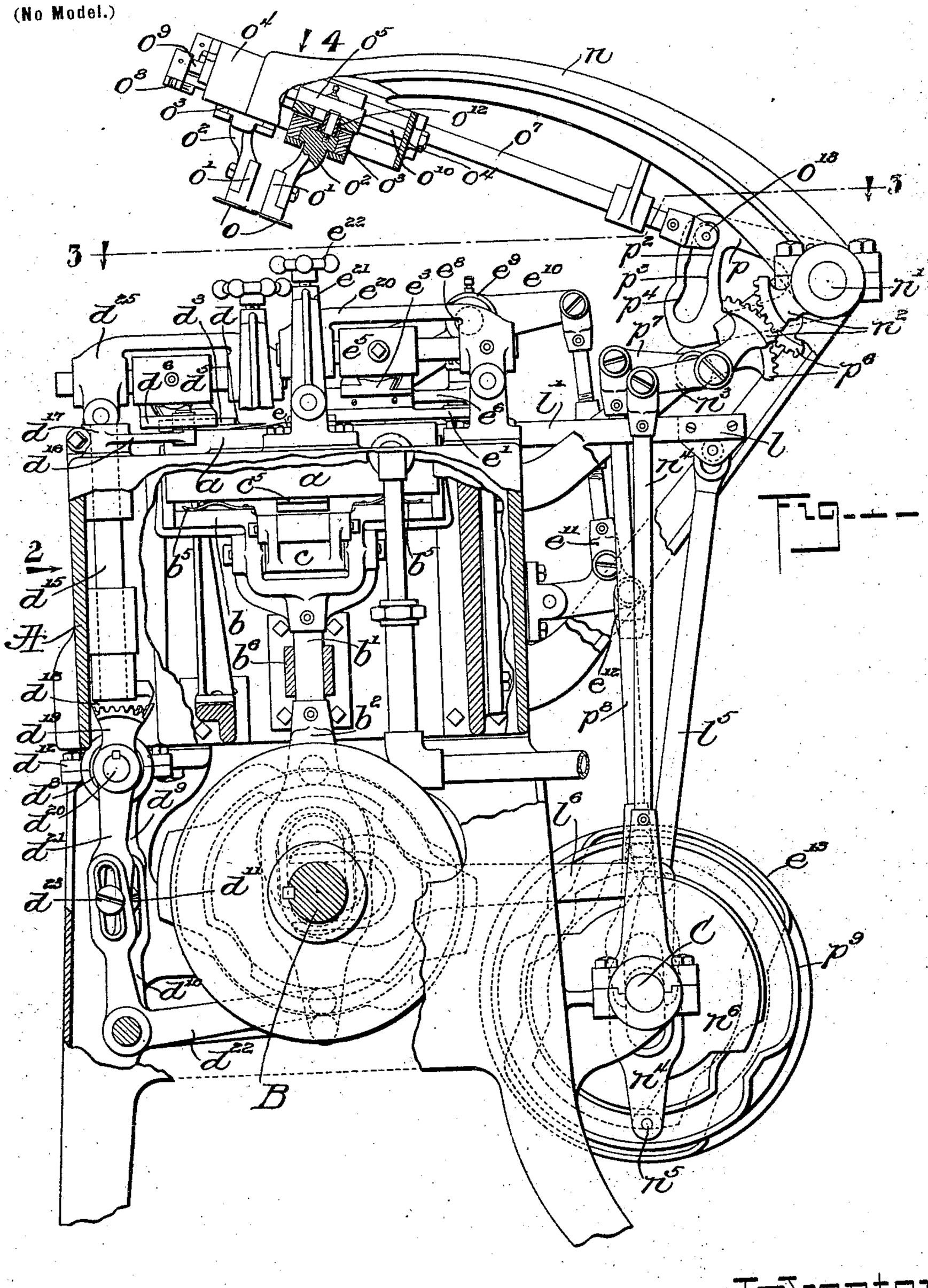
No. 688,460. Patented Dec. 10, 1901.

A. D. FENWICK.

MACHINE FOR FOLDING COLLAR BLANKS, &c.

(Application filed Mar. 19, 1900.)

(No Model.) 4 Sheets—Sheet 1.



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(No Model.) 4 Sheets—Sheet 2.

FIG. 2.

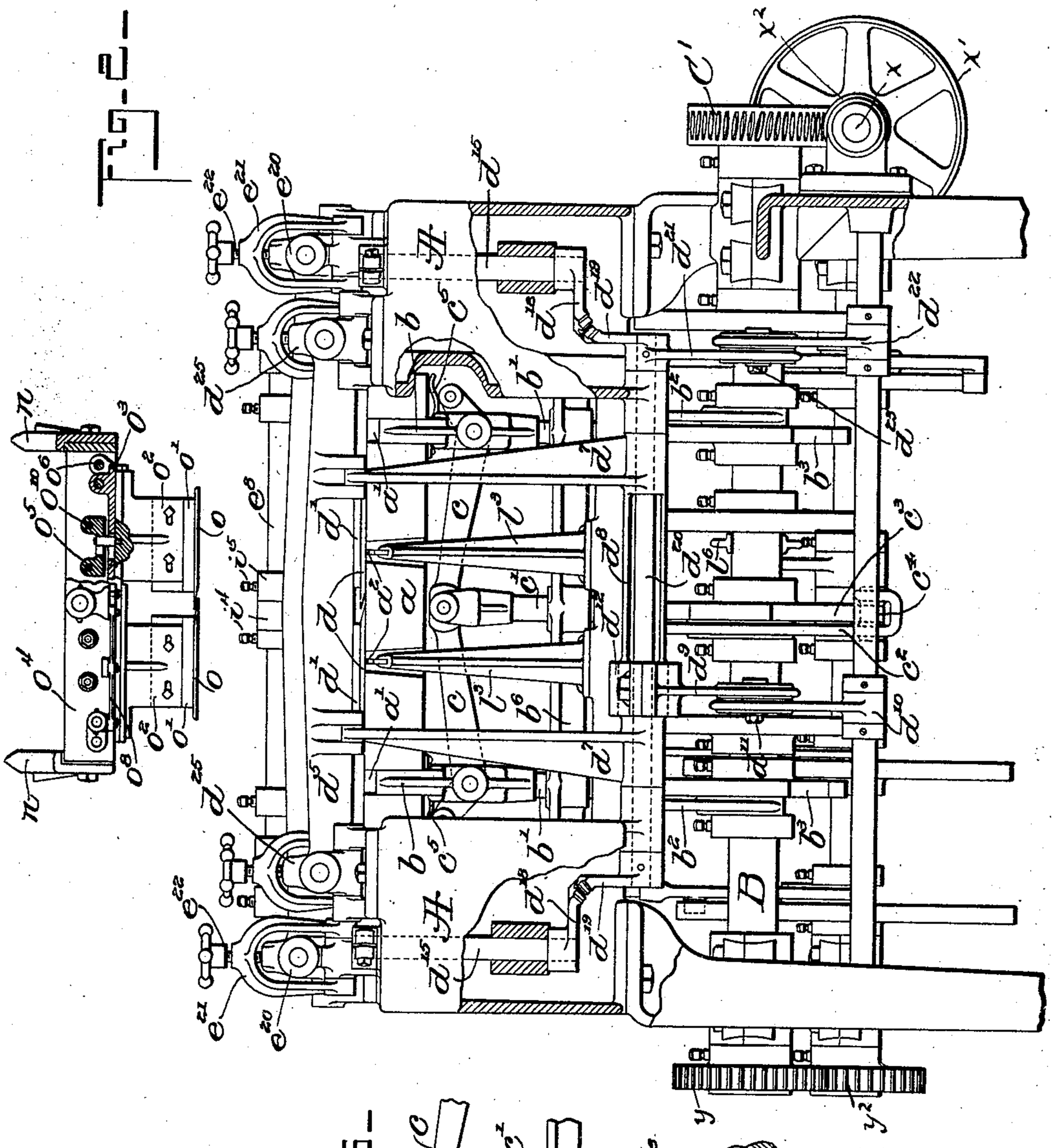
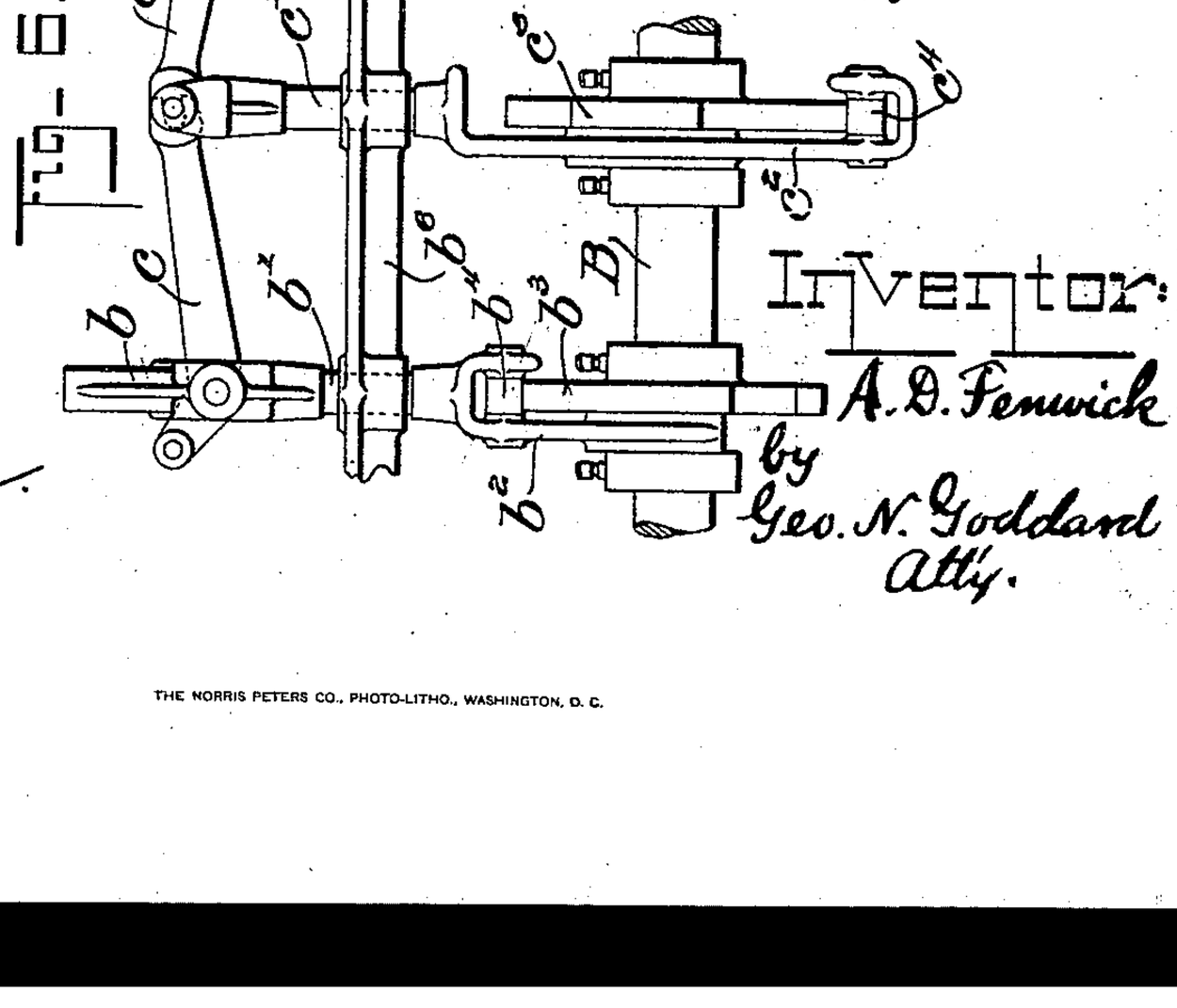


FIG. 6.



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(No Model.) 4 Sheets—Sheet 3.

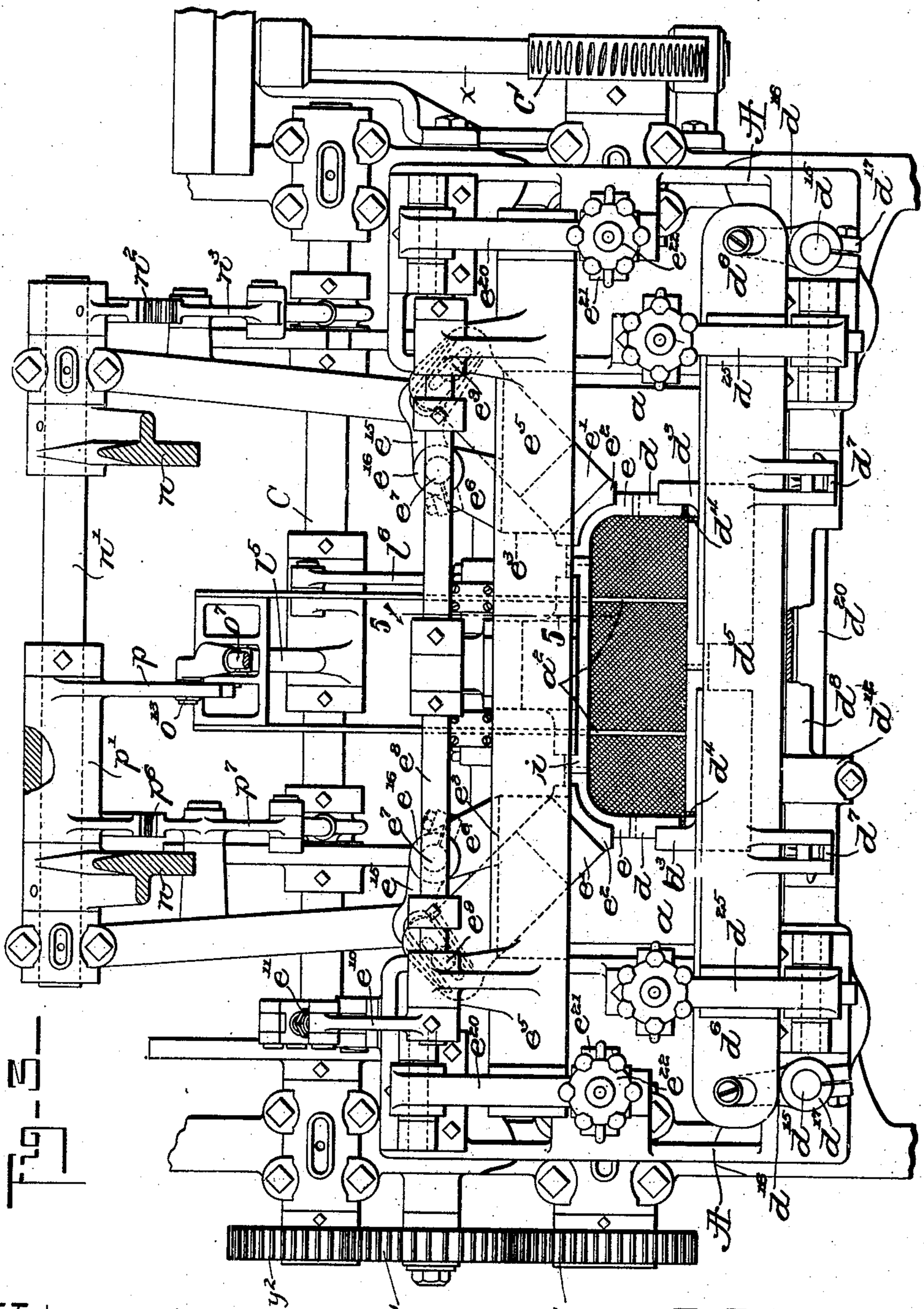

FIG. 5.

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No. 688,460. Patented Dec. 10, 1901.

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(No Model.) 4 Sheets—Sheet 4.

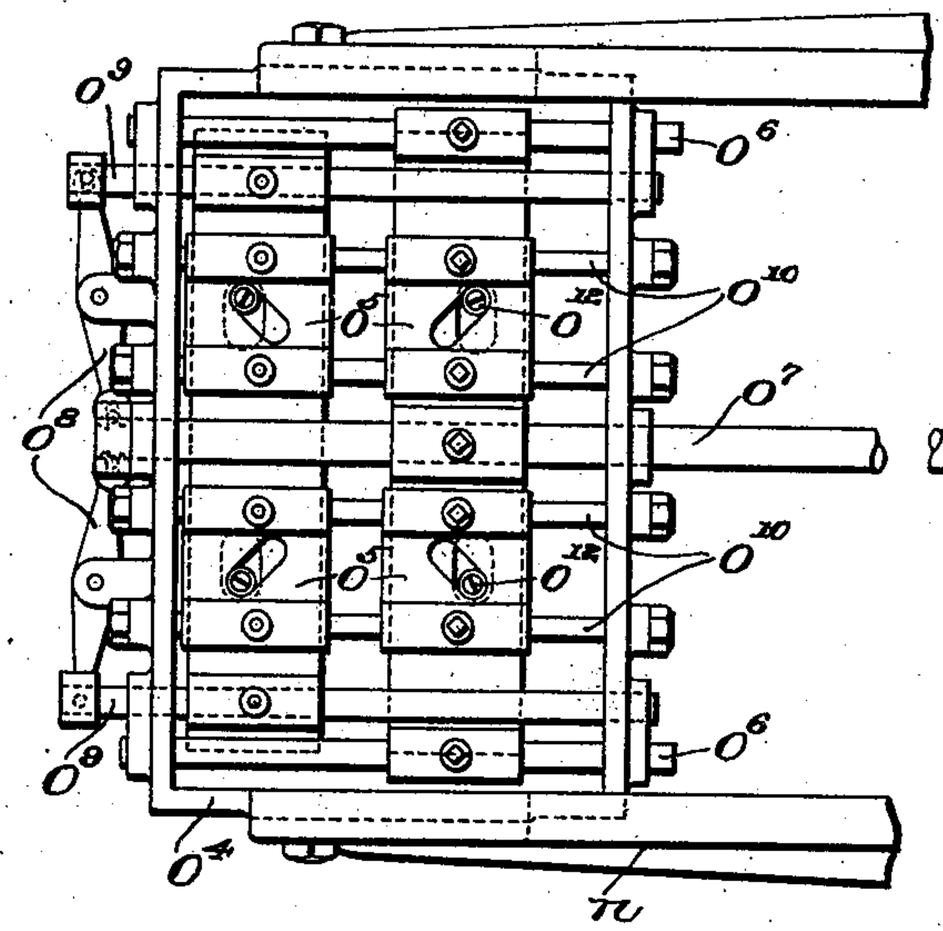

Fig. 4.

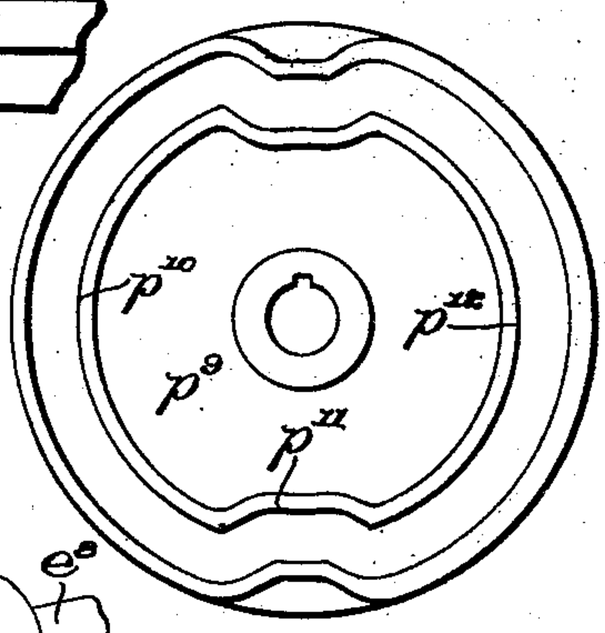

Fig. 9.

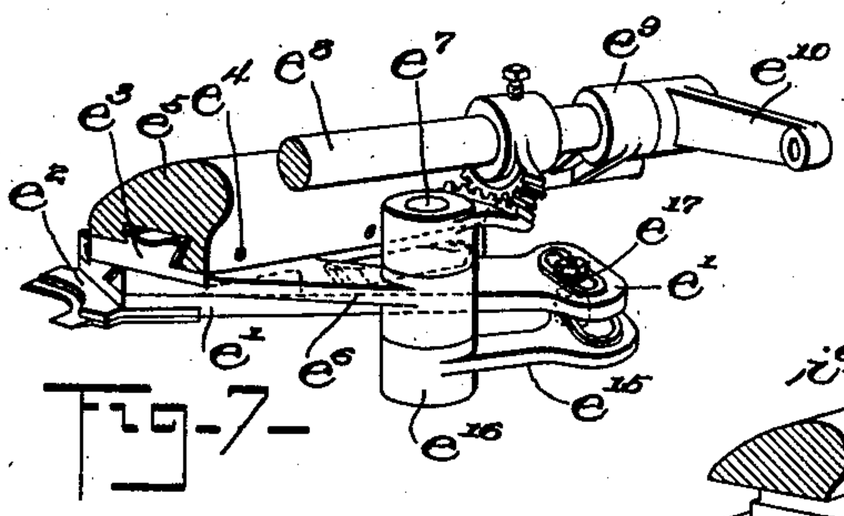

Fig. 7.

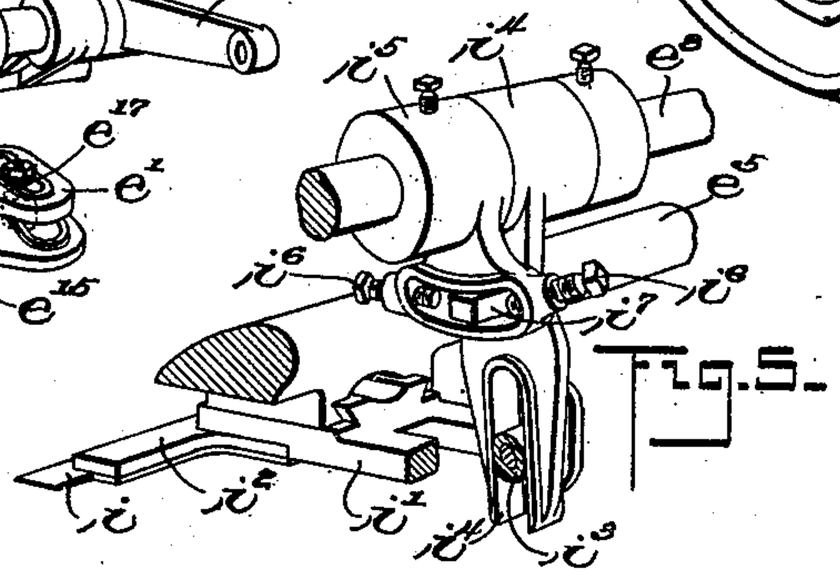

Fig. 5.

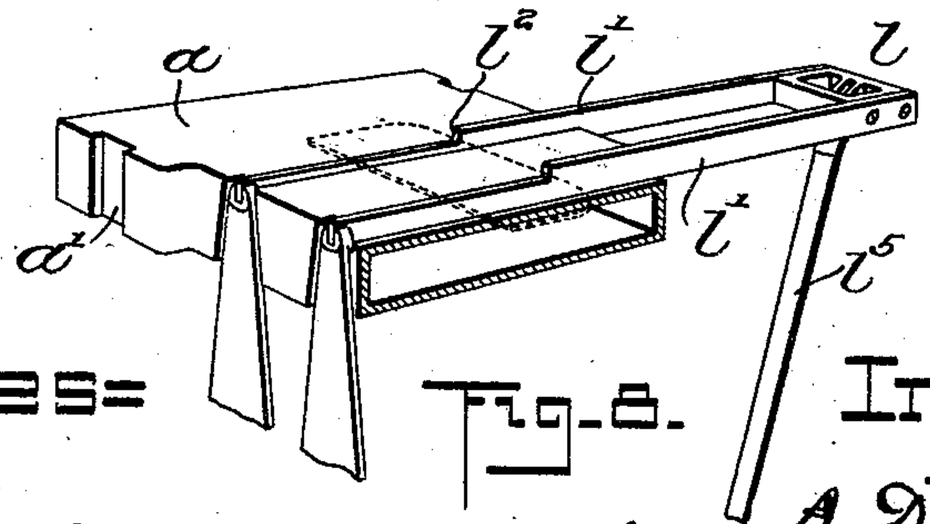

Fig. 8.

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UNITED STATES PATENT OFFICE.

ALBERT D. FENWICK, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO A. D. FENWICK MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

MACHINE FOR FOLDING COLLAR-BLANKS, &c.

SPECIFICATION forming part of Letters Patent No. 688,460, dated December 10, 1901.

Application filed March 19, 1900. Serial No. 9,202. (No model.)

To all whom it may concern:

Be it known that I, ALBERT D. FENWICK, a citizen of the United States, and a resident of Boston, county of Suffolk, Massachusetts, have invented certain new and useful Improvements in Machines for Folding Collars and Cuffs, of which the following is a specification.

My invention relates to machines for folding the edges of collars, cuffs, or other articles in the process of their manufacture.

Among the many novel features that characterize my present machine I will indicate at the outset a few that are radically and fundamentally new both in conception and in actual reduction to practice. In the first place, I believe that I am the first to conceive, as well as to reduce to practice, the idea of making a single machine operate in one cycle of its movements to fold one facing of the collar or cuff and on the next cycle to fold the other facing in a different manner, so that its edges will interlock with the first facing folded. Heretofore two machines have been needed to fold the two complementary facings of the same collar. I am also the first to combine with the die and folding-knives a movable supporting and pressing bed so mounted as to automatically accommodate itself to different thicknesses of the blanks to be folded and pressed. Again, I am the first to combine in a machine of this type the die, the folding-knives, and the bed with means for removing the folded blanks independently of the movement of the die.

Besides the fundamentally-novel ideas of means above enumerated this machine is characterized by other novel and important improvements, which will be fully explained in the specification and will be clearly defined in the appended claims.

Referring now to the drawings, in which I have shown one form under which my invention may be embodied, Figure 1 is an end elevation of a complete machine, parts thereof being broken away for the sake of clearness. Fig. 2 is a front elevation, the die being shown in its raised position without its supports and actuating mechanism. Fig. 3 is a plan view of the machine, the die being omitted. Fig. 4 is a plan view of the die with a part of its lifting and its actuating mechanism. Fig. 5 is a detail perspective view of the side knife and its actuating device. Fig. 6 is a detail in elevation of a part of the raising and pressing mechanism of the bed. Fig. 7 is a detail in perspective for operating one of the rounded-corner knives. Fig. 8 is a detail in perspective of the bed and the feed-out mechanism. Fig. 9 is a detail view of an actuating-cam.

To illustrate the range of work that can be done on this machine, I have shown a machine constructed for folding cuffs having two round corners and two square corners; but it will be obvious that either the round-corner-knife mechanism or the square-corner-knife mechanism can be applied to fold all the corners of the cuff.

Broadly considered, my machine embraces a blank-supporting bed *a*, heated in any suitable manner, a die made in sections *o*, which form a templet of the size and shape of the cuff, and the folding-knives *d*, *e*, and *i*, which surround the blank as it lies on the bed and are moved inwardly by suitable mechanism to fold the edges of the blanks over the periphery of the die. When the knives have moved in and folded over the edges, they remain stationary while the die is automatically collapsed and raised from the blank. As soon as the die is clear of the folded blank the pressing mechanism acts to press the bed upward with increased pressure against the under faces of the knives. Directly the bed is dropped to its lowermost position the feed-out mechanism operates to discharge the folded blank. All these movements of the machine are effected through mechanism actuated from the driving-shaft of the machine, so that the operator can give his attention solely to putting the blanks in position to be folded.

The die herein shown comprises four sections or overlapping plates *o*, secured to the blocks *o'*, which by means of connecting-bolts passed through elongated slots (see Fig. 2) are adjustably supported by the hangers o^2. These hangers o^2 have a dovetailed sliding connection with the carriers or slide-bars o^3, which are supported, respectively, on the rods o^6 o^9 in the die-frame o^4. A reciprocating rod o^7 forms the connection between the die and the actuating mechanism which controls the

relative movements of the sections of the die. The rear carrier o^3 is adjustably secured to this reciprocating rod by means of a set-screw. The reciprocating rod o^7 is also connected with the front carrier by means of the levers o^8 and the sliding supporting-rods o^9, to which rods the front carrier is adjustably secured by a set-screw, the object of this adjustment of the carrier being in both cases to make the same die answer for blanks of different sizes. As will be understood, a forward movement of the rod o^7 imparts a similar movement to the rear carrier and a reverse movement to the front carrier. Thus the two carriers are made to approach or to recede from each other by the action of the reciprocating rod, the movement of this rod being entirely controlled by mechanism outside of and independent of the head or frame of the die. The sliding hangers o^2 are provided with pins or rollers o^{12}, which project through slots in the carrier to engage with oblique slots in the stationary guides or cam-blocks o^5, which are adjustably secured to the cross-rods o^{10}. As the carriers o^3 move apart to expand the die the hangers o^2 are by the action of the rollers o^{12} in the oblique slots of the guide moved longitudinally of the carrier, so as to expand the die lengthwise. On the reverse or collapsing movement of the carriers the hangers in each carrier are moved nearer together, thus simultaneously collapsing the die lengthwise.

The mechanism for controlling the expanding and collapsing movements of the die comprises an oscillating cam or link p, projecting from the loose hub or sleeve p' and which is formed with an eccentric cam-slot. This cam-slot engages a roller or pin o^{13} on the end of the rod o^7. The cam-slot may be considered as formed with three different surfaces, the upper portion of its surface p^2 being in an arc concentric with the axis of the sleeve p', the middle portion p^3 being also concentric with said axis, but being slightly offset from the surface p^2 and the eccentric or collapsing portion p^4, which operates when moved up to the line of the roller to push the rod o^7 forward and collapse the die. It is obvious that the cam p is in such a position that its upper surface p^2 is in contact with the roller, that the die will be expanded to its fullest extent, that when the roller bears against the middle portion p^3 the die will remain expanded, but to a slightly-less extent than before, and that when the roller rides upon the eccentric portion p^4 the die will be collapsed. The position of the cam p is controlled by oscillating the sleeve p' through the medium of the sector-gears p^6, the arm p^7, and the connecting-rod p^8, which by means of a suitably-grooved cam p^9 is raised or lowered or held stationary at the desired position. To make clearer this operation of the cam p^9, a face view thereof is shown in Fig. 9. While the engaging roller of the rod p^8 is riding on face p^{10} of the cam the rod p^8 is elevated, the cam p is depressed, and the die is expanded. The inward sweep p^{11} of the cam-groove lowers the rod and collapses the die, while the surface p^{12} again lowers the cam, but not to its lowest position, so that the die is then in its second expanded position. This action, however, is only needed when the blanks of the cuff are being folded alternately three together and one alone, as in such case if the die be always of the same size when expanded the outside width of the three-ply facing will be greater than the outside width of the one-ply facing by extra thicknesses of material. Of course I do not confine myself to the use of an oscillating cam for controlling the movement of the die-sections.

The frame o^4 is supported by the arms n, which are secured to the rock-shaft n'. This rock-shaft is oscillated by means of the intermeshing sector-gears n^2, the lever n^3, and the reciprocating connecting-rod n^4, which carries at its lower end a roller n^5, which engages with the actuating-cam n^6 on the shaft C. The reciprocation of this rod n^4 and the rocking of the shaft n' at predetermined intervals cause the die to rise from and descend upon the bed a, as required.

I will now describe the operating mechanism and action of the folding-knives as they are shown in this form of my invention.

The blades or knives are formed of thin plates of metal corresponding in shape to the outline of the collar or cuff. In the machine here shown I employ five knives—two square-cornered knives d, two round-cornered knives e, moving on diagonal lines, and the straight-side knife i. The knives d may be formed with slots d^4 near the corners to facilitate the folding of the square corners. The adjacent ends of all the blades overlap each other, so as to form a continuous contractible folding edge around all sides of the blank. The square-cornered blades d are secured to the under side of sliding knife-blocks d^6, which have a dovetailed engagement with the knife bar or carrier d^5, so as to permit a movement of the knife-blocks lengthwise of said carrier toward and away from each other. Reinforcing-plates d^3 may be interposed between the knife-blocks and the knives to stiffen the blades.

Suppose that a blank is on the bed to be folded with the die resting upon it. It will be clear that a rearward movement of the front knife-bar d^5 will fold the front side or edge of the blank over the die. As soon as this is done the knife-blocks d^6 are caused to move toward each other, thus folding in the end edges of the cuff, the corner-knives e moving simultaneously to do their part of the work. The mechanism herein shown for imparting this rearward or lateral movement to the carrier or knife-bar d^5 comprises the oscillating arms d^7, which project from an oscillating sleeve d^8 and which engage extensions on the front edge of the knife-bar d^5. As these arms oscillate they move the carrier d^5 in and out to fold a blank or to make way for the next

blank. This sleeve d^8 is oscillated by means of a downwardly-projecting arm d^9, which is actuated by an oscillatory angle-lever d^{10}, the lower end of which engages a suitable cam on the driving-shaft B. The upper end of said angle-lever and the lower end of the arm d^9 are slotted to receive an adjustable connecting-pin d^{11}. By adjusting said pin up or down the arc of oscillation of the sleeve can be regulated to vary the extent of the lateral movement of the carrier d^5. To provide for using the machine on cuffs of different widths, I may make the arm d^9 adjustable upon the sleeve d^8, and this may be done by forming the arm d^9 with a split hub d^{12}, which can be adjustably secured to the said sleeve.

The mechanism for imparting the longitudinal movements to the knife-blocks d^6 comprise the oscillating shaft d^{15}, having the horizontal arm or lever d^{16}, which is provided with a pin or roller to engage a slot in the block d^6. This arm d^{16} may have an adjustable connection with the rock-shaft d^{15}, as by a split hub d^{17}, so that the arm can be set to position the end portion of the knife to accommodate cuffs of different lengths. The lower end of said rock-shaft is provided with a miter-gear sector d^{18}, which meshes with a similar sector d^{19}, secured to the rock-shaft d^{20}, so that the oscillation of the rock-shaft moves the blades d longitudinally toward or away from each other, thereby folding in the end edges of the blank. Secured to this rock-shaft is a depending arm d^{21}, which engages with an angle-lever d^{22} through the medium of an adjustable connecting-pin d^{23}, passed through the slots in the adjacent ends of these two coöperating levers. The adjustment of this pin d^{23} serves to vary the longitudinal traverse of the knife-blocks and the knives. The angle-lever d^{22} is actuated by a suitable cam on the driving-shaft B.

It should be understood that this machine is constructed to pass through two complete evolutions at each rotation of the driving-shaft B, each series of evolution serving to fold, press, and discharge a cuff-blank. The cams on the shaft B, which serve to actuate the angle-levers d^{10} and d^{22}, respectively, are so constructed and arranged that in folding one blank the lateral movement of the knives d to fold the side edge takes place before the longitudinal movements which fold the end edges, while on the next half-rotation of the driving-shaft to fold the succeeding blank the knives d are moved longitudinally toward each other to fold the end edges first and then moved laterally to fold the front edge, this being easy of accomplishment, since the two folding movements of the blades are actuated by distinct cams. Thus one blank will be formed with the infolded edges of its ends overlying at the corners the infolded edge of the side, while the next blank has the infolded edge of its side overlying the infolded edges of the ends, thereby forming two complementary blanks capable of perfectly interlocking, as will be readily understood by those skilled in the art. It will be noticed that each of the square-corner or angle knives subtends adjacent portions of two edges of the blank and that by two successive movements of these knives the adjacent subtending portions of the blank are successively infolded, so that one overlaps the other.

I will now explain the operating mechanism for the rounded-corner knives e. These knives are secured to diagonal sliding knife-blocks e' and may be stiffened or strengthened by reinforcing-plates e^2. The knife-blocks e' are slidingly mounted in brackets or hangers e^3, which are mounted in the knife bar or carrier e^5 by means of a dovetailed or other connection, permitting an adjustment of the brackets longitudinally of the knife-bar to accommodate the position of the knives e to cuffs of different lengths, Fig. 7. Set-screws e^4, Fig. 7, serve to hold the brackets in their adjusted positions. These brackets e^3 have rearwardly-projecting arms e^6, which form bearings for short vertical rock-shafts e^7, which they support. This shaft is oscillated by means of a horizontal rock-shaft e^8, which is supported in bearing-brackets e^9, projecting from the knife bar or carrier e^5. The rock-shaft e^8 is oscillated by means of the lever e^{10}, secured thereto, the compound connecting-rod e^{11} e^{12}, and the cam e^{13} on the shaft C. On the lower end of the vertical rock-shafts e^7 are slotted levers e^{15}, which are clamped to the rock-shaft by means of a split hub e^{16}, (see Fig. 3,) so as to be adjustable thereon. The rear extension of the slide or knife-block e' carries an adjustable roller e^{17}, which engages with the slot in the arm or lever e^{15}. As will be understood, the oscillatory movement of the horizontal shaft e^8 is transmitted to the vertical shaft e^7 and the lever e^{15}, which acts upon the roller carried by the knife-block e' to reciprocate the knife-block and knife in a diagonal direction toward and away from the corner of the cuff. The object of making the arm e^{15} and the roller e^{17} adjustable is to accommodate the same to different widths of cuffs and to regulate the inward traverse of the corner-knives. The middle knife i is also actuated from the horizontal rock-shaft, as is best shown in Fig. 5. This knife, too, has a stiffening-plate i^2 and is secured to a sliding knife-block i', mounted to slide in transverse ways on the under side of the knife bar or carrier e^5. The rear end of the knife-block i' has a roller i^3, which is engaged by a forked arm i^4. This forked arm is hung loosely on the rock-shaft e^8 and is actuated by a slotted arm i^5, which is fixed to the rock-shaft. The slotted arm i^5 is provided with opposing set-screws i^6, between which a stud i^7 on the arm i^4 projects. As the shaft and the arm i^5 oscillate one of the screws engages the stud i^7, causing the two arms to move in unison. On the reverse oscillation the other set-screw performs the same office. The object of this arrangement is to shorten the traverse of the

middle knife, so that it will not get ahead of the corner-knives in the inward movement, since the corner-knives travel on an oblique line, while the middle knife travels in a direct line. The lost motion can be regulated by adjusting the screws.

The knife-bar e^5 is hung from a pair of pivoted brackets or yokes e^{20} and is adjustable therein, a set-screw serving to hold it in place. The brackets e^{20} are firmly locked in place by means of the pivoted stirrups e^{21}, carrying a set-screw e^{22}. By loosening this set-screw and swinging over the stirrup the operator can turn the bar back, thus getting easy access to the knives in order to clean them. A similar arrangement is provided to enable the knife-bar d^5 to be swung back to afford access to the knives by means of the pivoted yokes d^{25}. However, instead of being held stationary, as is the knife-bar e^5, the knife-bar d^5 has a reciprocating movement in the pivoted yokes d^{25}, as heretofore explained.

It will be understood that there will be no object in making the knife arrangement on one side of the machine different from that on the other side when both sides of the cuff are to be alike, and it would be an easy matter to take out one knife-bar and replace it with a different one without making any other changes than such as might be required in the actuating mechanism.

The bed a is supported in a pair of vertically-movable yokes b, secured to the upper ends of lifting-rods b'. At their lower ends these lifting-rods are provided with a forked extension b^2, which bestrides the shaft B merely to act as guides. Antifriction-rollers b^4, engaging the cams b^3, serve to raise and lower the bed. Instead of resting the bed a directly upon the supporting-yokes I prefer to interpose springs b^5, so as to accommodate any desired number of thicknesses of material in the folding operation. The bed a may be provided with ways or grooves a' on its sides, into which the arms of the yokes fit.

In order to press the blanks after their edges have been folded and the die withdrawn from the folds, I provide a pressing mechanism arranged to raise the bed somewhat above the normal level which it occupies during the folding operation. This pressing mechanism embraces a pair of levers c, fulcrumed in the yokes b, so that when their inner ends are depressed their outer ends will exert a powerful pressure against the bottom of the bed. In this case I also prefer to interpose stiff springs c^5 between the short arms of the levers c and the bottom of the bed a. The levers c are operated by a reciprocating rod c', whose lower extension c^2 is provided with a roller c^4, engaging the pressure-cam c^3 on the shaft B. The movements of the supporting-cams b^3 and of the pressure-cam c^3 are so timed that the arms c are not actuated to press up the bed until after the folding operation is completed and the die withdrawn. Immediately after the blank has been pressed the supporting-cams b^3 act to lower the bed below its normal or operative position to permit the discharge of the folded blank by the feed-out device. The vertical rods b' c' pass through a fixed bridge-piece b^6, secured to the frame A, which acts as a guide.

The feed-out or blank-discharging device embraces a carrier l, provided with two horizontal arms l', lying in grooves a^2 in the top of the bed, their front ends being supported in the standards l^3. The top edges of these arms l' lie below the level of the top of the bed-plate a when the latter is in operative position for folding the blanks. After the blanks have been folded and pressed, as described above, the cams b^3 act to lower the bed away from the folding-knives. This movement brings the top of the bed below the level of the top of the arms l' of the carrier, so that the folded blank rests upon the carrier. The carrier is then moved transversely of the bed and discharges the blank over the front edge of the bed. To facilitate this operation, the arms l' are formed with shoulders l^2, against which the edge of the blank may lie. As soon as these shoulders have passed the front edge of the bed the bed rises again, thus preventing the return of the blank as the carrier is retracted. This rise of the bed brings it again into operative position for folding the next blank. The separation of the bed and knives need last only long enough to permit the blank to pass between them. The carrier l is actuated by means of a pivoted lever l^5, which may be oscillated in any suitable manner, as by a rod or link l^6, actuated by a cam on the driving-shaft B.

It should be remembered that the machine as herein described is constructed and arranged to perform a complete series of evolutions on each half-revolution of the drive-shaft B—that is, a half-revolution of this shaft operates to cause the die to descend upon the blank, the knives to move in and fold over the edges of the blank, the die to collapse and rise from the blanks, and the bed to press the folded blank against the knives and to drop down to permit the feed-out device or carrier to discharge the blank—and the next half-revolution of the shaft causes the operations to be repeated with such variations in the particular movements as have already been pointed out.

The mechanism which I have shown in this instance for imparting motion to the driving-shaft of the machine comprises a short transverse worm-shaft x, to which is secured a driving-pulley x', a worm x^2 of said worm-shaft engaging the worm-gear C′ on the end of the shaft B. At its other end the shaft B is provided with a spur-gear y, which meshes with an intermediate idler-gear y', which in turn transmits motion to the gear y^2 and the shaft C. I have devised this arrangement of driving mechanism in order to overcome or counterbalance the tendency of the weight

of the cross-head and the momentum of the parts of the machine to accelerate or retard the speed of the machine in different parts of its evolutions. It will be understood that while the worm gives a steady positive movement to the operating-shaft of the machine it holds the parts against any retardation or acceleration by reason of the weight of the cross-head or other parts, which is an important consideration in machines of this class.

While there are many novel and valuable features of construction and arrangement in the mechanism by which the various operations are carried on, it should be understood that I do not by any means confine myself to the mechanism herein shown and described, as it will be clear that very considerable changes may be made in the mechanism shown without departing at all from the spirit of my invention. I have already briefly indicated some of the fundamentally novel conceptions which I am the first to invent, and it is my purpose to assert my right thereto broadly as a pioneer inventor. These and other features characteristic of the present invention will be clearly defined in the annexed claims.

No claim is herein made to the construction or mechanism of the templet or die, since the novel features of construction in said templet or die are made the subject-matter of application, Serial No. 47,440½, filed by me February 15, 1901, as a division of this application.

Without, then, attempting to indicate all the variations in construction and arrangement which may be made in my invention nor all the uses to which it is applicable, what I claim is—

1. In a machine for infolding the edges of collar and cuff blanks, the combination of a die, infolding-knives arranged around the periphery of the die when in operative position, a blank-supporting bed beneath the folding-knives, relatively light compensating springs for supporting the bed yieldingly during the folding operation, pressing mechanism for exerting a heavy pressure against the bed, and relatively heavy springs interposed between the pressing mechanism and the bed, substantially as described.

2. In a folding-machine, the combination with a die and folding-knives having an inward movement to fold the edges of a blank, of a movable bed, vertically-movable yokes for supporting the bed in operative position during the folding operation, and means having movement independent of the yokes for forcing said bed against the under side of the knives to press the blank after it has been folded, substantially as described.

3. In a folding-machine, the combination with a die and folding-knives, of a bed, a movable support therefor, pressing-levers fulcrumed on said support and means for actuating said pressing-levers to press the folded blank, substantially as described.

4. In a folding-machine, the combination with the folding-knives of a movable bed, a carrier whose top lies below the blank-supporting surface of the bed during the folding operation, means for actuating the carrier to remove the folded blank after the bed has been dropped, substantially as described.

5. In a folding-machine, the combination with the folding-knives, of a bed, means for separating the bed and the folding-knives, means for discharging the blank between the bed and the knives after they have been separated, substantially as described.

6. In a folding-machine, the combination with the folding-knives, of the movable bed having grooves or channels across its supporting-surface, a carrier arranged to lie in the grooves when the bed is raised, means for allowing the bed to drop and means for moving the carrier to remove the folded blank from the bed, substantially as described.

7. In a folding-machine the combination with a bed and folding-knives, of a die movable to and from the bed, and mechanism for causing the folded blank to be removed below the plane of the folding-knives whereby the blank may be removed whatever the vertical position of the die may be, substantially as described.

8. In a folding-machine, the combination with the die and a blank-supporting bed, of the knives and mechanism for moving the knives to fold first the end edges and then the side edges of the blank in succession at one operation of the machine, and on the next operation to fold first the side edges and then the end edges of the next blank to be folded, whereby two interlocking complementary blanks may be folded successively on the same machine, substantially as described.

9. In a folding-machine, the combination of the knife-bar movable toward the blank to be folded, the angle-knives having sliding engagement with said knife-bar, means for moving the knife-bar in and out, and means for moving the knives longitudinally of the knife-bar, substantially as described.

10. In a folding-machine, the combination of the movable knife-bar, the angle-knives having sliding engagement with said knife-bar, means for moving said knife-bar toward and away from the blank to be folded, and means for moving said knives toward and away from each other along the knife-bar, the movements of the bar-actuating mechanism and the knife-actuating mechanism being so coördinated that the one that acts first in folding one blank, acts last in folding the next blank, whereby differently-folded blanks are produced in alternation by the same machine, substantially as described.

11. In a folding-machine, the combination of a knife-bar, folding-knives supported therein, supporting-brackets for said knife-bar and

means for detachably locking said brackets to the frame of the machine, whereby the knife-bars may be readily raised to afford access to the knives, substantially as described.

12. In a folding-machine, the combination of the pivoted brackets, the knife-bar slidingly supported therein, the folding-knives slidingly supported by the knife-bar, and means for locking said brackets securely in place, substantially as described.

13. In a folding-machine, the combination of the sliding knife-bar, the knives slidingly supported thereby, the oscillating arms engaging the knife-bar to move it forward and back, rock-shafts having operative connections with the sliding knives to move them toward and away from each other, means for actuating the said oscillating arms and the rock-shaft, substantially as described.

14. In a folding-machine, the combination of a movable knife bar or carrier, folding-knives supported to slide longitudinally therein, mechanism for actuating said knife-bar and said knives to fold the edges of a blank, said mechanism being provided with adjustments whereby the extent of traverse of the knife-bar and of the knives may be regulated as desired, substantially as described.

15. In a folding-machine, the combination of a knife bar or carrier adjustably mounted on its supports, a series of overlapping blades mounted to slide in said knife-bar, actuating means for moving said knives in unison to fold the side and corners of a blank, and means for actuating said knives in the various positions of adjustment of the knife-bar, substantially as described.

16. In a folding-machine, the combination of a knife bar or carrier adjustably mounted on its supports, a series of knives slidingly supported from said knife-bar, mechanism for actuating said knives in unison to fold the edges of a blank, said mechanism being carried by said knife-bar so as to move therewith as the bar is adjusted, substantially as described.

17. In a folding-machine the combination with a bed or support for the blank to be folded, of a knife-bar extending longitudinally of the bed, folding-knives mounted in said knife-bar so as to have a sliding movement inward at an angle to the knife-bar to infold the subtending portions of the blank, substantially as described.

18. In a folding-machine, the combination with a bed or support for holding the blank to be folded, of a knife-bar supported adjacent to said bed, knives for infolding the corners of the blank supported in said knife-bar so as to have movement in oblique lines over the corners of the blank and means for imparting movement to said corner-knives substantially as described.

19. In a folding-machine, the combination with a bed or support for holding the blank to be folded, of a knife-bar supported adjacent to said bed, a pair of corner-knives mounted to slide at an angle to said knife-bar to infold the corners of the blank and an intermediate knife between said corner-knives arranged to coöperate with said corner-knives to infold the side of the blank substantially as described.

20. In a folding-machine the combination of a blank-support with a plurality of angle-knives each of which subtends portions of two adjacent edges of the blank to be folded, and means for moving each angle-knife by two successive movements in different directions so as to infold successively the two portions of the adjacent subtending edges so that one edge overlaps the other at the corner, substantially as described.

21. In a folding-machine the combination of the laterally-movable knife-bar, a plurality of folding-knives supported by and having sliding movement longitudinally of said knife-bar, said knives being constructed to subtend adjacent portions of different edges of the blank to be folded, substantially as set forth.

22. In a folding-machine the combination of the laterally-movable knife-bar, folding-knives supported to slide longitudinally of said knife-bar, and means for moving the knives independently of the movement of the knife-bar, substantially as described.

23. In a folding-machine the combination of means for holding a blank in position to be folded, infolders arranged to be moved to infold edges of the blank, actuating mechanism therefor, and a rotary cam-shaft, carrying suitable actuating-cams, coördinated with the actuating mechanism to fold and press the edges of the blank at each half-revolution of said cam-shaft, substantially as described.

24. In a folding-machine the combination of a templet, means for actuating the same, a blank-support, infolders and means for actuating said infolders to infold edges of the blank, means for supporting the blank during the folding operation, and a rotary cam-shaft, carrying suitable actuating-cams, coördinated with the templet and folder mechanism to completely fold the edges of a blank at each half-rotation, substantially as described.

25. In a machine for infolding the edges of collar and cuff blanks the combination of a die, infolders, a blank-support, relatively light springs whose tension tends to keep the infolders and the bed together during the infolding of the edges of the blank, pressing mechanism for pressing the folded blank between the bed and the infolders, and relatively heavy springs coöperating with said pressing mechanism, substantially as described.

In witness whereof I have hereunto set my hand this 15th day of February, 1900.

ALBERT D. FENWICK.

In presence of—
GEO. N. GODDARD,
FRANK WAYLAND.