(No Model.) 5 Sheets—Sheet 1.

O. H. MARSTON.

PAPER FOLDING MACHINE.

No. 557,310. Patented Mar. 31, 1896.

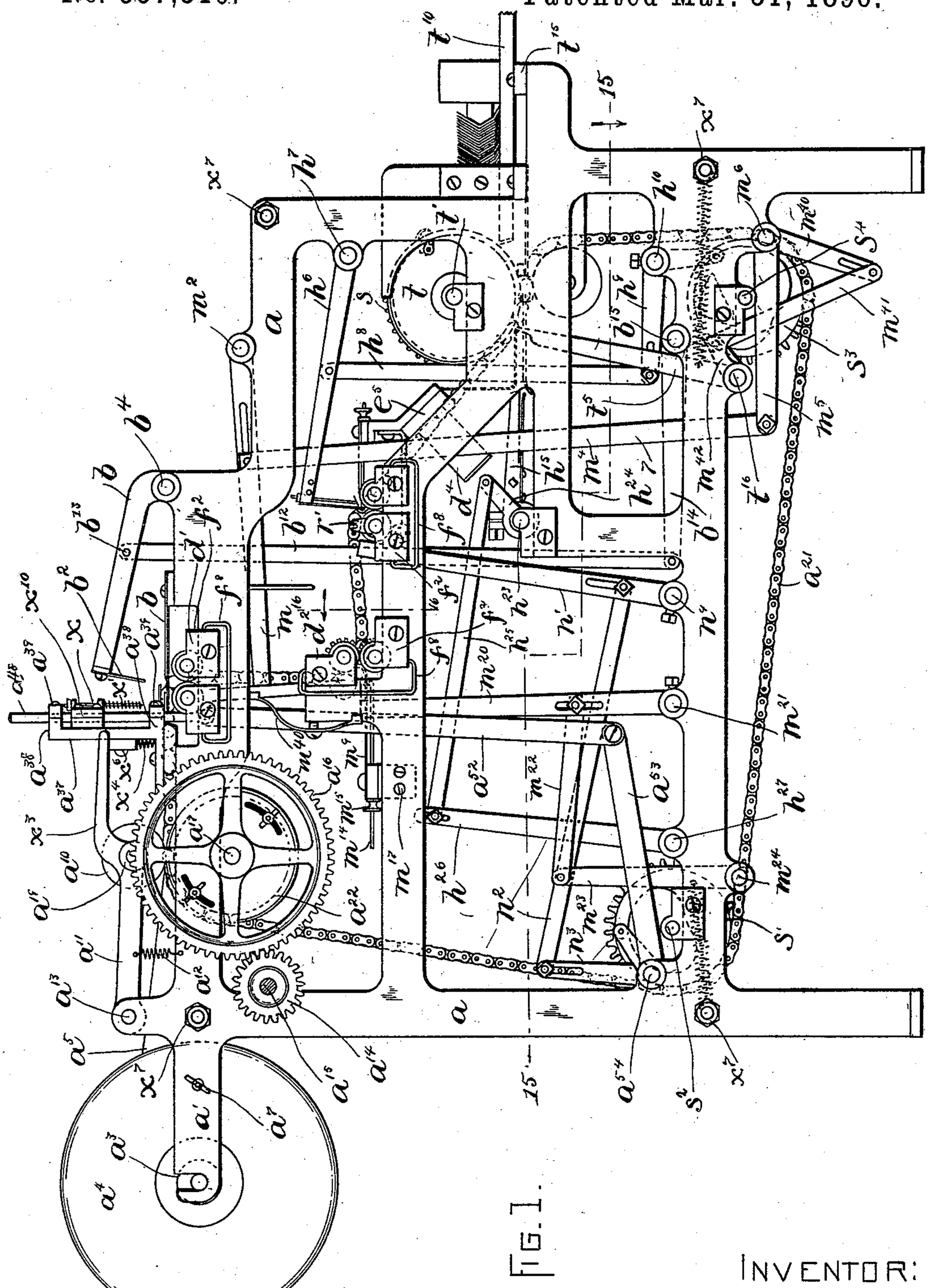

Fig. 1.

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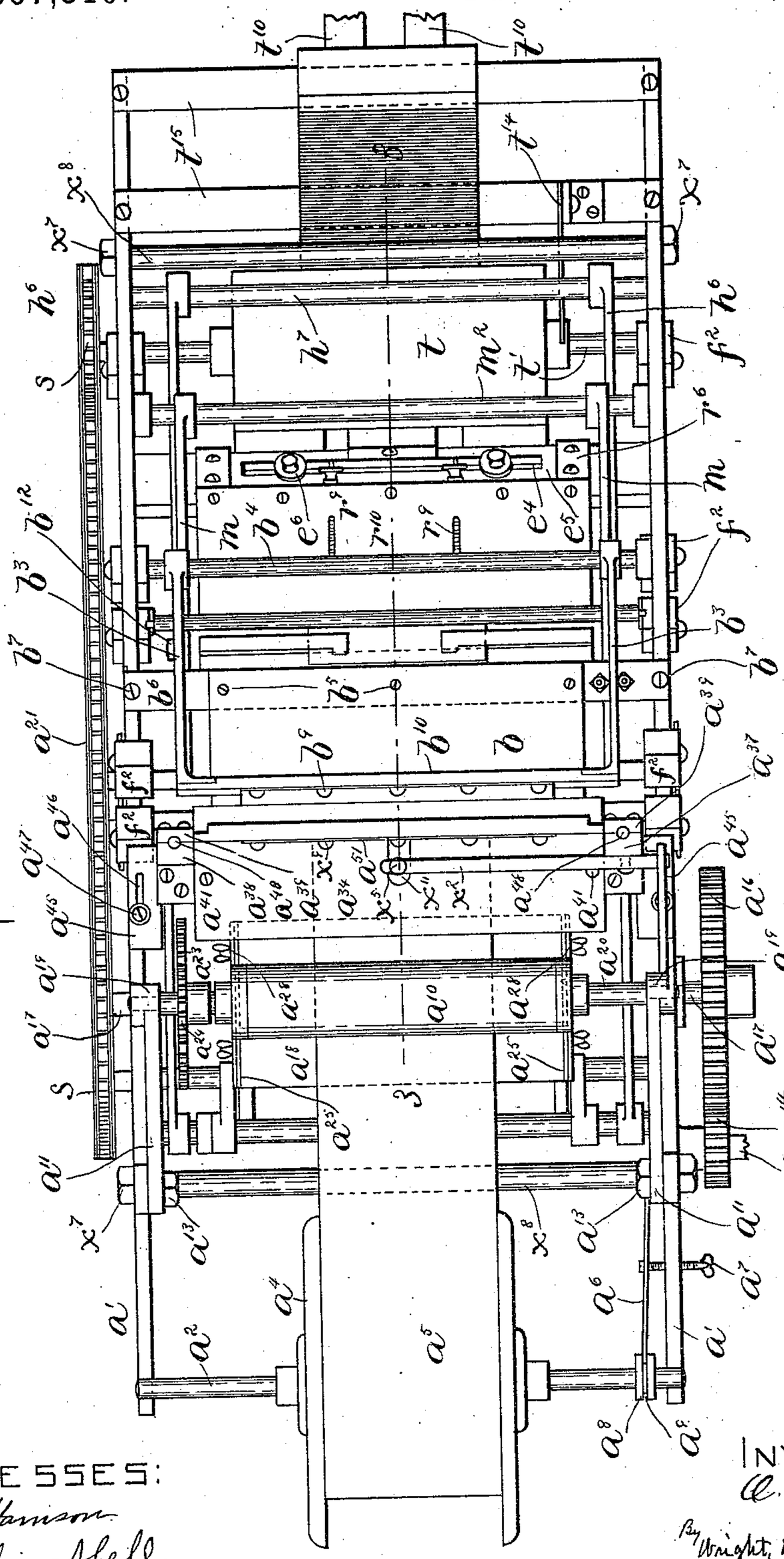
PAPER FOLDING MACHINE.

No. 557,310. Patented Mar. 31, 1896.

FIG. 2.



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5 Sheets—Sheet 3.

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PAPER FOLDING MACHINE.

No. 557,310. Patented Mar. 31, 1896.

FIG. 4.

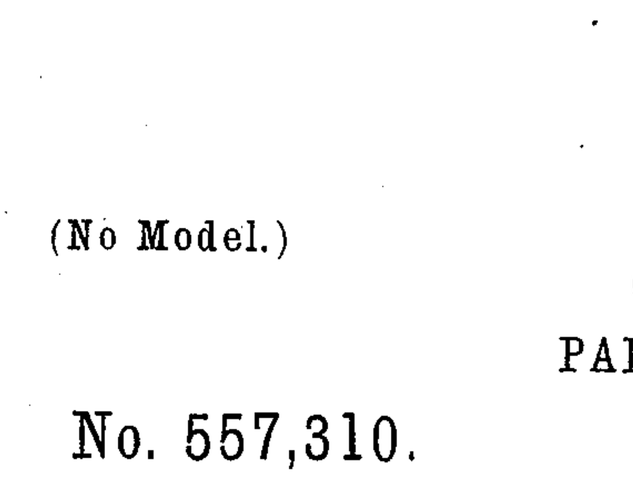
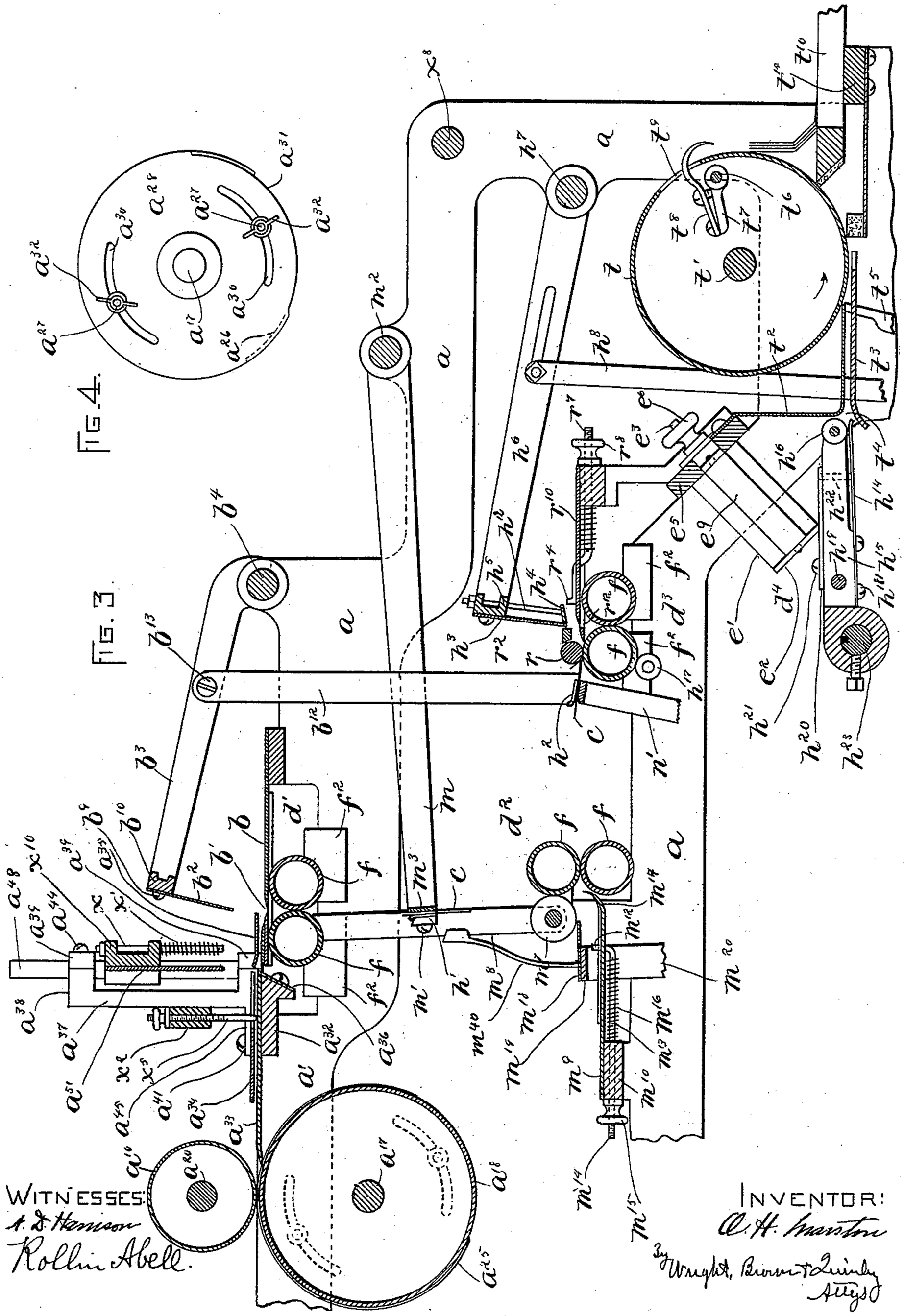


FIG. 3.



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PAPER FOLDING MACHINE.

No. 557,310. Patented Mar. 31, 1896.

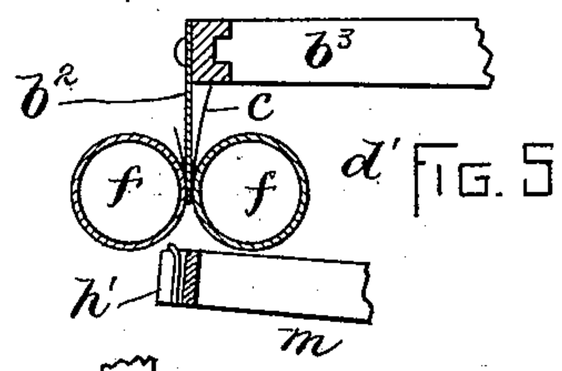

FIG. 5

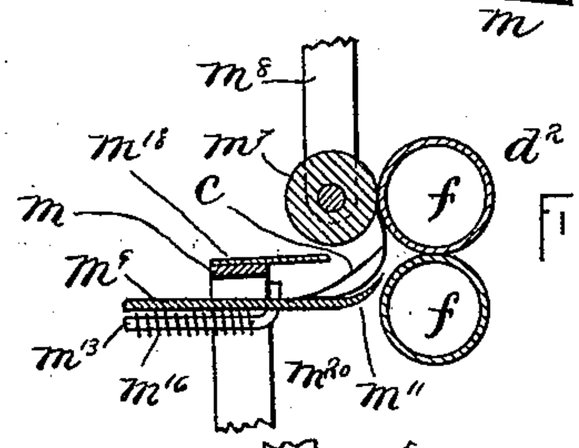

FIG. 6.

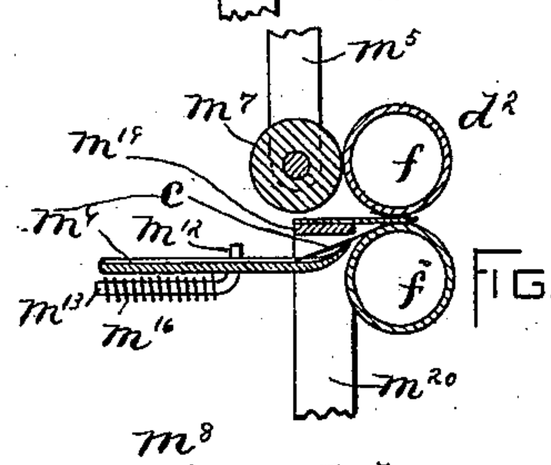

FIG. 7.

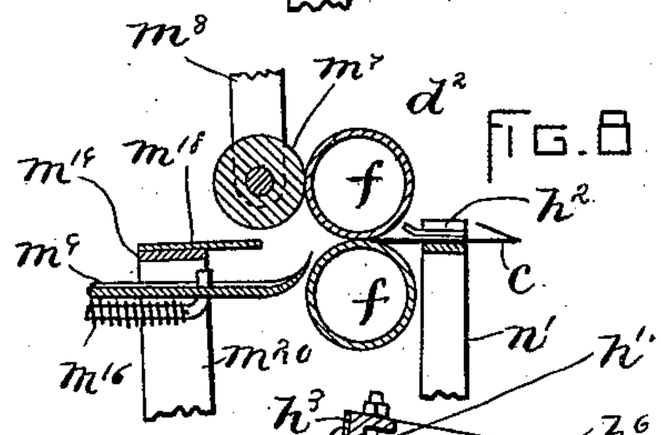

FIG. 8

FIG. 9.

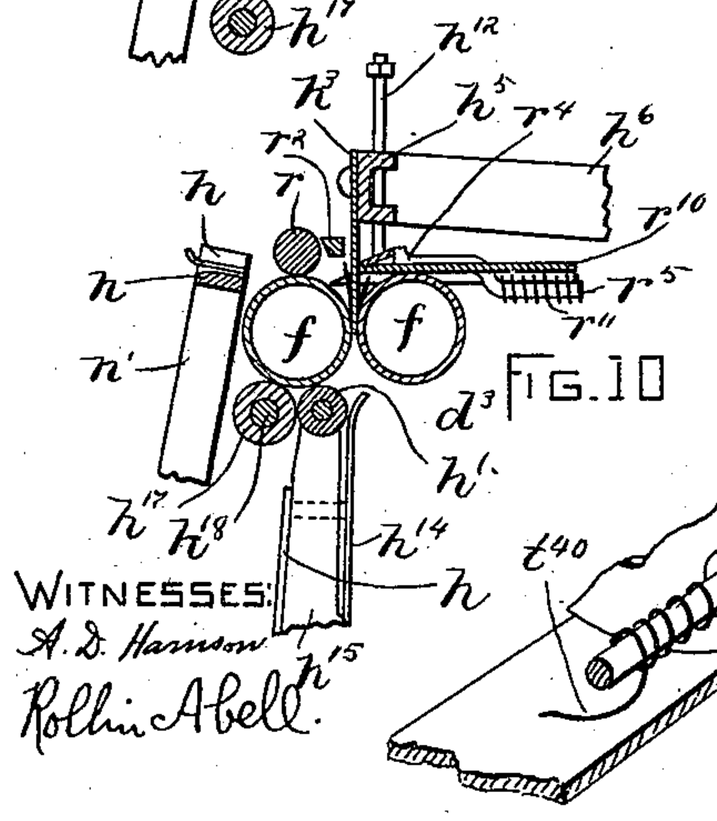

FIG. 10

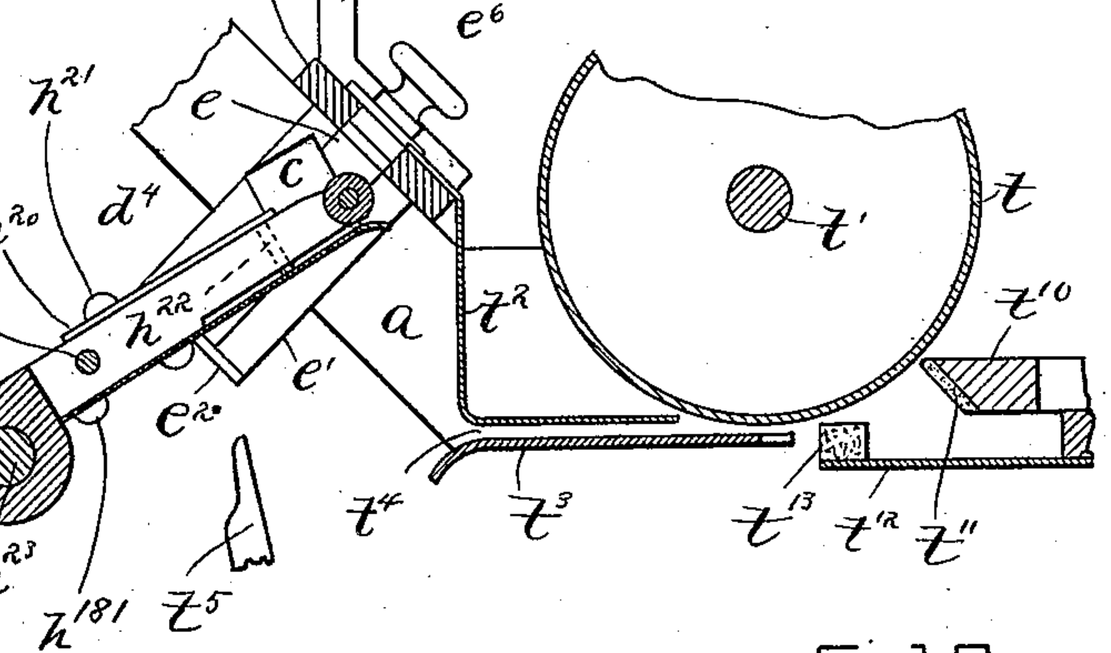

FIG. 11.

FIG. 12.

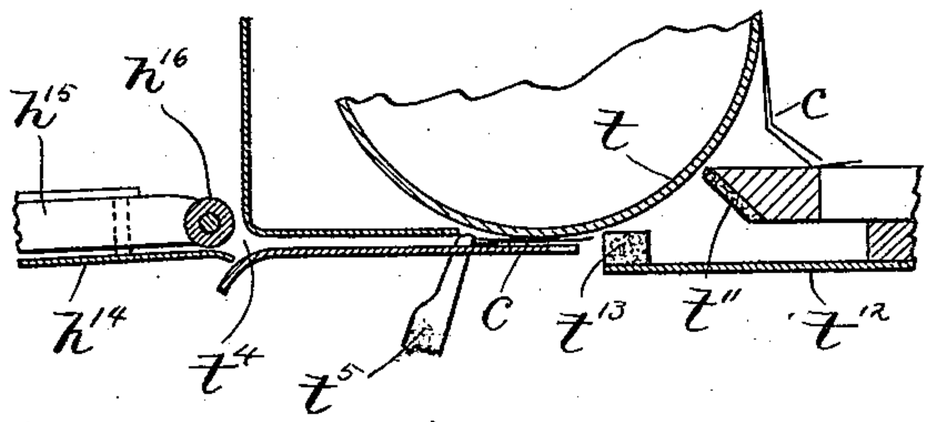

FIG. 13.

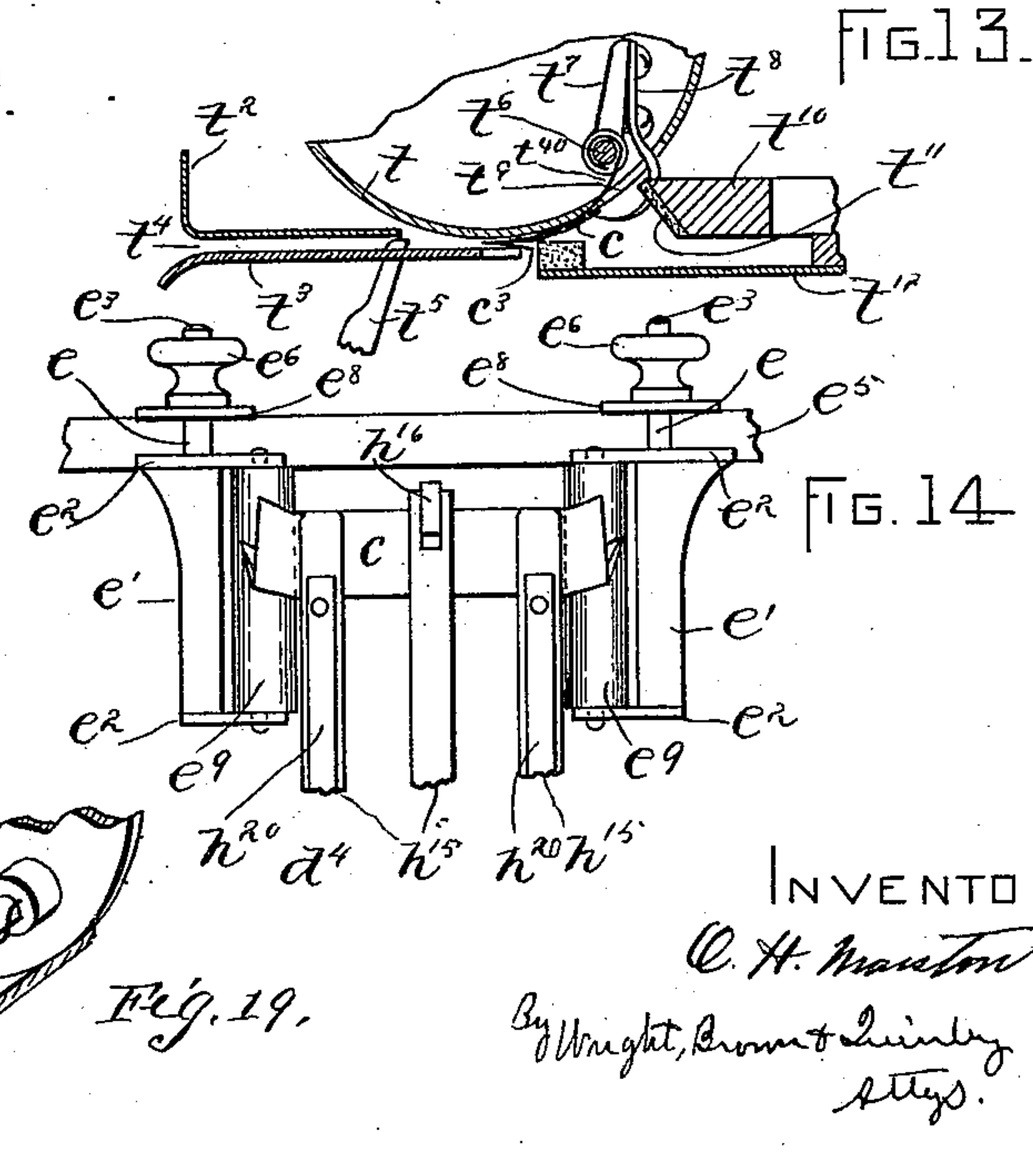

FIG. 14

FIG. 19.

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(No Model.) 5 Sheets Sheet 5.

O. H. MARSTON.

PAPER FOLDING MACHINE.

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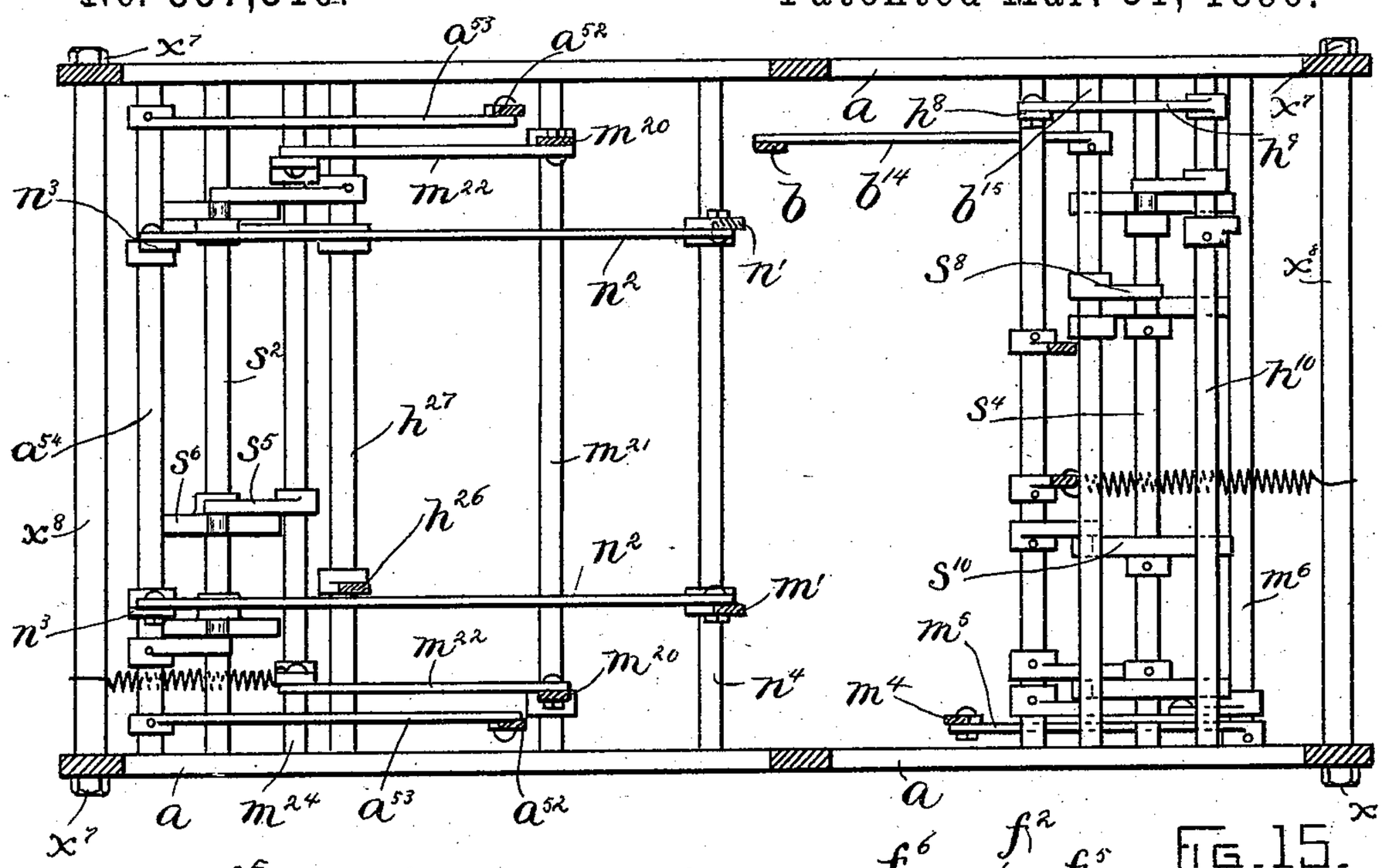


FIG. 15.

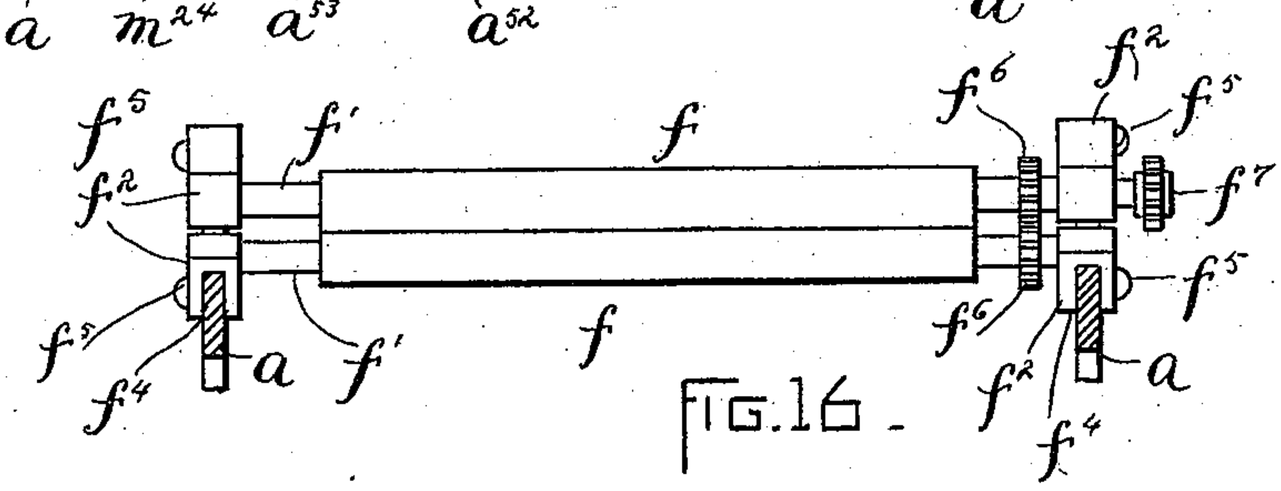


FIG. 16.

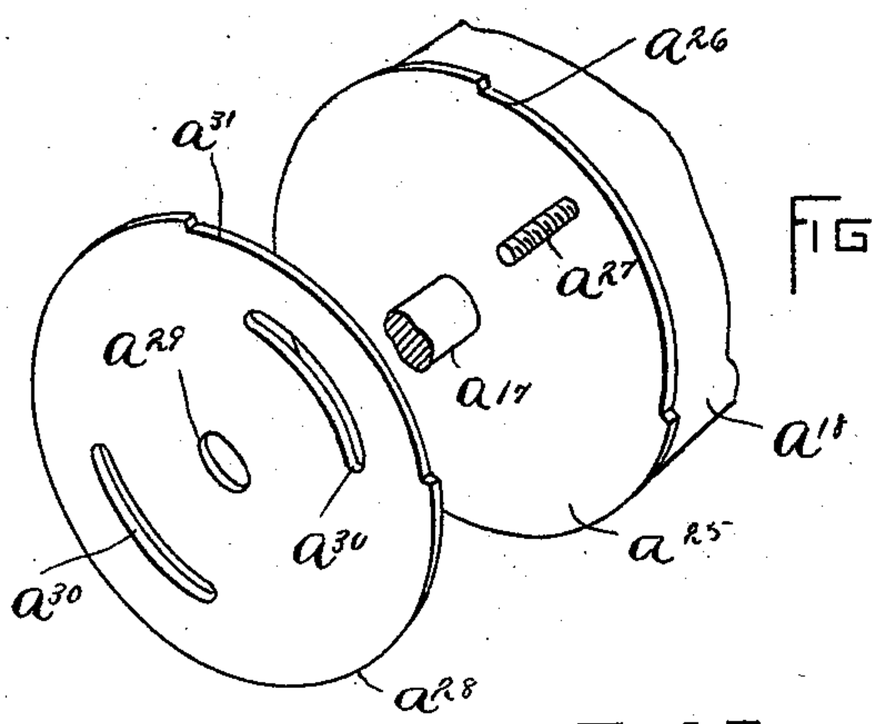
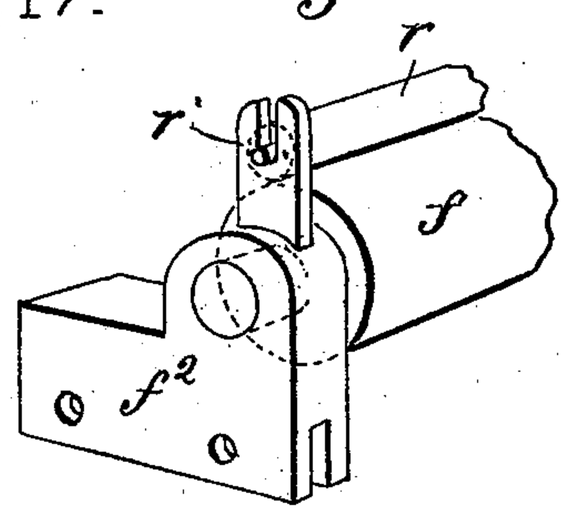
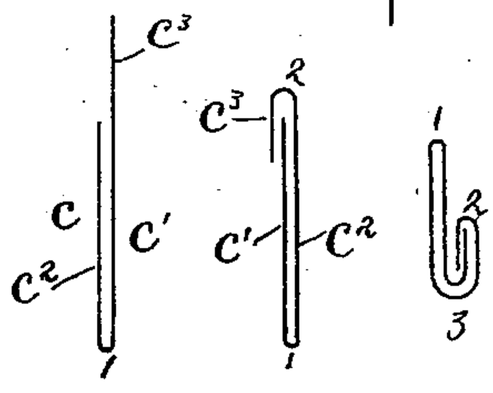


FIG. 17.

FIG. 18.

Fig. 20.





WITNESSES:
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INVENTOR:
O. H. Marston
By Wright Brown & Quinby
Attys.

UNITED STATES PATENT OFFICE.

OLIVER H. MARSTON, OF STONEHAM, MASSACHUSETTS.

PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 557,310, dated March 31, 1896.

Application filed April 24, 1895. Serial No. 546,954. (No model.)

To all whom it may concern:

Be it known that I, OLIVER H. MARSTON, of Stoneham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Paper-Folding Machines, of which the following is a specification.

This invention relates to an improvement in paper-folding machines, and particularly to that class of machines designed for folding papers to hold druggists' powders.

The invention consists in the novel features of construction and the relative arrangement of parts hereinafter fully described in the specification, clearly illustrated in the drawings, and particularly pointed out in the claims.

Reference is to be had to the accompanying five sheets of drawings, forming a part of this application, in which like characters are used to designate like parts wherever they occur.

Figure 1 represents a side elevation of a machine constructed in accordance with my invention. Fig. 2 represents a top plan view of the machine shown in Fig. 1. Fig. 3 represents a vertical longitudinal sectional view on the lines 3 3 of Fig. 2. Fig. 4 represents a front elevation of the adjustable feed-controlling disks. Figs. 5 to 10 are detail views of the mechanism for forming the longitudinal creases. Figs. 11 to 14, inclusive, are detail views of the mechanism for forming the transverse creases near the ends of the paper and for ejecting the finished product from the machine in a partially-unfolded condition convenient for immediate use. Fig. 15 represents a horizontal longitudinal sectional view of the machine shown in Fig. 1, taken on the line 15 15 of said figure and looking in the direction of the arrow. Fig. 16 represents a detail view of one pair of the creasing-rolls. Fig. 17 represents a perspective detached view of the feed-controlling disks shown in Figs. 1, 2, and 4. Fig. 18 is a detail view showing the several folds in the blank arranged in the order in which they are made. Fig. 19 is a detailed view showing the spring for operating the rod and finger in the drum. Fig. 20 is a detailed view of the slotted brackets in which the rolls r are located.

Referring to Figs. 1, 2, 3, and 15, a represents a suitable framework held together by cross-rods x^8 and nuts x^7. Arms a' extend from the top of one end of the framework and are provided at their ends with slots a^3 arranged to receive and hold the ends of a shaft a^2, carrying a spool a^4 fast thereon, from which a strip of paper a^5 of suitable width is fed to the machine. As fast as one spool is exhausted the shaft and said spool are removed from the arms a' and another shaft and spool placed upon said arms. The spools are not always secured in the same relative positions upon their respective shafts, thus feeding the paper into the machine at different places. In order to overcome this difficulty and insure the paper being fed into the machine at the same point, I secure upon the inside of one of the arms a' a spring-bar a^6. A set-screw a^7, mounted in said arm and secured to said bar, serves as a convenient means for adjusting the free end of said bar in or out and retaining said end in its adjusted position. The free end of this bar is arranged to engage a groove a^9 formed in the periphery of a pulley a^8 fast on one end of the shaft a^2.

By means of the bar and pulley the spool may be adjusted crosswise of the machine, so as to deliver its paper at a predetermined point. Levers a'', pivoted at one of their ends by bolts a^{13} to the inside of the top of the framework a', are provided near their free ends with bearings a^{19}, in which are mounted the ends of a shaft a^{20}, upon which is secured a roll a^{10}, arranged to bear upon a roll a^{18} immediately beneath it. These two rolls constitute the feed-rolls between which the paper a^5 from the spool a^4 passes and by which said paper is fed into the machine in predetermined lengths. The roll a^{18} is mounted upon a shaft a^{17} and fast thereto. This shaft a^{17} is mounted in suitable bearings in the framework a' immediately below the shaft a^{20}. A spur-gear a^{16} is secured to one end of this shaft and engages a driving-pinion a^{14}, fast upon a shaft a^{15}, connected to any suitable source of power. Fast upon the opposite end of the shaft a^{17} from the gear a^{16} is a sprocket-wheel a^{22}, (shown in dotted lines in Fig. 1,) upon which is mounted a sprocket-chain a^{21}. A spur-gear a^{23}, fast upon the shaft a^{17}, engages a similar gear a^{24} upon the shaft a^{20}. The rotation of the shaft

a^{20} rotates the roll a^{18}, the sprocket-wheel a^{22}, and by means of the gears a^{23} and a^{24} also turns the roll a^{10}. The shaft a^{17} is driven continuously to feed the paper and to keep in operation the various parts of the machine hereinafter described through the medium of the sprocket-chain a^{21}. The paper being fed into the machine by the continuously-turning rolls a^{10} and a^{18} is first cut into suitable blanks and afterward folded as desired by a series of creasing-rolls and carrying devices.

While it is desirable that the creasing or folding mechanism be run continuously, it is important that the feed of the strip of paper a^5 be intermittent and that such intermittent feed be so regulated as to feed the paper into the machine in lengths corresponding to the length of the blanks to be folded. This I accomplish by means of the mechanism shown in Figs. 1, 2, 3, 4, and 17.

Upon the shaft a^{17} and secured to each end of the roll a^{18} is a disk a^{25}. This disk is provided with projecting screw-threaded pins a^{27} a^{27}. A similar disk a^{28}, provided with an aperture a^{29}, is loosely mounted upon the shaft a^{17}, adjacent the disk a^{25}. The disk a^{28} is provided with a cut-away portion a^{31}, corresponding to the cut-away portion a^{26} of the disk a^{25}. The peripheries of the disks a^{25} and a^{28} each project a slight distance beyond the periphery of the roll a^{18}, except at the cut-away portions a^{26} and a^{31}, where they are flush with the periphery of said roll. The disk a^{28} is provided with slots through which the pins a^{27} of the disk a^{25} pass. Wing-nuts a^{32} upon these pins serve as a means for binding the disks firmly together in any desired adjustment. The roll a^{10} (see Fig. 2) extends over the disks and rests upon them. It is thus kept and raised from the roll a^{18} by means of the disks, except at the cut-away portions, where it can move toward the roll a^{18} and with said roll grip the paper to feed the same forward into the machine.

The cut-away portions are of a length corresponding to the length of the longest blank to be used. When it is desired to use shorter blanks, the disk a^{28} is adjusted, as shown in Fig. 4, until the portion of the periphery of the roll a^{18} that is unprotected by the disks corresponds to the length of the blank to be used. The difference in diameter between the disks and the roll a^{18} is very slight—just enough to make the rolls a^{10} and a^{18} inoperative, except when the roll a^{10} drops into the cut-away portion. The bearings of roll a^{10}, being hinged, can be raised and lowered by the disks. This movement, however, is not sufficient to disengage the gears a^{23} a^{24}.

The paper as it is fed from the feed-rolls is delivered upon a plate a^{33}, secured to a cross-bar a^{32}, cast integral with the framework of the machine. The free edge of this plate is arranged in close proximity to the roll a^{18} in order to insure the paper being delivered upon the said plate. To the side of the cross-bar is secured a knife a^{36}. A standard a^{37} is adjustably secured to each side of the framework a' of the machine, directly over the cross-bar a^{32}, by having a screw a^{47} pass through a slot a^{46} in a foot a^{45}, that forms the base of said standard. By this construction the knife a^{51}, that is supported by these standards, can be adjusted so that when it descends it will just clear the knife a^{36}, the two knives forming shears. A plate a^{34} is secured to the base of the standards by screws a^{41} on the side next the feed-rolls. As shown in Fig. 3, this plate is arranged over the plate a^{33} and a short distance above the same, thus forming a passage-way from the feed-rolls to the knives. A lever x^2, pivoted at x^6 to one of the standards a^{37}, (see Figs. 1, 2, and 3,) is provided at the end of its long arm with an adjustable screw x^5, arranged to pass through a hole x'' in the plate a^{34} and bear upon the paper to hold the same, except when it is being fed. The end of the screw x^5 is kept in engagement with the paper a^5 by means of a spring x^4, connected at its ends in any suitable manner to the lever and the plate a^{34}. The short arm of the lever x^2 is arranged to be engaged by an arm x^3, integral with one of the levers a'' and positioned over the short arm of the lever x^2. When the roll a^{10} descends to feed the paper, the arm x^3 engages the short arm of the lever x^2, thus raising the end of the screw x^5 from the paper, permitting the latter to be fed past the knives the length of a blank. When the roll a^{10} is raised, the arm x^3 leaves the lever x^2 and the spring x^4 forces the end of the screw down upon the paper to prevent the latter from sagging near the spool or being drawn back.

Rods a^{48} are mounted to slide in correspondingly-formed depressions in brackets a^{38} at the top and bottom of the standards a^{37}. These rods are held in place by clamps a^{39} secured to said brackets and confining the rods between said brackets and clamps. Secured at its ends to said rods is a bar x^{10}, to which is attached a knife a^{51} by means of screws x^9. These rods a^{48} are pivoted (see dotted lines, Fig. 1) to the ends of bars a^{52}, that in turn are pivoted to the free ends of levers a^{53}, the opposite ends of said levers a^{53} being rigidly secured to a shaft a^{54} suitably mounted in the framework a of the machine. The knife a^{51} is operated at proper intervals by means of the mechanism just described. As the paper is fed forward past the knives the required distance it rests upon a plate b slotted at b' to receive a creasing-blade b^2, secured by screws b^9 to a bar b^{10} connected to the free ends of levers b^3. These levers b^3 at their opposite ends are rigidly secured upon a shaft b^4 rotatably mounted in the framework of the machine. The plate b is secured by screws b^5 to a bar b^6 suitably attached by screws b^7 to the framework a. A plate a^{35} secured to the lower clamp a^{39} is arranged over that part of the plate b that is between the slot b' and the knives forming a continuation of the pas-

sage that is on the feed-roll side of the knives. The distance from the slot b' to the knives corresponds to the distance from the crease l in the blank c to one of its sides. This crease l is shown in Fig. 18 as positioned at one side of the center of the blank c, in order to provide for a flap c^3.

A rod b^{12} connected at one end by a screw b^{13} to one of the arms b^3 is pivoted at its other end to the free end of a lever b^{14}, fast upon a shaft b^{15} rotatably mounted in the framework of the machine. As the shaft b^{15} is operated the creasing-blade forces a blank c through the slot b' and between a pair of creasing-rolls d'. As shown in Figs. 1 and 3, there are four sets d', d^2, d^3, and d^4 of these creasing-rolls, the first three sets being arranged to form the longitudinal creases or folds, and the fourth, d^4, being arranged to form the cross-creases 4 (see Fig. 18) at the ends of the blanks. The number of sets of these rolls and their relative arrangement will depend upon the particular style in which it is desired to fold the paper. There is a creasing-blade or analogous device for each set of rolls. As the first three sets, d' d^2 d^3, are duplicates of one another, a description of one will suffice for all.

Referring to Figs. 1, 3, and 16, f represents two rollers fast upon shafts f', that are mounted to turn in blocks f^2. These blocks are slotted, as at f^4, to straddle and slide upon some suitable support. (Here shown as a part of the framework a of the machine.) Screws f^5, mounted in said blocks and adapted to pass through slots in the framework a or other support, secure said blocks to their support, and also permit the block to slide upon its support. In practice one block is held rigidly upon its support and its companion block and roll arranged to have a sliding movement. A spring f^8 has its ends secured in said blocks and serves to hold the roll that is adjusted to slide yieldingly against the roll mounted in the fixed block. One of the shafts f' is provided at its end with a sprocket-wheel f^7 arranged to be engaged and driven by the sprocket-chain a^{21}. Spur-gears f^6 fast on the shafts f' engage each other and cause the rolls f to turn in unison, the separation of the rolls caused by the insertion of the creasing-blades and paper not being sufficient to disengage the gears f^6.

Referring now to Figs. 1, 2, 3, and 14 and to the set d^4 of the creasing-rolls, e represents bolts (here shown as two) arranged in a slot e^4 in a plate e^5 integral with the frame a of the machine and lying crosswise thereof. These bolts are provided with screw-threaded ends e^3, upon which are mounted thumb-nuts e^6. Washers e^8 are mounted upon the bolts between the plate and the thumb-nuts. These bolts extend through the plates and carry brackets composed of arms e^2 held together by standards e'. Rollers e^9 are rotatably mounted in these brackets, as shown in Fig. 14. By means of the thumb-nuts the brackets and their rollers can be set at any desired distance apart. This distance is just sufficient to permit the passage between the rolls of carrying-arms that transfer the blank from the rolls d^3 to the rolls d^4 to an unfolding wheel. As the blanks pass the rolls d^4 they are creased, as at 4. (See Figs. 14 and 18.) The creasing-rolls d', d^2, and d^3 are all driven by the sprocket-chain a^{21} and arranged to rotate in a direction to pull the blank from the creasing-blade and force it into a spring-clip on the end of a carrying-arm by which it is carried to the next set of rolls. The rolls d^4 are rotated by the blank as it is forced between them. As the blank is passed between the rollers d' where the crease 1 is formed it is forced by said rolls into a spring-clip h' secured by screws m' to a bar m^3 connected to the free ends of levers m, that are rigidly fixed upon a shaft m^2 rotatively mounted in the framework a of the machine. A bar m^4 connects one of these levers with the free end of a lever m^5, that is fast upon a shaft m^6 rotatively mounted in the framework a. The movement of the arm m is so timed that the clip h' is close up under the rolls d' to receive a blank as it is delivered. It immediately carries the blank to the rolls d^2, that are shown as arranged one above the other. A roller m^7 carried by two arms m^8 pivoted to the framework a above the rollers d^2 is arranged to be yieldingly held by a spring m^{40} that bears upon one of the arms m^8 against the upper roller f of the rolls d^2, but to move away from said roller when the blank c carried by the clip h' is forced between them, and serves to support the blank, so that it can be carried by the upper roller f down upon a table m^9 immediately below the rollers d^2. This table m^9 is secured in any desired way to a cross-bar m^{10} attached to the framework of the machine by screws m^{17}. The free edge of this table is turned up, as at m^{11}, to enable it to project inward over the lower roller f of the rolls d^2 to insure the delivery of the blanks c upon the table and also to permit the blanks to partially double up, as shown in Fig. 6. As the blank c is forced down upon the table m^9 it slides over said table until its free edge strikes the toes m^{12} of rods m^{13}. The continued movement of the blank upon the table causes it to partially double up, in which position it is caught by a creasing-blade m^{18} and forced between the rollers d^2 to form the crease 2 to make the flap c^3.

The rods m^{13} are mounted in suitable apertures in the bar m^{10} below the table. At one end, m^{14}, these rods are screw-threaded to receive a nut m^{15}, by which the movement of the rod toward the rollers d^2 may be adjusted. The other ends of these rods are bent to form toes m^{12}, that project up through suitable slots in the table. Helical springs m^{16} are mounted upon these rods to yieldingly resist the movement of the blank in order to insure its taking the required position before being caught by the creasing-blade m^{18}. This blade is secured to a bar m^{19}, which in turn is connected

to the free ends of levers m^{20}. These levers at their other ends are secured to a shaft m^{21} rotatively mounted in the bed of the machine. Arms m^{22} connect these levers with the free ends of levers m^{23} rigidly connected to a shaft m^{24}, that is rotatively mounted in the bed of the machine. As the blank c is delivered from the rollers d^2 it is forced into a spring-clip h^2 upon a bar n and carried to a roller r and one of the rollers f of the rolls d^3. The bar n is secured to the free ends of levers n', that at their other ends are rigidly attached to a shaft n^4 rotatively mounted in the framework of the machine. Arms n^2 join these levers with levers n^3 rigidly connected to the shaft a^{54}. The roller f of the rolls d^3 that is nearest the clip h^2 has resting upon it a roller r resting at its ends in a slotted bracket r' on the blocks f^2. (See Figs. 1 and 3.) The roller r serves to keep the blank after it leaves the clip h^2 in contact with the roller f, in order that the blank may be forced past the guard-strip r^2 secured to the bracket r' adjacent to the roller r under a sliding clamp-plate h^4 and against the toes r^4 of rods r^5. These rods are mounted in suitable brackets r^6, secured to the plate e^5. These rods at one end, r^7, are screw-threaded, and upon said ends are arranged nuts r^8 to adjustably limit the movement of the rods toward the rolls d^3. At their opposite ends these rods are formed with toes r^4, that project up through slots r^9 in a table r^{10} secured to the brackets r^6. Helical springs r^{11} on these rods enable the rod to yieldingly resist the pressure of the blank. The free edge of the table r^{10} extends over one of the rollers f of the rolls d^3 and in close proximity to its companion roll in order to insure the blank being fed upon the table.

The table is formed with a slot r^{12} through which the blank is forced between the rolls d^3 in order to form the crease 3. As the blank is fed upon the table r^{10} it is caught by a creasing-blade h^3 and forced down between the rolls d^3. This blade is secured upon a bar h^5 attached to the free ends of levers h^6. These levers at their other ends are rigidly attached to a shaft h^7 rotatably mounted in the frame of the machine. An arm h^8 connects one of these levers to a lever h^9 secured at one end to a shaft h^{10}. A clamping-plate h^4 is slidingly connected to the bar h^5 by means of rods h^{12} and moves up and down in close proximity to the blade h^3 or the side next the toes r^4. The rods h^{11} are loosely arranged in the bar h^5 and free to slide up and down in said bar. When the bar h^5 descends, the plate h^4 strikes the blank and the table r^{10} to clamp the blank. The bar h^5, however, with its creasing-blade continues to descend, forcing the blank between the rolls, the loose or sliding connection between the bar h^5 and the plate h^4 permitting this independent movement of the clamping-plate h^4 and the creasing-blade h^3.

As the bar h^5 descends, the plate holds the flap c^3 of the blank c against the blank in order to prevent the flap from unfolding as the blank is forced between the rollers f of the rolls d^3 by the blade h^3 to form the crease 3. As the blank leaves the rolls d^3, it is forced into spring-clips h^{14} on the ends of levers h^{15} and carried to the passage-way leading to the unfolding-wheel t. During the passage of the blank from the rolls d^3 to the wheels t it is forced between the rolls d^4 in the position shown in Fig. 14 in order to form the creases 4. One of the levers h^{15} carries at its free end a rotatable disk h^{16}. This disk is adapted, when the parts are in the position shown in Fig. 10, to rest against and be turned by a roller h^{17} in order to assist in forcing the blank into the clips h^{14}. The roller h^{17} is arranged upon a shaft h^{18}, that is mounted in the boxes f^2 of one of the rollers f of the rolls d^3. The clips h^{14} are secured to their respective arms by screws h^{181}. A spring-plate h^{20} is secured at one end by a screw h^{21} to each of the levers h^{15} on the opposite side of said levers from that to which the clips h^{14} are attached. The free ends of these spring-plates are provided with pins h^{22}, that pass through said levers and impinge against the clip h^{14}. When the blanks are forced into these clips, they pass the pins h^{22}, and during their passage between the rolls d^4 the pin and clip together securely retain the blank in place. A cross-rod h^{19} joins together the several levers h^{15} (here shown as 3) in order to bind these parts together. The levers h^{15} are rigidly mounted upon a shaft h^{23}, rotatively mounted in the framework of the machine. Lever h^{24} is also rigidly mounted upon the shaft h^{23}. A bar h^{25} connects the free end of this lever to the free end of the lever h^{26}, rigidly mounted upon a shaft h^{27}, the latter being mounted to rotate in the framework of the machine. The levers h^{15}, after they pass the rolls d^4, stop with the opening between the clip h^{14} and the levers h^{15} in line with a passage-way t^4, formed by a plate t^2, secured to the plate e^5, and by a plate t^3 below said plate t^2, secured to the framework of the machine, all as shown in Figs. 12 and 13. As the levers h^{15} come to the position shown in Fig. 12 the free end of the lever t^5 passes up between the levers h^{15} behind the blank. As soon as the levers h^{15} assume the position shown in Figs. 3 and 12 the end of the lever t^5 is thrown forward from the position shown in Fig. 11 to the positions shown in Figs. 1, 3, 12, and 13, thus carrying the blank from the levers h^{15} into the passage-way t^4 and under the unfolding-drum t. The unfolding-drum t is set over the delivery-mouth of the passage-way t^4. This drum is rigidly mounted upon a shaft t', that is in turn mounted to rotate in suitable bearings in the framework of the machine. Upon the end of this shaft is secured a sprocket-wheel s, that is driven by a sprocket-chain a^{21}.

t^6 represents a spring-pressed rod mounted in the unfolding-drum t. To this rod is rigidly secured an arm t^7 carrying a finger t^8, that extends through a slot t^9 in the periphery of the drum. This drum is arranged to ro-

tate in the direction indicated by the arrows, Fig. 3. The spring t^{40} (see Fig. 19) is coiled upon said rod, one end of said spring being fast to said rod and the other end of said spring being secured in any desired way to said drum. This spring normally tends to make the finger assume the position shown in Fig. 3. Just as the finger passes the delivery-mouth of the passage-way t^4 a blank is pushed by the lever t^5 between the periphery of the drum t and the end of the finger t^8. Simultaneously with this operation a projection (not shown) on the rod t^6 strikes a cam t^{14}, (see Fig. 2,) forcing the finger to the position shown in Fig. 13, thus gripping the blank between the finger and the periphery of the drum and drawing the same up by the ends of bars t^{10}. The ends of these bars near the wheel are covered with rubber, as at t^{11}. To the under side of these bars are connected spring-blades t^{12} having rubber t^{13} at their free ends in close proximity to the drum. As the blank is drawn by the rubber t^{13} the flap c^3 is caught and unfolded. After the finger and blank pass the end of the bar t^{10} the rod is released from the action of the cam and the finger is thrown upward by the spring, thus dropping the blank upon the bars in an unfolded position, as shown in Figs. 1, 3, and 12. These bars are mounted upon suitable cross-pieces t^{15} connected at their ends to the framework of the machine. The lever t^5 is rigidly secured on a shaft t^{16}, that is rotatably mounted in the framework of the machine.

The operation of the parts so far described is, briefly, as follows: As fast as a blank is cut it is forced by the blades b^2 between the rolls d'. As the blank leaves the rolls d' it is caught by the clip h' and carried to the rolls d^2. When in position on the table in front of the rolls d^2, the blank is immediately forced through these rolls by the blade m^{18}, where it is caught by the clip h^2 and carried to the rolls d^3. As soon as the blank is in position on the table r^{10} it is forced by the blade h^3 between the rolls d^3, where it is caught by the levers h^{15} and carried by the rolls d^4 and delivered by the lever t^5 to the unfolding-drum. The rolls have a rotary motion, while the blades and clips have a reciprocating motion. The blades reciprocate toward and from the rolls, while the clips reciprocate between two sets of rolls, carrying the blank from one set of the rolls to the succeeding rolls and immediately returning to their initial position.

The precise manner of mounting the levers upon their respective shafts is unimportant so long as they are rigidly secured to said shafts. For sake of illustration, in the drawings I have shown a collar and set-screw. A sprocket-wheel s' is mounted upon a shaft s^2, and a like sprocket-wheel s^3 is mounted upon a shaft s^4. These shafts are in the lower part of the framework of the machine and at opposite ends thereof, as shown in Fig. 1. The shafts a^{54}, h^{27}, and m^{24} are provided with arms s^5 for engaging the cams s^6 rigidly mounted upon the shaft s^2. By this means a rocking motion is imparted to the aforementioned shafts and by them transmitted to their respective lever connections. The shaft m^6 is provided with a lever m^{40}. This lever is connected by lever m^{41} with an arm m^{42} rigidly secured to shaft t^{16}, the shaft m^6 receiving its motion by means of shaft t^{16}. The shafts h^{10}, b^{15}, and t^{16} are provided with arms s^8, arranged to engage the cams s^{10} upon the shaft s^4 and to thereby receive a reciprocating motion and impart the same to their respective lever connections. A sprocket-chain a^{21}, mounted upon sprocket-wheels s', s^3, and a^{22} and the sprocket-wheel f^7 on the shaft f', receives motion from the wheel a^{22} and communicates it to the other sprocket-wheels and through them communicates motion to the several parts of the machine.

The cams s^6 upon the shaft s^2 and the cams s^{10} upon the shaft s^4 are all of the conventional shape and kind properly positioned upon their respective shafts in the ordinary and well-known manner, an illustration and description of one therefore sufficing for all, since these cams are practically duplicates of one another.

While the drums and rolls of the machine have a continuous rotary motion the levers m^3, m, m^{20}, h', h^6, h^{15}, and t^5 have a reciprocating motion, all as clearly shown in the drawings heretofore described.

x represents holding-rods suitably mounted in each end of the bar x^{10} and provided with springs x' so arranged that the rods are yieldingly held against any upward pressure on their lower ends. As the knife descends to cut a blank, these rods engage the blank and hold it in position after it is cut until the blade b^2 engages it. The rods being slidingly mounted in the bar the lower ends of said rods will remain upon the blank a short time after the knife has left the blank, and it is during this interval of time that the blade b^2 engages the blank. The purpose of these rods is to prevent the blank from becoming displaced after it is cut and before it is engaged by the creasing-blade.

Having thus explained the nature of my invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim, and desire to secure by Letters Patent, is—

1. In a paper-folding machine, in combination, a plurality of pairs of spring-pressed rolls, blades for forcing a blank between said rolls, a pivoted arm provided with a spring-clip constructed and arranged to receive said blank from one of said pairs of rolls on one side of said clip and to deliver said blank from the opposite side of said clip to the other of said pairs of rolls, the blank passing through said clip, substantially as and for the purpose set forth.

2. In a paper-folding machine in combina-

tion a series of rolls, a series of blades for forcing a blank between said rolls, and a series of pivoted arms provided at their ends with spring-clips for receiving a blank from one set of rolls and transferring it to the succeeding set of rolls, and a pair of end-creasing rolls the last of said series of arms being arranged to carry its blank between said end-creasing rolls substantially as and for the purpose set forth.

3. In a paper-folding machine in combination an adjustable intermittent feeding device, a cutting device, a series of pairs of spring-pressed rolls, a series of blades for forcing a blank between each of said pairs of rolls, a series of pivoted arms provided with spring-clips for receiving a blank from one pair of rolls and transferring it to the succeeding pair of rolls, an unfolding device including a drum provided with a spring-finger, and a pair of end-creasing rolls the last of said series of arms being arranged to carry the blank between said pair of end-creasing rolls to form the end creases and to deliver said blank to the unfolding device, substantially as and for the purpose set forth.

4. In a paper-folding machine in combination a series of pairs of rolls for creasing a blank, an unfolding device comprising a rotary drum provided with a spring-pressed finger, a pair of pivoted arms, provided with a spring-clip at their ends for transferring a blank from the last set of rolls to the vicinity of said drum, and a pivoted arm for forcing the blank from said spring-clip against said drum and beneath the free end of said finger, substantially as and for the purpose set forth.

5. In a paper-folding machine, in combination, an automatic intermittent feeding device, an automatic cutting device, an automatic holding member controlled by said cutting device, and arranged to hold the blank after it is cut, and an automatic holding member controlled by said feeding device arranged to hold the free end of the blank, except when the latter is being fed, substantially as and for the purpose set forth.

6. In a paper-folding machine in combination, a pair of spring-pressed rolls *f*, a friction-roll yieldingly held against one of said rolls, means for forcing a blank between said friction-roll and one of the rolls *f*, a table upon which said blank is delivered, a spring-pressed toe mounted in said table against which said blank is forced to partially double up the same, and a creasing-blade arranged to force the partially-doubled blank between the rolls *f*, *f*, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 20th day of April, A. D. 1895.

OLIVER H. MARSTON.

Witnesses:
A. D. HARRISON,
ROLLIN ABELL.