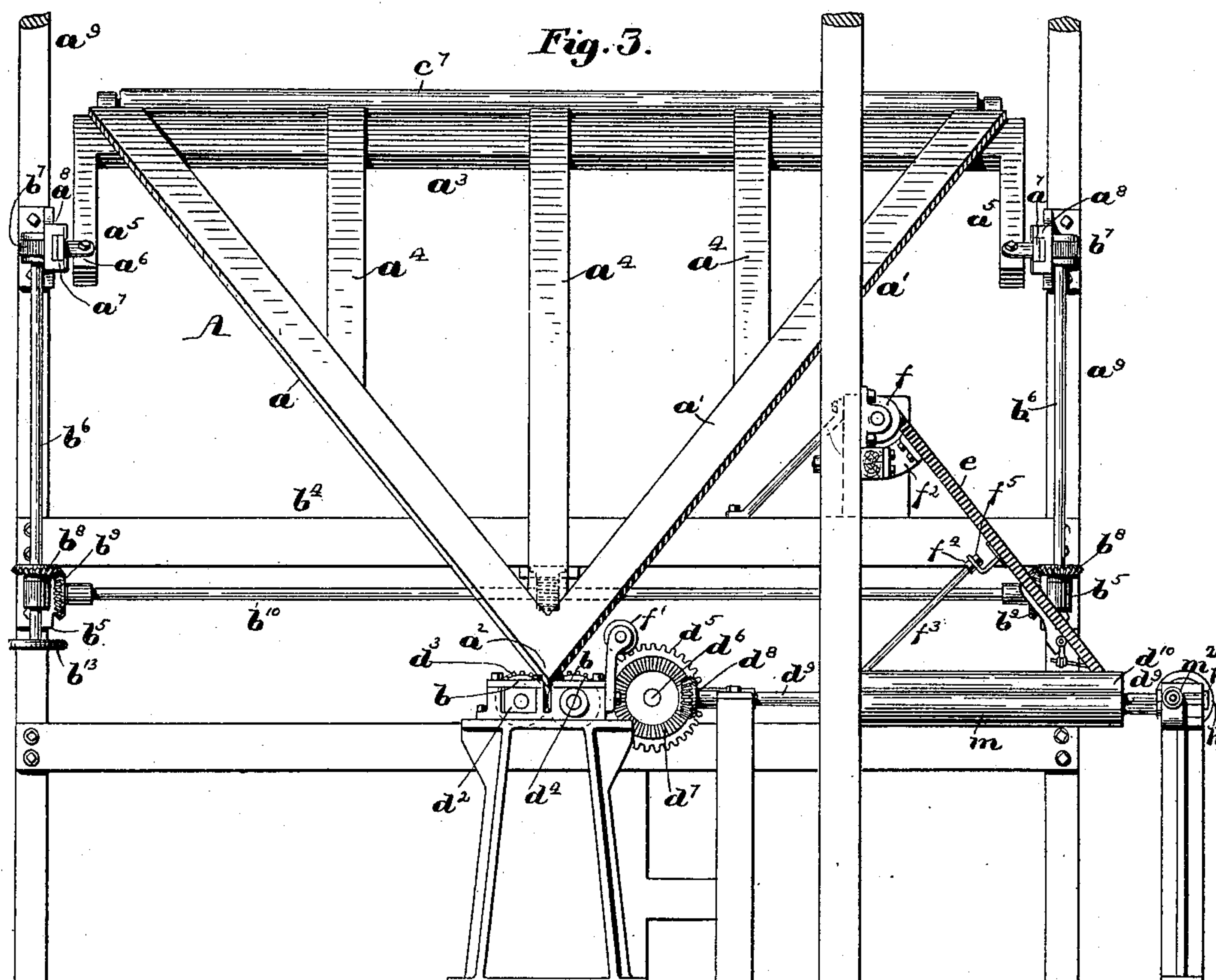
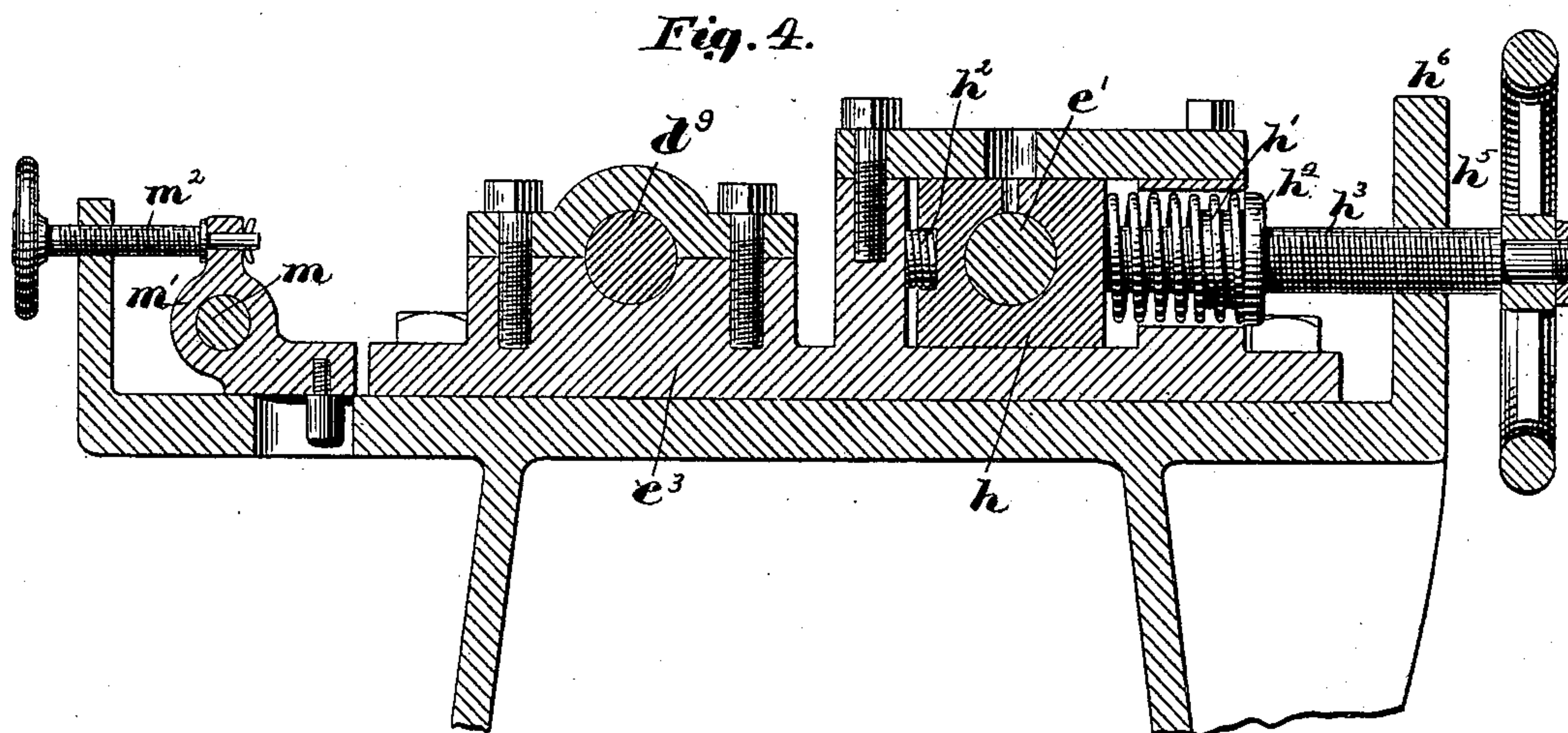
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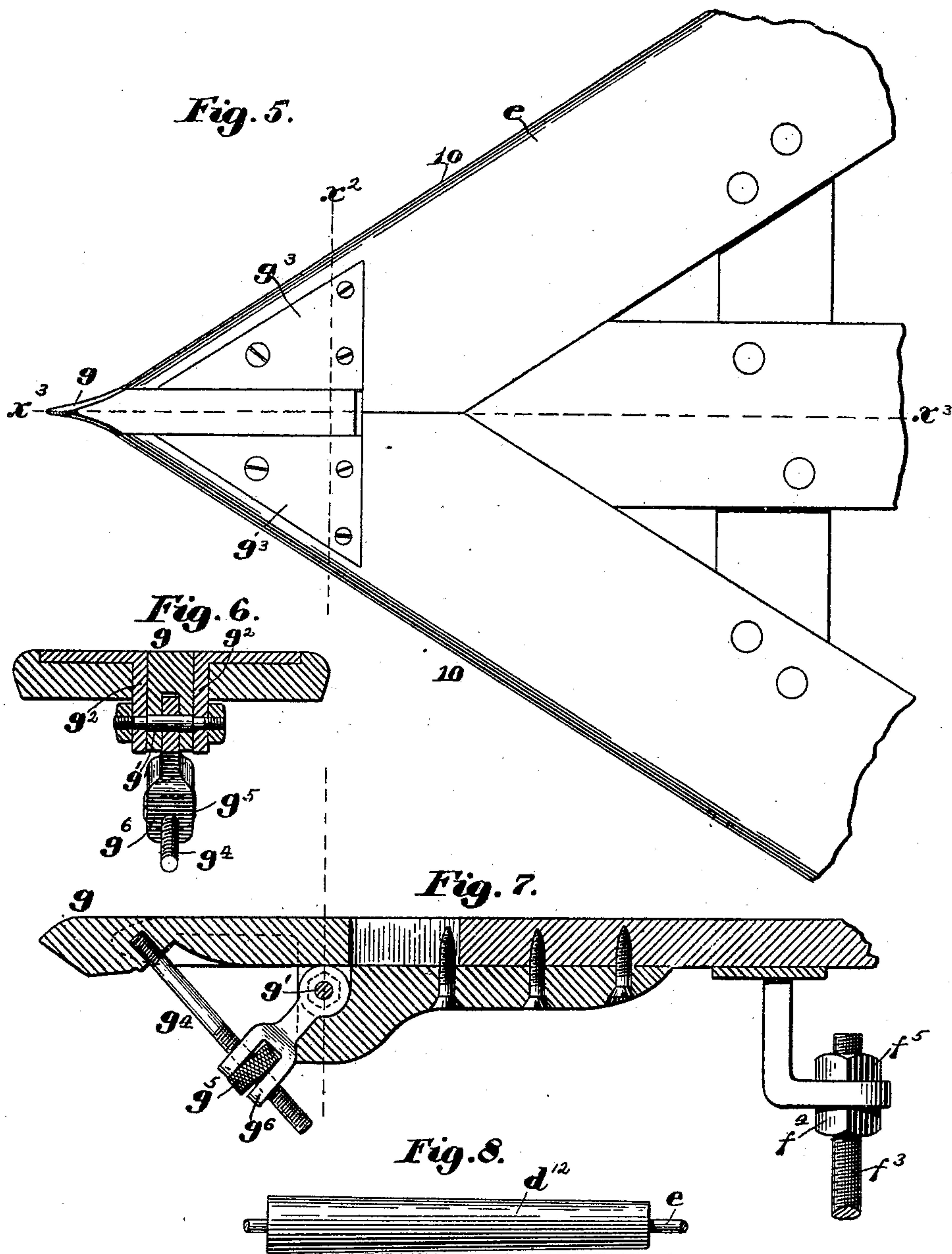
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

JOHN EDMUNDS, OF WALTHAM, MASSACHUSETTS, ASSIGNOR TO ALFRED M. GOODALE, OF SAME PLACE.

CLOTH-DOUBLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 618,379, dated January 24, 1899.

Application filed December 31, 1897. Serial No. 664,806. (No model.)

To all whom it may concern:

Be it known that I, JOHN EDMUNDS, of Waltham, county of Middlesex, State of Massachusetts, have invented an Improvement in Cloth-Doubling Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

The machine the subject of this invention has been devised to automatically double cloth longitudinally twice in succession, my machine laying the cloth at one operation smoothly and evenly in four thicknesses at one continuous operation.

Heretofore cloth has been folded over so-called "plicators" occupying a substantially horizontal position and presenting edges occupying a position one with relation to the other at an angle of about ninety degrees, the cloth being wrapped about these angular edges and passed between "traction-rolls" central with relation to said plicator and parallel to the same, and from these traction-rolls the cloth laid in contact one-half against the other is led between a pair of feeding-rollers, and this operation may be repeated. In my experiments with a machine for doing this work I have found it essential for its correct operation that the plicator stand at an angle to the feeding-rollers and that the space between the under side of the plicator and said rolls be entirely free, open, and unobstructed at about the edges of the plicator, so that the material leaving the point of the plicator may be led directly into the space between and be engaged by the feed-rolls. I have also by experiment ascertained that the plicator for the best results should present an angle of less than ninety degrees and that the edges of the cloth must pass from the edges of the plicator in a straight line directly to the nip of the feed-rolls, and by changing the angle at which the plicator stands with relation to the nip of the feed-rolls the tension or strain on the edges of the cloth may be kept uniform with that exerted by the point of the plicator to thereby insure accurate folding—as, for instance, if the tension exerted on the cloth by the point of the plicator is

excessive the angle of the plicator with relation to the feed-rolls may be increased to equalize the strain. In the machine here to be described the cloth meets with no obstruction between the plicator and the feed-rolls, and the straighter the travel of the cloth the better it operates. The main plicator herein to be described is located between the feed-rolls and web-controlling devices and is made horizontally adjustable with relation to the length of the feed-rolls. The second plicator has an adjustable nose, and the feeding mechanism, shown as rolls to take the cloth from the said plicator, is so made as to draw the cloth from the point of the plicator at a surface speed less than the surface speed of the feeding mechanism acting on the edges of the material being laid to form the second fold. To do this, the feed-rolls instead of being cylindrical are of tapering form, they increasing in diameter away from the point of the second plicator, so that the material at the said point is always kept under strain and taut to thereby lay the four thicknesses even and without wrinkles.

Figure 1 is a top or plan view of a cloth-folding machine embodying the invention to be herein described; Fig. 2, a section of Fig. 1 in the line x . Fig. 2^a is a detail of one of the bars c' somewhat enlarged; Fig. 3, a view of Fig. 2, looking toward the left. Fig. 4 is an irregular sectional detail in the line x' , Fig. 1, looking toward the machine; Fig. 5, a detail, much enlarged, of the second folder; Fig. 6, a section of Fig. 5 in the line x^2 . Fig. 7 is a section in the line x^3 , Fig. 5; and Fig. 8 shows one of the second pair of feeding-rolls detached to show its tapering shape.

The first folder A consists of a frame presenting two side bars a a' , terminating in a point a^2 , the outer sides or edges of the said bars occupying such a position one with relation to the other as to present an angle of about or somewhat less than ninety degrees. The bars a and a' may be made of wood, and they may be joined at their widely-spread ends to a yoke or bar a^3 , suitable braces a^4 extending from said bar or yoke to said side bars. The arms a^5 of the yoke a^3 are entered between ears a^6 of rack-bars a^7 , fitted to slide in guideways a^8 ,

bolted to the uprights or corner-posts a^9 . The point a^2 of the plicator terminates substantially at or below the surface-line of the top of the feed-rolls b , and the plicator, it occupying an angular position with relation to said rolls instead of parallel therewith, as heretofore, has connected to it, at its rear side above said point, a neck b' , having an attached horizontal rack b^2 fitted to slide in a guideway b^3 , attached to a cross-bar b^4 , connecting the corner-posts a^9 . The posts a^9 also have attached to them suitable brackets b^5 , having bearings for two vertical shafts b^6 , each provided at its upper end with a pinion b^7 , engaging the teeth of the rack-bars a^7 , the said shafts having attached to them near their lower ends each a bevel-gear b^8 , which is engaged by a bevel-gear b^9 , fast on a connecting-shaft b^{10} , provided with a pinion b^{12} , meshing with the rack b^2 . One of the shafts b^6 has a hand-wheel b^{13} , which when turned will actuate simultaneously both shafts b^6 and the shaft b^{10} , as may be desired, to position the point of the plicator as may be desired with relation to the length of said feed-rolls.

The cloth to be folded is placed on a roll c , suitably supported at the left-hand side, as herein shown, of the stationary frame B, having corner-posts a^9 a^{12} , united by top girths a^{13} a^{14} . The top girths a^{14} have mounted on them one or more like cloth guiding and smoothing devices, shown as composed each of a rod 3, jointed at its ends to end pieces c' , each rod 3 having near the middle of its length a pivot-pin 60, (see Fig. 1,) which enters a hole in one of the several top girths a^{14} . Each end piece has, as shown, two other rods, on each of which is mounted a suitable roller-shell, as 2 and 4. These several guiding and smoothing devices are joined together by a rod c^2 , said rod having attached to it a handle or lever c^4 , by which the operator may turn the said guiding and smoothing devices and put them into a more or less angular position with relation to the direction of movement of the cloth through the machine, a slight change of position of said devices resulting in changing or shifting the cloth to the right or left, as may be desired, to thus insure that the center of the cloth to be folded will run over the point a^2 of the plicator. The rod c^2 passes through elongated slots 61 of the ears 62 of the bars c' , (see Fig. 2^a,) said rod having at each side of said ears suitable adjustable nuts, so that there will be very slight play between the ears and the nuts as the rod is moved longitudinally.

The frame B has a guide-roll c^6 , over which the cloth passes on its way to the directing devices, and the upper end of the plicator has a roller c^7 , on which the cloth rests preparatory to passing over the plicator, said roller following the plicator in all its adjustments.

The main plicator is further braced and stiffened by a brace d , connected to the yoke or bar a^3 and to the neck b' . The feed-rolls b have their journals mounted in suitable

bearings d' d^2 , and each has at one end a toothed gear d^3 d^4 in mesh one with the other, so as to move in unison. The gear d^4 is engaged by a driving-gear d^5 , secured to one end of a shaft d^6 , having at its opposite end a bevel-gear d^7 , which engages a bevel-gear d^8 on a shaft d^9 , carrying the feed-roll d^{10} of the second set or pair of feed-rolls d^{10} d^{12} , cooperating with the second plicator e . The roll d^{12} is fast on a shaft e' , and it and the shaft d^9 are journaled in bearings e^2 e^3 , said shaft e' being rotated from the shaft d^9 by the gears e^4 e^5 , the gear e^4 being carried by said shaft d^9 . The shaft d^6 has a belt-pulley e^6 to receive a belt driven from any usual counter-shaft of the mill, so that said shaft becomes the driving-shaft of the machine. The central fold of the cloth passes from the end of the plicator directly between the feeding-rolls, and the two edges 8 of the material pass directly from the edges of the bars a a' of the plicator to the rolls b , as shown in Fig. 2. The once-folded material passes under and about one of the rolls b to the sustaining-roll f at the upper end of the second plicator e , and said cloth may also contact with a guide-roll f' on its way to the second plicator. The upper end of the second plicator is held in position by bolts in a stand or bracket f^2 , (see Fig. 3,) the said plicator being supported between its ends by a suitable threaded strut f^3 , having adjusting-nuts f^4 f^5 to place the said plicator at the desired angle with relation to the plane in which the rolls d^{10} and d^{12} lie.

The second plicator has a movable nose g , mounted on a rod g' , passed through ears g^2 of wear-plates g^3 , attached to the small end of the said plicator, its rounded inclined edge occupying an angle of less than ninety degrees. The nose g has a connected adjusting device, shown as a screw-threaded rod g^4 , provided with a nut g^5 , held loosely in the fork of an arm g^6 , mounted loosely on the rod g' , the turning of said nut in one or the other direction raising or lowering said nose, its position being changed from time to time according to the class of goods being folded. The point g is in practice subjected to so much strain that it has to be made of metal, while the plicator e itself is or may be made of wood.

The point g of the plicator e supports four thicknesses of cloth, and to enable all four of these thicknesses to be laid smoothly one on the other great care has to be taken to draw all four of these plies smoothly and evenly through the feed-rolls d^{10} d^{12} . To insure this, I have slightly tapered said rolls, they being of greater diameter at their ends most remote from the point of said plicator e , (see Fig. 8,) so that the parts of said rolls of greater diameter moving at a faster surface speed draw harder on the four thicknesses of material at the edges of the twice-folded web and stretch the said cloth firmly about the plicator, the feed-rolls taking away the said cloth. The twice-folded web is shown

by dotted lines at *w*, Fig. 1, and it may pass to any usual cross-folding or winding devices. (Not shown.)

The shaft *d*⁹ is in fixed bearings; but the shaft *e*¹ will or may be mounted in a movable box *h*, resting on the bearing *e*³, said box being normally acted upon at opposite sides by springs *h*¹ and *h*². The stress of the spring *h*¹ may be controlled by a threaded shaft *h*³, provided with a collar *h*⁴ and a hand-wheel *h*⁵, said shaft entering a threaded opening in a standard *h*⁶. This movable box enables the rolls to be adapted to nip closely any desired thickness of material.

The roll *m*¹, having its shaft or journals in suitable boxes, one of which is shown at *m*¹, serves to support the twice-folded cloth, that one of said boxes herein shown being made adjustable by a screw *m*², the rotation of the screw in one or the other direction changing the angle of said roll *m* sufficiently to control the direction of movement of the cloth passing over said roll with relation to a straight-line path.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a cloth-doubling machine, a pair of biting feed-rolls occupying a position in a substantially horizontal plane, and means to rotate said feed-rolls, combined with a plicator having its side edges located at an angle of about ninety degrees with relation each to the other, said plicator occupying an angular or diagonal position with relation to the horizontal plane occupied by said feed-rolls, the point of said plicator being extended substantially to the bite of said feed-rolls, and means to adjust both the upper and lower ends of said plicator in the direction of the bite of said feed-rolls to thereby adapt the plicator to material of different widths, the material being folded passing from the side edges of said plicator directly into the nip of said rolls, said feeding-rolls drawing the material directly from the edges of the plicator and folding the same longitudinally, substantially as described.

2. In a cloth-doubling machine, guiding and smoothing devices capable of having their angle changed with relation to the direction of travel of the cloth to be folded, to thereby control and direct the course of its movement through the machine; a pair of biting feed-rolls occupying a position in a substantially horizontal plane, and means to rotate said feed-rolls; combined with a plicator having its side edges located at an angle of about ninety degrees with relation each to the other, said plicator occupying an angular or diagonal position of substantially fifty degrees with relation to the horizontal plane occupied by said feed-rolls, the point of said plicator being extended substantially to the bite of said feed-rolls, the space between the edges of the plicator and the said feed-rolls being entirely unobstructed, whereby the material being

folded is free to pass from the edges of said plicator directly into the nip of said rolls, the feeding-rolls drawing the material directly from the edges of the plicator and folding the same longitudinally, substantially as described.

3. In a cloth-doubling machine, a plicator having its side edges located at an angle of about ninety degrees with relation each to the other and occupying an angular or diagonal position with relation to a horizontal plane, a roller supported by and located at the upper end of said plicator, means to simultaneously adjust said plicator and the roller carried by it longitudinally in the direction of the length of the feed-rolls; combined with a pair of feeding-rolls occupying a horizontal position, the point of the plicator occupying a position substantially in the bite of said rolls, the space between the side edges of said plicator and said rolls being substantially unobstructed to thereby enable the cloth being folded to be extended from the side edges and point of said plicator in a straight line into the bite of said rolls, and means to rotate said rolls to draw the fabric from the plicator and fold the same longitudinally, substantially as described.

4. In a cloth-doubling machine, a plicator having its edges located at an angle of about ninety degrees with relation each to the other, the edges of said plicator occupying an angular or diagonal position with relation to a horizontal plane; combined with a pair of biting feed-rolls occupying a horizontal position, the point of the plicator occupying a position substantially in the bite of said rolls, and the space between the side edges of the plicator and the said rolls, being substantially unobstructed to enable the cloth being folded to be led from the side edges and point of said plicator directly into the bite of said rolls, means to rotate said rolls to draw the fabric from the plicator and fold the same longitudinally, and means to automatically and simultaneously adjust in unison the upper and lower ends of said plicator horizontally with relation to said feeding-rolls, substantially as described.

5. In a cloth-doubling machine, a pair of feed-rolls; and a plicator occupying an angular position with relation to the axis of said rolls, said plicator having extended from it a series of rack-bars; combined with a series of shafts having gears to engage said rack-bars and automatically move both ends of said plicator longitudinally with relation to the axis of rotation of said rolls, substantially as described.

6. In a machine for doubling cloth, a pair of feed-rolls, and a plicator having side edges and tapered to a point, said plicator occupying an angular position with relation to a horizontal plane, a rack connected with said plicator rigidly at a distance above its point; a shaft and a pinion engaging said rack to adjust said plicator bodily longitudinally with relation to said rolls, the point of said plica-

tor terminating substantially at the bite of said rolls, said plicator delivering the material from its point directly to the bite of the rolls, substantially as described.

5 7. In a doubling-machine for webs, a plicator, provided at its apex with an adjustable nose, combined with a pair of feed-rolls, and means to move them, substantially as described.

10 8. In a doubling-machine for webs, a plicator, having an adjustable nose, combined with a pair of feed-rolls, a yielding box for one end of the shaft carrying one of said feed-rolls, substantially as described.

15 9. In a doubling-machine for webs, a plicator, having an adjustable nose, combined with a pair of feed-rolls, said feed-rolls being tapered, as described.

20 10. In a doubling-machine for webs, a plicator standing at an angle to the feeding-rolls, combined with tapered feeding-rolls, and means to move said rolls, substantially as described.

25 11. In a machine for twice doubling material longitudinally, the following instrumentalities, viz: a pair of feed-rolls, means to

rotate them; a plicator having angular edges and occupying an angular position with relation to said rolls, the point of said plicator standing substantially close to the bite of 30 said rolls, the space between the under side of said plicator and said rolls being unobstructed, to thereby enable the cloth to be led from the angular edges of said plicator in a straight line into the bite of said rolls; com- 35 bined with a second pair of feed-rolls located at right angles to the said first pair of feed-rolls; a second plicator having angular edges and located at an angle to said second pair of feed-rolls, and means to move said second 40 pair of feed-rolls, said feed-rolls being tapered to thereby provide for a variable movement in the taking up of the cloth being fed between them, substantially as described.

In testimony whereof I have signed my 45 name to this specification in the presence of two subscribing witnesses.

JOHN EDMUNDS.

Witnesses:

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MARGARET A. DUNN.