W. W. & W. L. DIXON.

FOLDING MACHINE.

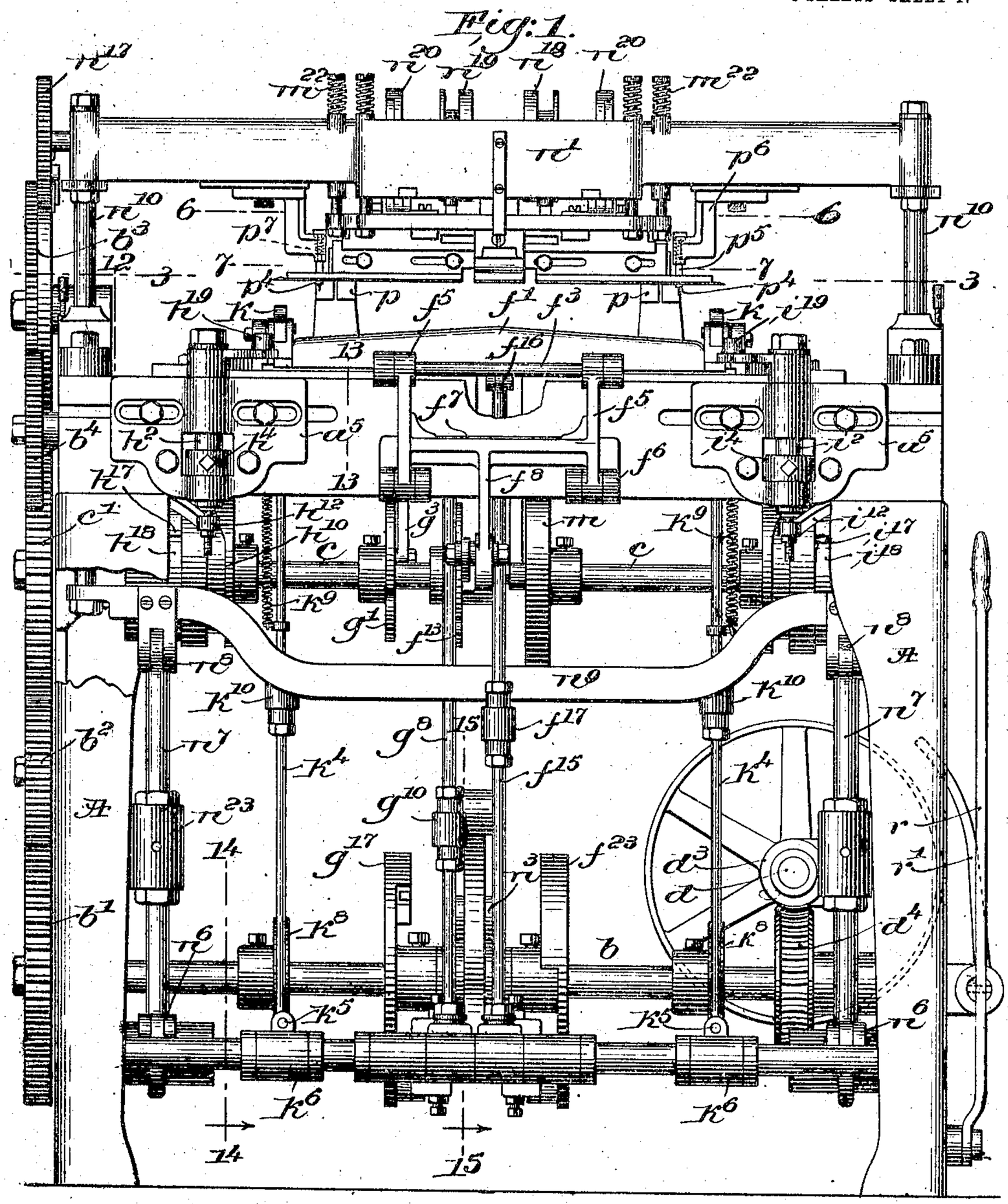
APPLICATION FILED SEPT. 27, 1899.

924,149.

Patented June 8, 1909.

9 SHEETS—SHEET 1.

Fig: 1.



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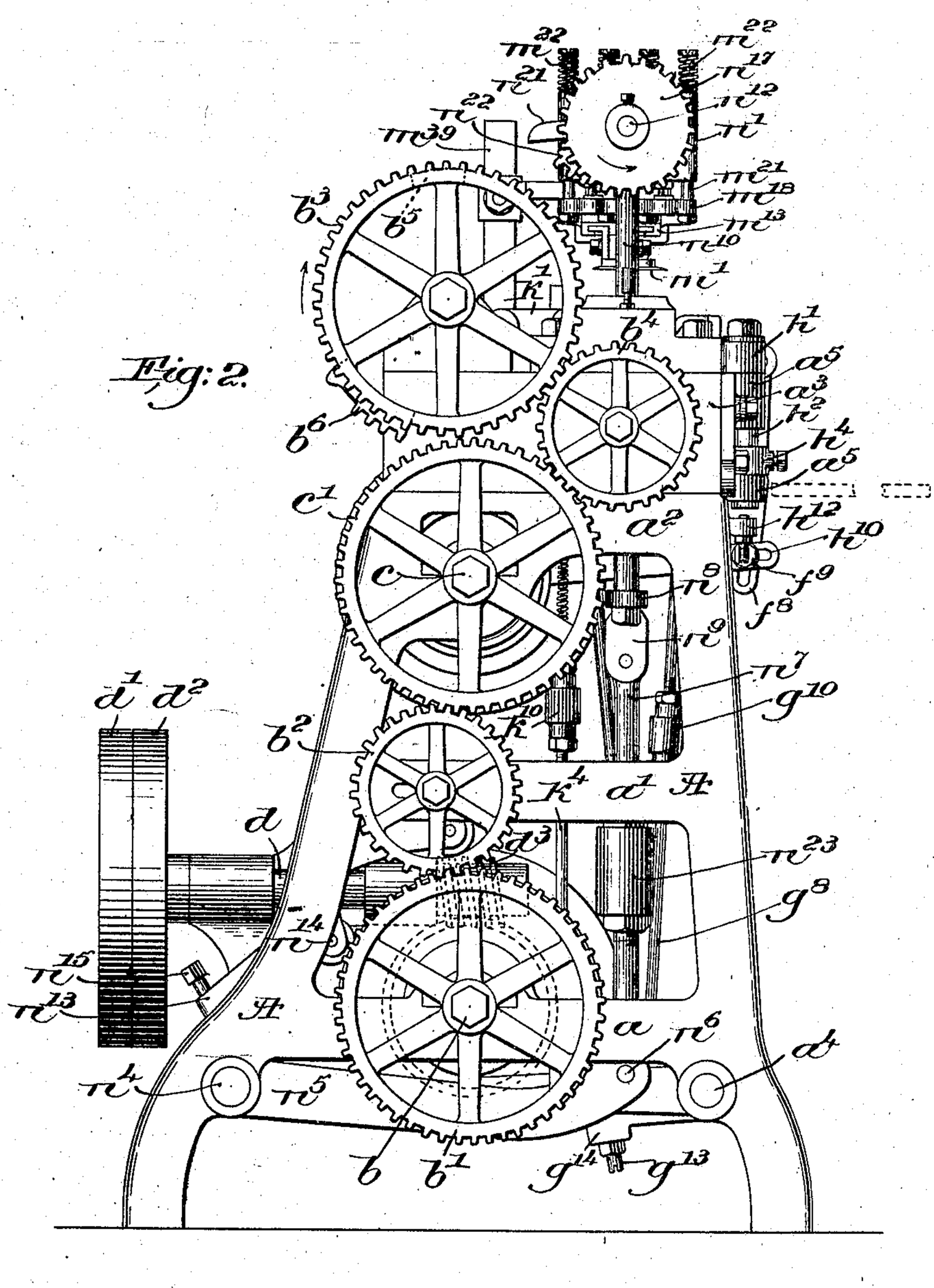
9 SHEETS—SHEET 2.

Fig: 2.



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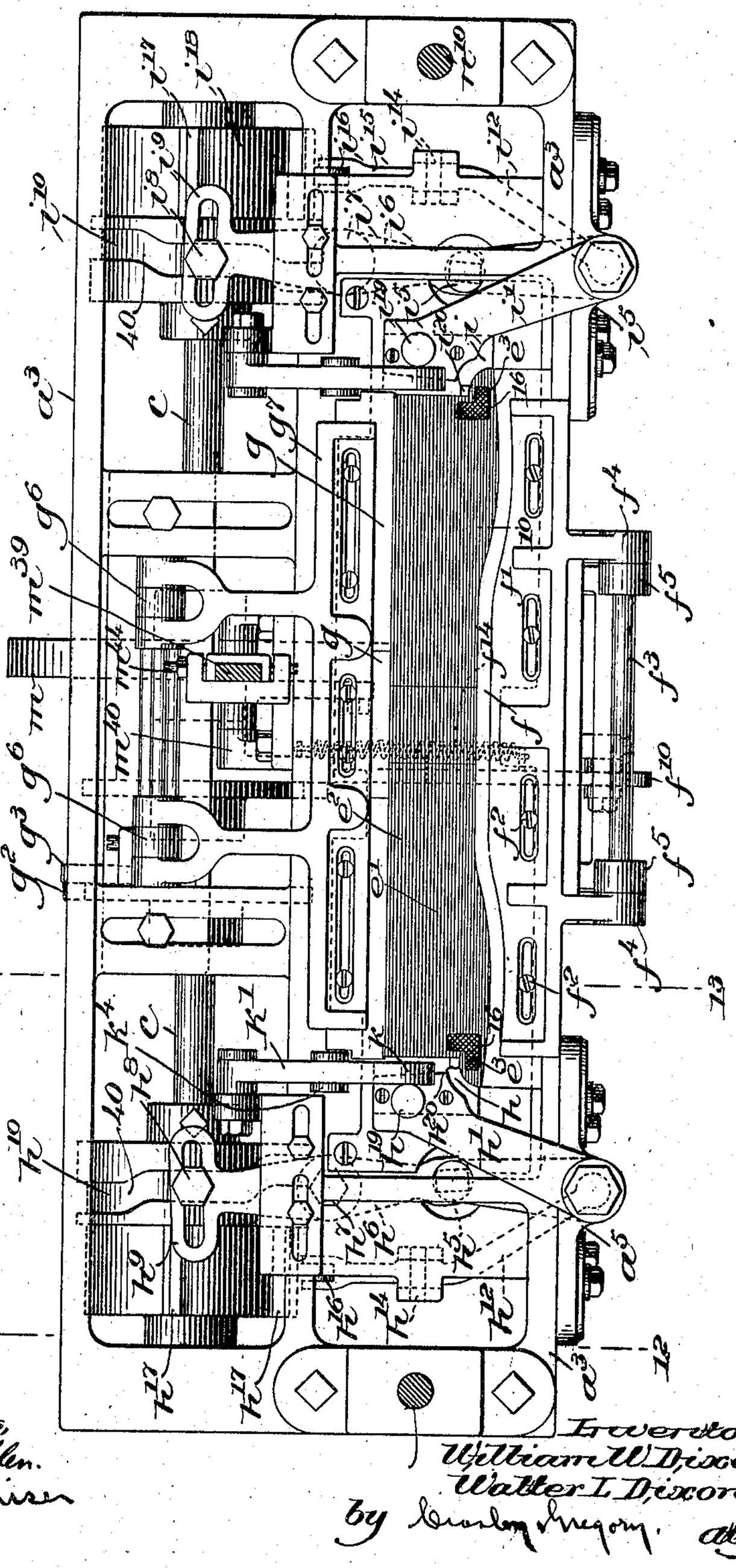
9 SHEETS—SHEET 3.

Fig: 3



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9 SHEETS—SHEET 4.

Fig: 4.

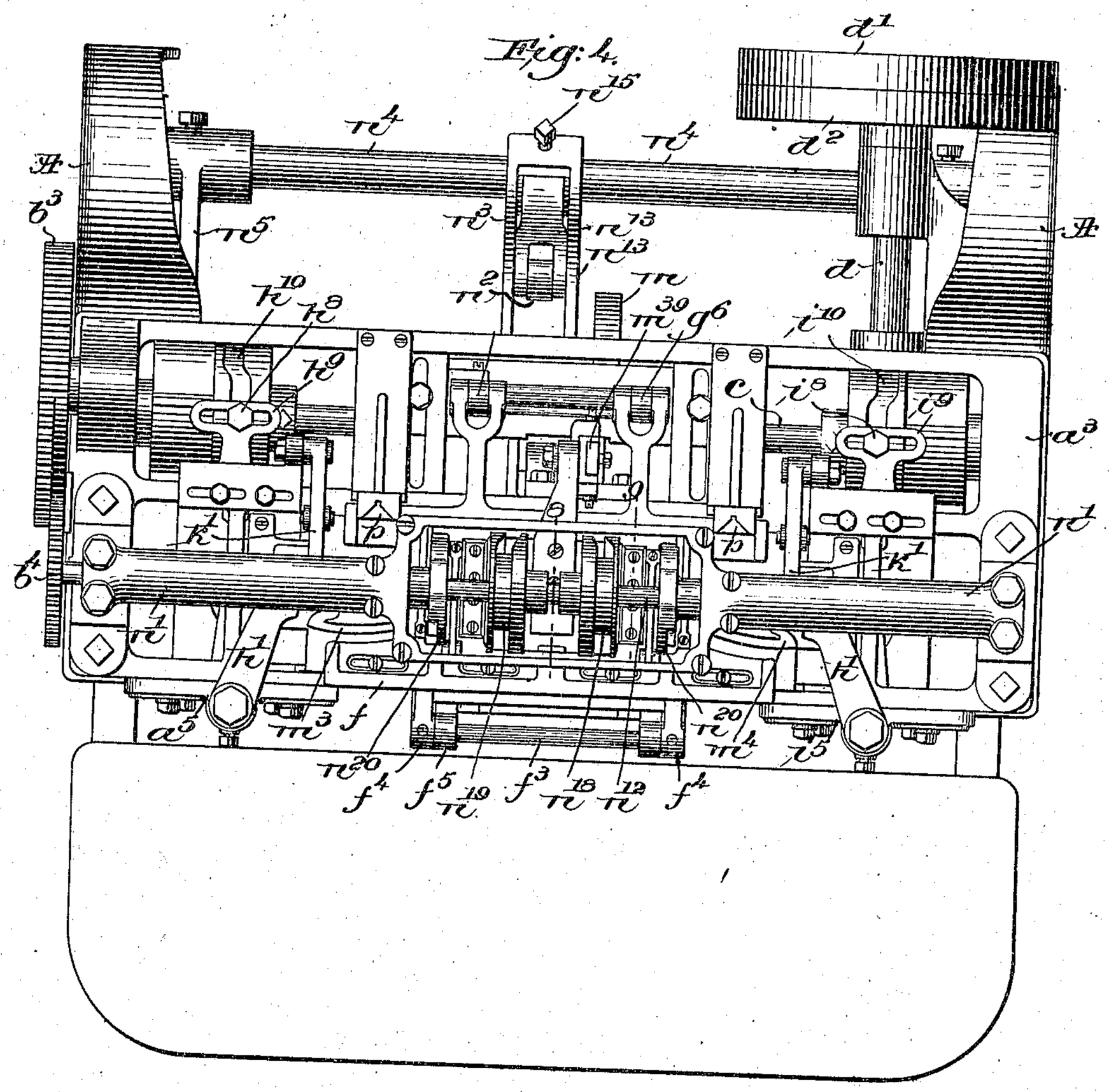
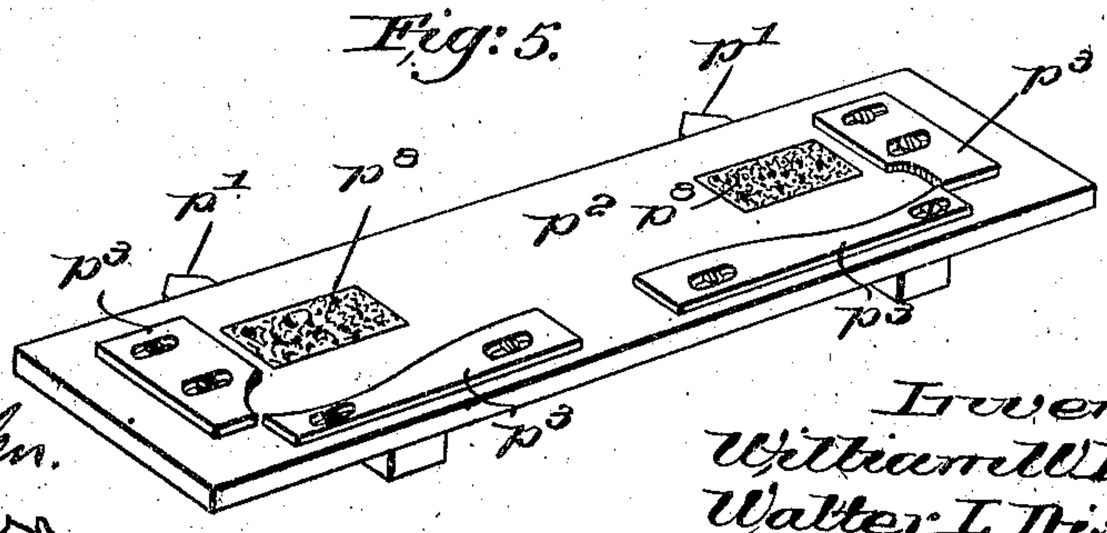


Fig: 5.



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9 SHEETS—SHEET 5.

Fig. 6.

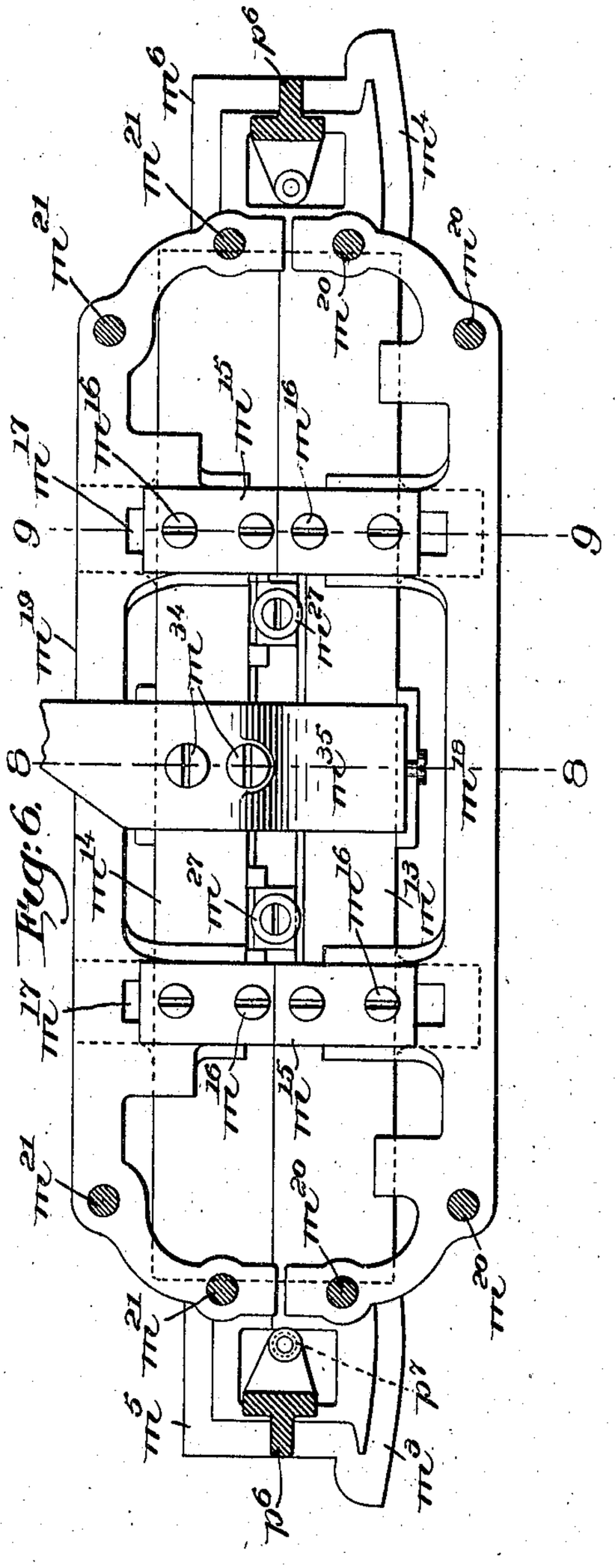
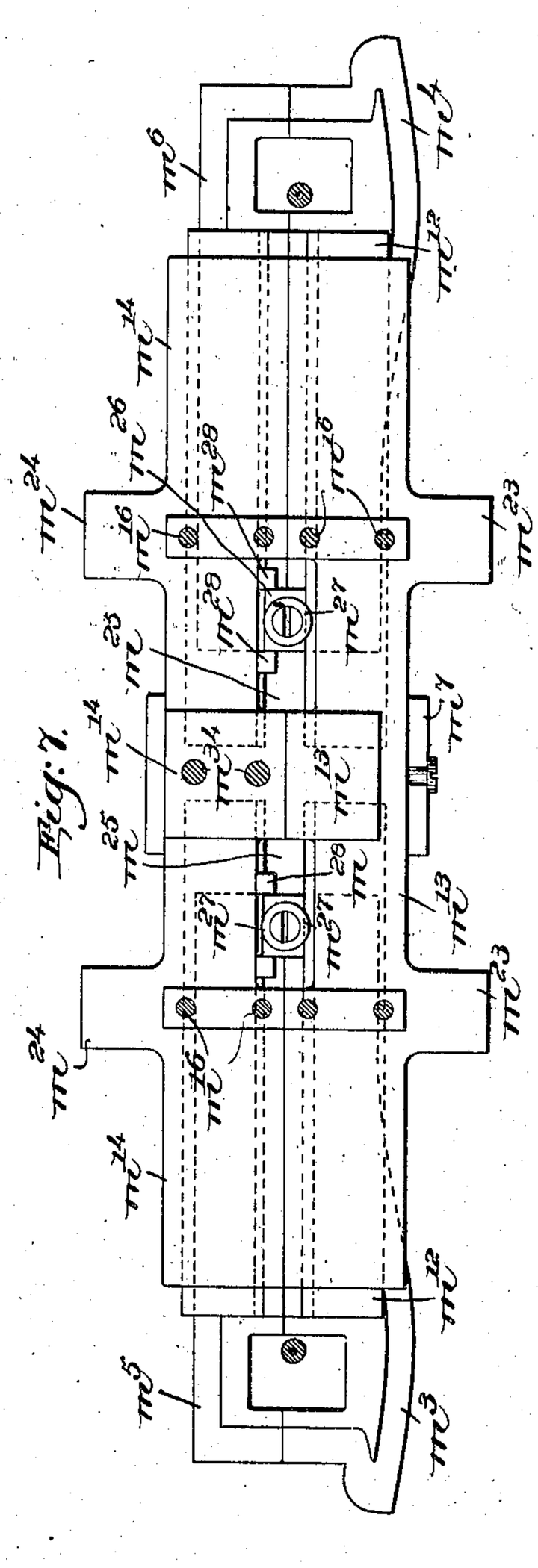


Fig. 7.



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9 SHEETS—SHEET 6.

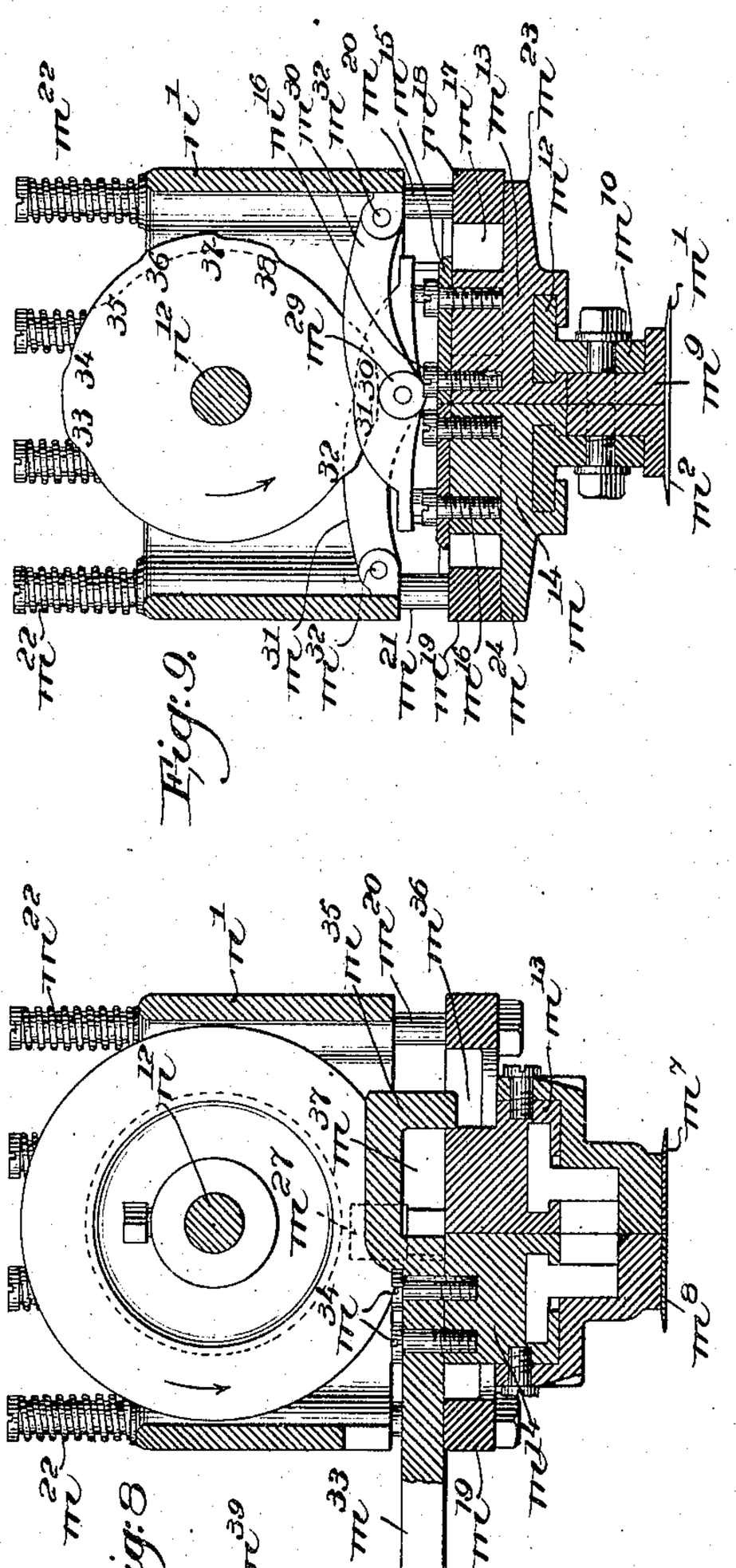

Fig. 9.

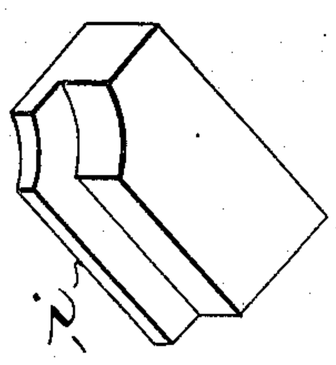

Fig. 11.

Fig. 8

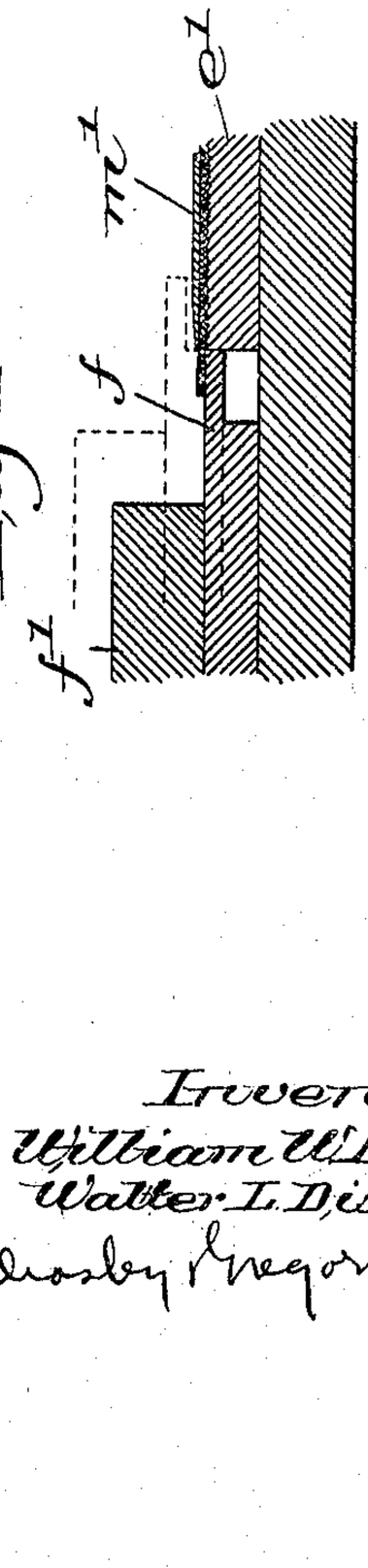

Fig. 10.

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9 SHEETS—SHEET 7.

Fig: 12.

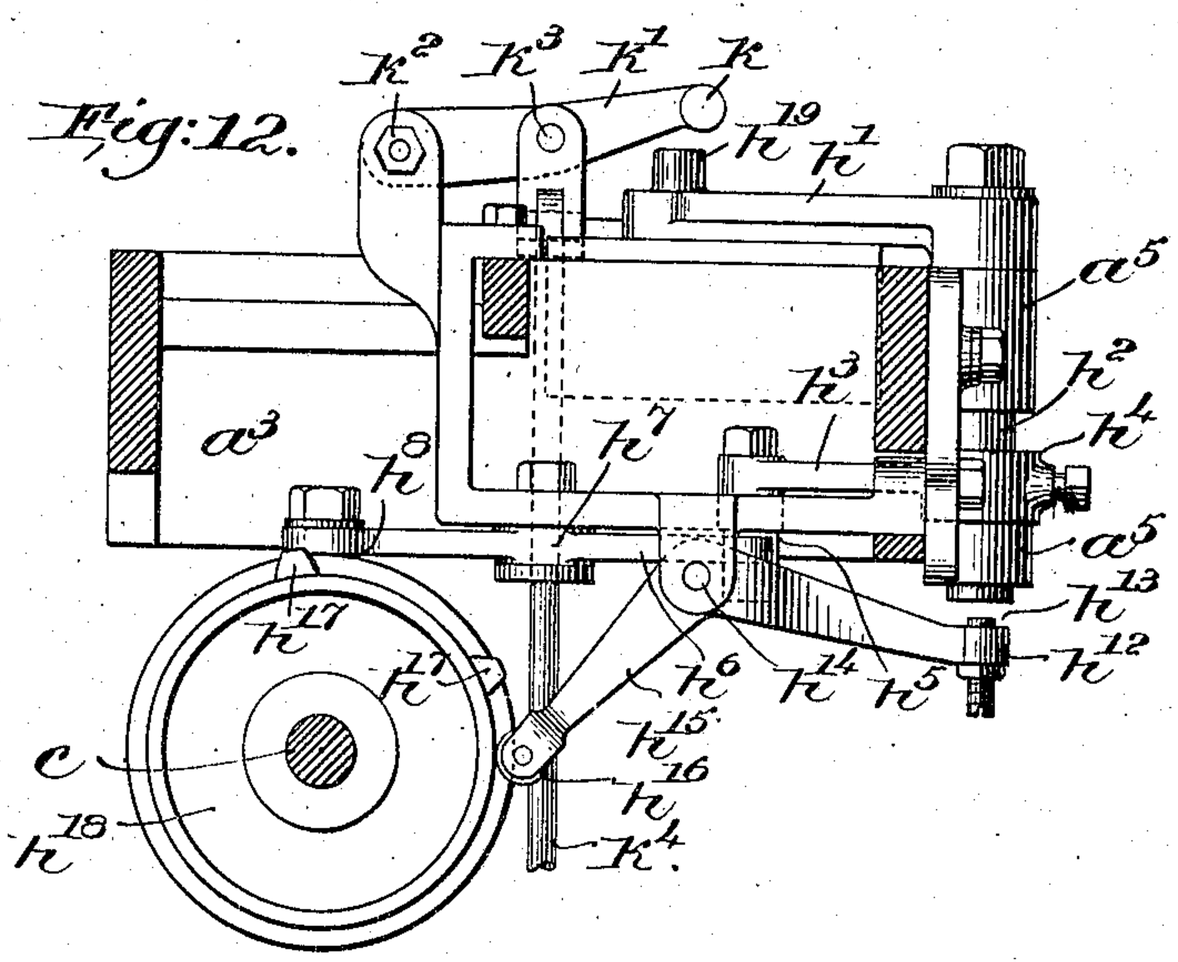
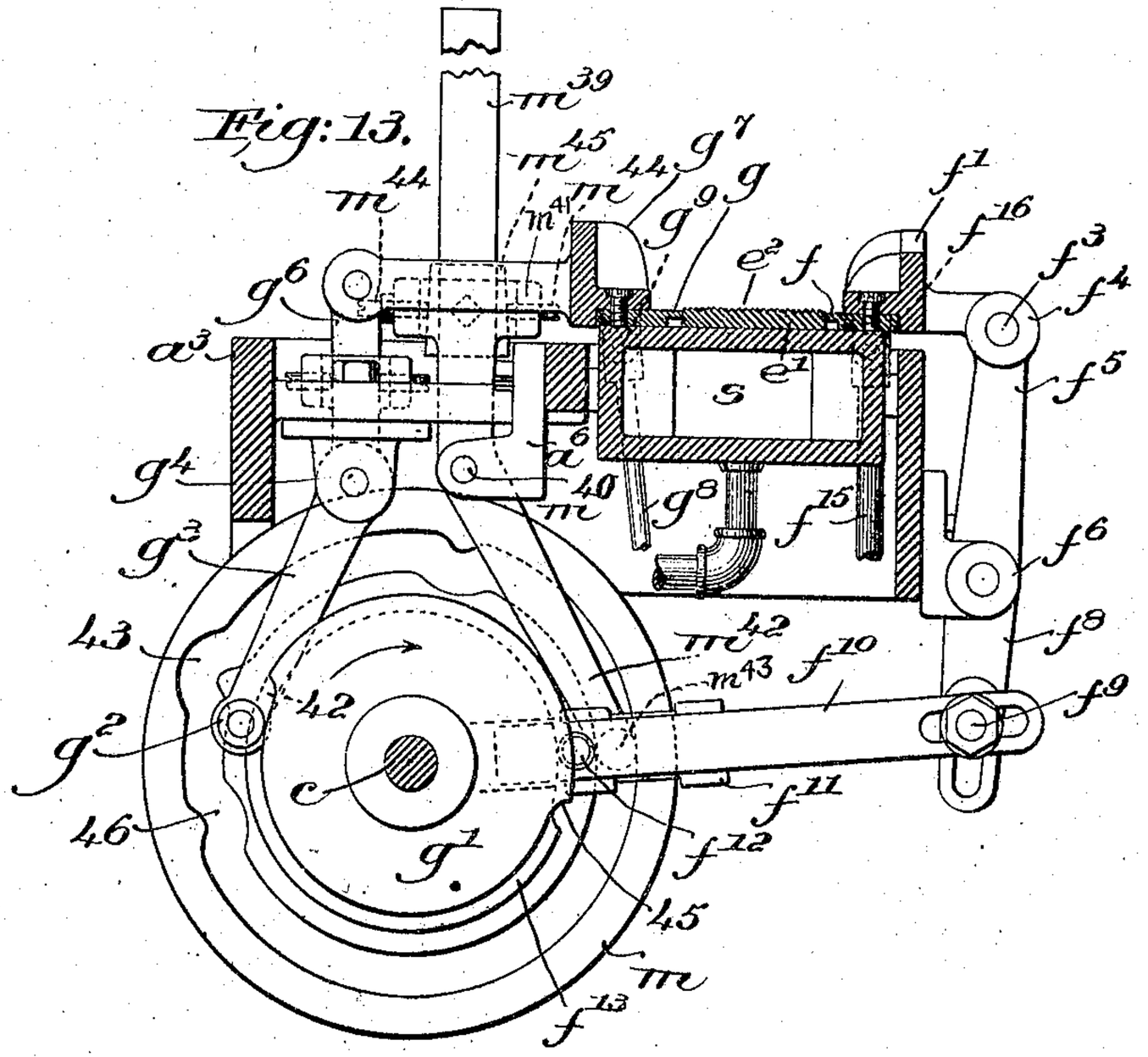


Fig: 13.



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9 SHEETS—SHEET 8.

Fig: 14.

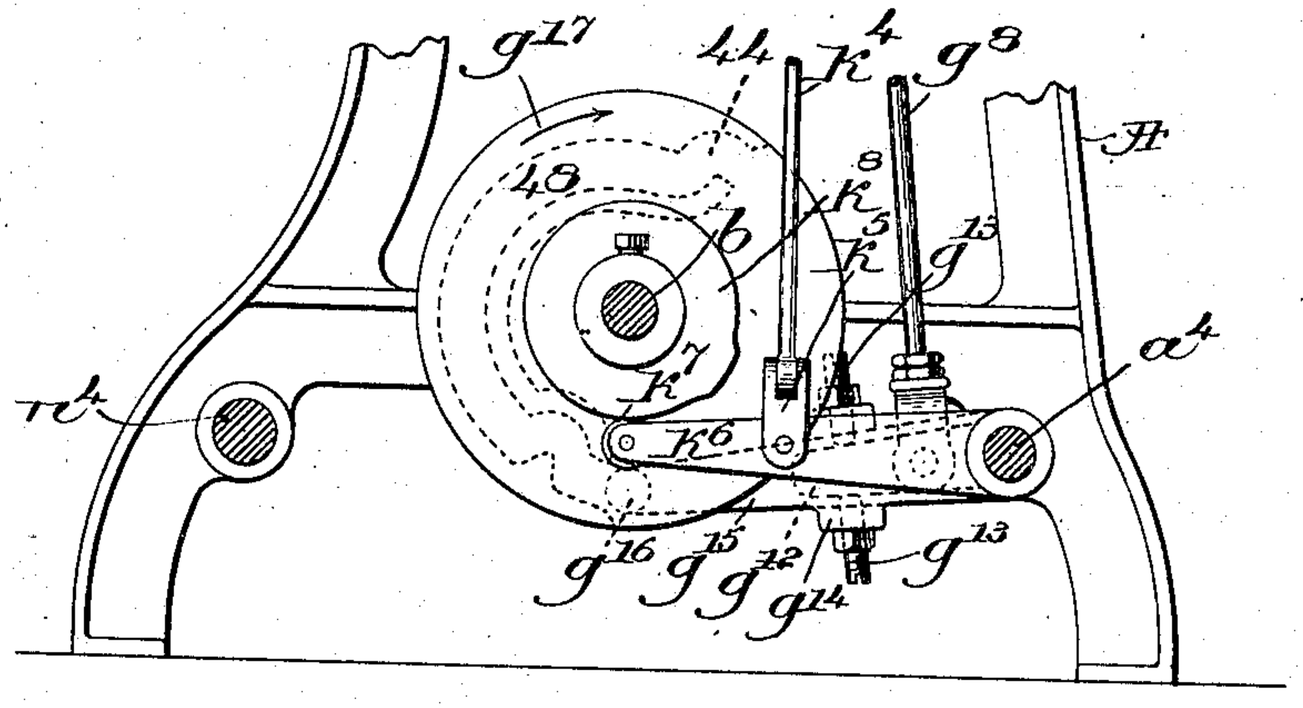
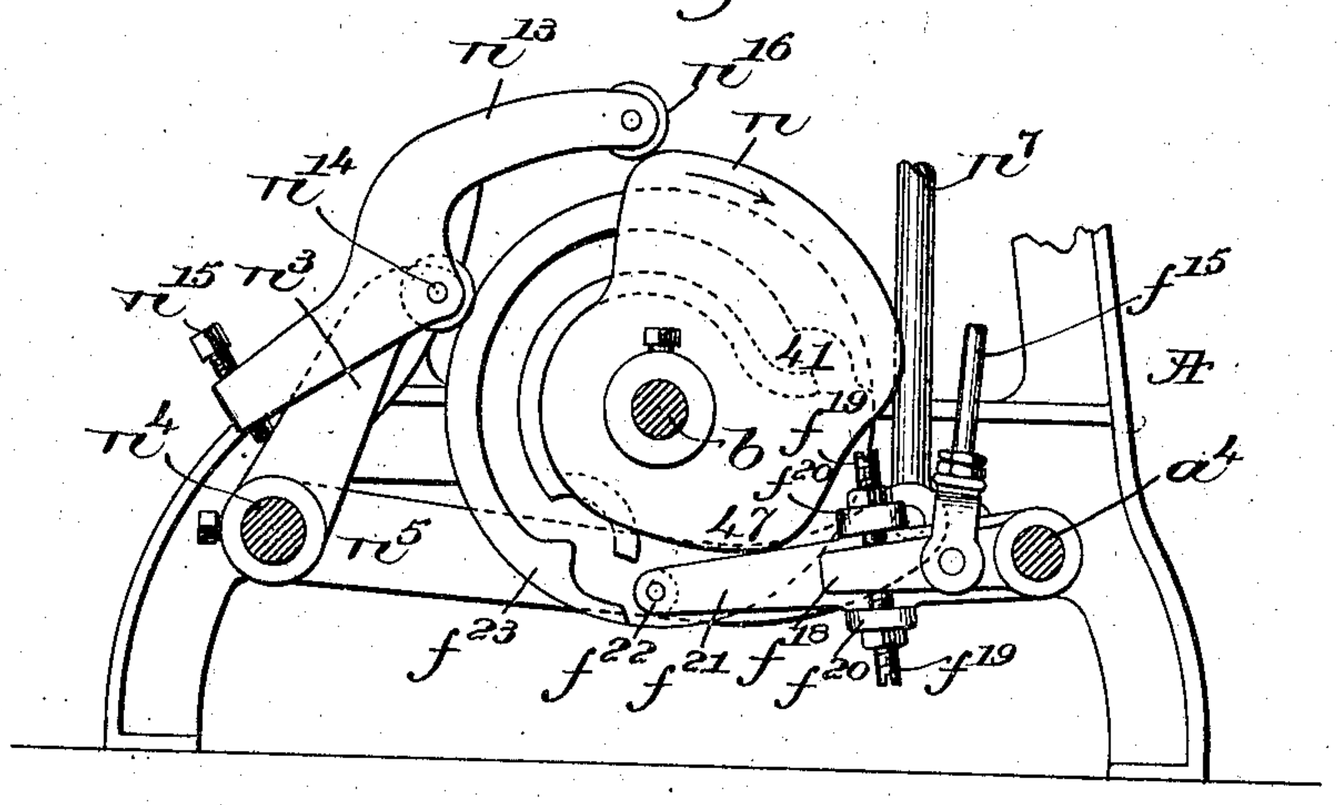


Fig: 15.



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9 SHEETS—SHEET 9.

Fig: 16.

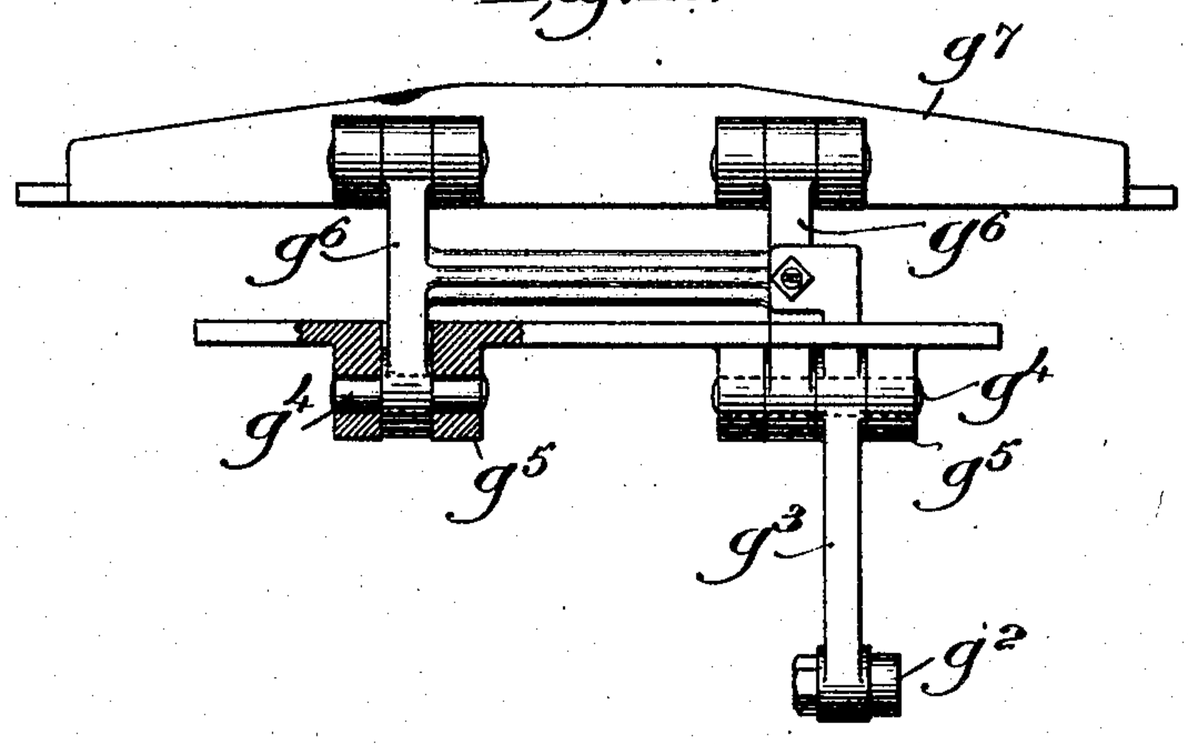


Fig: 17.

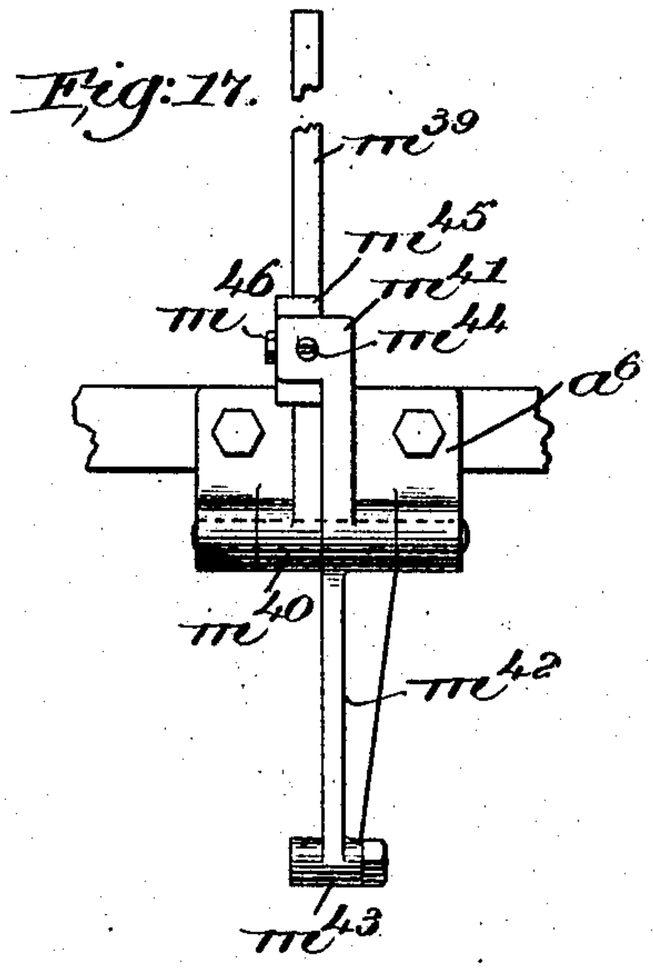
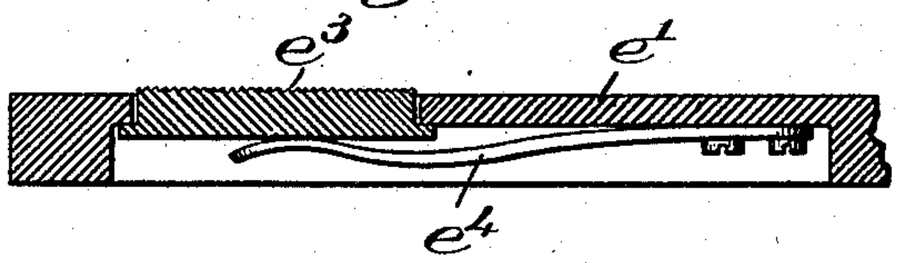


Fig: 18.



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UNITED STATES PATENT OFFICE.

WILLIAM W. DIXON AND WALTER L. DIXON, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO REECE FOLDING MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

FOLDING-MACHINE.

No. 924,149. Specification of Letters Patent. Patented June 8, 1909.

Application filed September 27, 1899. Serial No. 731,831.

To all whom it may concern:

Be it known that we, WILLIAM W. DIXON and WALTER L. DIXON, citizens of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Folding-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The present invention is an improved machine for folding collars, cuffs, and analogous articles. The articles mentioned are made up of a plurality of plies or thicknesses of cloth, including an inner lining material of coarse fabric, and an outer material of fine linen, and they usually require the making of folds at various angles or corners, and on account of the extreme tendency of the cloth to stretch and become distorted, the cloth stretching in different directions or to different degrees according to the position of the corner or angular fold relatively to the direction of the threads composing the cloth, have rendered all the machines thus far invented, so far as we are aware, more or less faulty, and furthermore, in folding collars and cuffs particularly, it is necessary that the folds should be permanently creased so that when the parts are subsequently stitched together, there will be no liability of the fold changing its proper position in the slightest, it being understood that any such change or imperfection of folding renders the article unsalable.

Our present invention aims to provide a machine which will cure the above mentioned defects and which will lay over and crease the separate folds as they are made, and iron them down, as it were, so that they will permanently and accurately retain their folded position; a further object of our invention being to simplify the moving parts and operative mechanism of the machine, and arrange the various parts in such relative positions as to secure the requisite strength for rapid operation under all conditions. The actual construction as shown in the drawings also contains many improvements in various features of the machine, as will hereinafter appear in detail, which are either for increased speed, efficiency and accuracy or for the performance of special functions; and such improvements as well as the main subjects hereof will be claimed in the claims appended hereto.

The various constructional details and the operation and advantages thereof will be more fully pointed out in the following description, reference being had to the accompanying drawings illustrative of one embodiment of our invention, and the latter will be more particularly defined as a whole and in its details in the appended claims.

In the drawings, Figure 1 is a front elevation of the entire machine, parts being broken away for clearness of illustration. Fig. 2 is a left hand elevation thereof. Fig. 3 is a horizontal section taken on the line 3—3, Fig. 1, parts being omitted. Fig. 4 is a top plan view of the machine. Fig. 5 is a perspective detail showing the feeding device for placing or positioning the blanks in the machine. Fig. 6 is an enlarged horizontal section showing the die or former and the carrying frame therefor, taken on the line 6—6, Fig. 1. Fig. 7 is a similar section taken on the line 7—7, Fig. 1. Figs. 8 and 9 are transverse vertical sections through the former and its operating mechanism, taken respectively on the lines 8 and 9 looking toward the right, Figs. 4 and 6. Fig. 10, partial section on the line 10, Fig. 3; Fig. 11, perspective detail of one of the folding knives *i*; Figs. 12 and 13 are vertical transverse sections showing the blade operating cams, taken respectively on the lines 12 and 13, Figs. 1 and 3, looking toward the right. Figs. 14 and 15 are similar views showing the lifting pressure cams, taken respectively on the lines 14 and 15, Fig. 1. Fig. 16 is a rear elevation, partly in section, of the back folding blade and its operating levers. Fig. 17 shows in rear elevation a detail of the die operating mechanism. Fig. 18 is a vertical section taken longitudinally through the tab end of the raised pad.

Our machine in general comprises a frame A having cross ribs *a*, *a'*, *a²*, *a³*, at its ends, carrying central operating shafts *b*, *c*, power being communicated to the machine by a transverse shaft *d* carrying at one end fast and loose pulleys *d'*, *d²*, and at its opposite end a worm *d³* meshing with a worm wheel *d⁴* (Figs. 1 and 2) mounted on the shaft *b*.

This machine is of the type in which blanks are fed into the machine and held in place by a former or die, while folding blades engage the projecting edges of the blanks and lay them over in the required folds, the die being carried by a cross head and operated by

mechanism, herein shown as cams, journaled in the cross head, the cross head moving up and down in guides in the frame of the machine, and the folding blades being supported on the bed or top of the frame.

Referring to Figs. 3 and 4, it will be seen that the bed e of the machine has a central raised pad or receiving portion e' conforming in peripheral shape to the article to be folded, herein illustrated as a standing collar, said raised portion standing above the bed so that the front folding blade f and back folding blade g, and the end folding blades h, i, can be depressed as shown in Figs. 1, 3, and 10, with their upper surfaces extending flush with the top surface of the raised portion e'. The front folding blade f, and its holder f' to which it is secured by screw bolts f^2, is pivotally mounted on a rod f^3 passing through ears f^4 of the holder f', and the free ends of the arms f^5 are pivotally supported at their lower ends in ears f^6 projecting from the frame of the machine. The arms f^5 are connected integrally by a cross bar f^7 having a depending arm f^8 connected adjustably at f^9 to a throw link f^{10} sliding in a guide f^{11} mounted on the shaft c, as clearly shown in Fig. 11, and the throw link f^{10} having at its inner end a roll f^{12} operated by a cam f^{13} fast on the shaft c, and being maintained in contact with said cam by the spring f^{14}, see Fig. 3. Fig. 13 shows the cam f^{13} between a cam g' for operating the rear edge folding blade and the cam m for shifting the die or former, as will presently be explained. The cam g' acts upon a roll g^2 on the free end of a lever g^3 pivoted at g^4 in ears g^5 of the frame of the machine, see Fig. 16, said lever g^3 being connected to arms g^6 mounted at their lower ends in the ears g^5 and at their upper ends in a holder g^7 carrying the back folding blade g, these parts and the operation thereof being the same as already explained in connection with the front folding blade, the mechanism described serving to move said blades out and in simply. The up and down movement of the blades is communicated by means of rods f^{15} and g^8 pivotally connected adjacent the front edges and under sides of the folding blades, as shown in dotted lines in Fig. 13 at f^{16} and g^9 respectively, (see also Fig. 1), said rods being made in two parts connected by turn buckles f^{17} and g^{10}, for the purpose of regulating the degree of pressure of the folding blades in creasing the cloth as will presently be described, and at their lower ends, see Figs. 14 and 15, they are pivoted in arms f^{18}, g^{12}, loose on a shaft a^4 in the front of the frame. The free ends of said arms are between opposite pairs of bearing studs f^{19}, g^{13}, adjustably carried in ears f^{20}, g^{14} projecting from levers f^{21}, g^{15}, also freely pivoted on the shaft a^4, the opposite ends of said levers being provided with rolls f^{22}, g^{16}, traveling in path cams in the faces of similar cams f^{23}, g^{17}, fast on the driving shaft b. The various cams mentioned thus far are so timed that they move the folding blades up so as to deflect the free edges of the blank held by the former, and then inwardly so as to lay said free edges over on the former loosely, and then after the former has been withdrawn the blades are brought down with great force upon the fold just made, so as to crease it. The same operation is performed by the end folding blades, but by a different mechanism.

Referring to Figs. 1, 3 and 12, it will be seen that the end folding blade h is carried by an arm h' fast on a vertical bolt or shaft h^2 journaled in a bracket a^5 adjustable on the frame of the machine, said bolt between said bearings having a lever h^3 fast thereon at h^4, the free end of the lever being pivotally connected at h^5 to a lever h^6 pivoted at h^7 to the frame of the machine, and having a roll h^8 adjustably mounted in its slotted end h^9, said roll running in a path cam h^{10} fast on the shaft c; this mechanism it will be observed serves to move the end blade in an arc having the pivot h^2 for its center, this arc approximately bisecting the reëntrant angle at the collar tab, as will be evident viewing Fig. 3, this particular swinging movement having been found to accomplish the folding of the collar at this difficult point much more smoothly and uniformly than previous movements. As herein shown the up and down movement of the end blades is accomplished by means of a lever h^{12} having an adjustable stud h^{13} in its free end and pivoted intermediately at h^{14}, the rear end h^{15} thereof carrying a stud and roll h^{16} engaged by spurs h^{17} of a cam h^{18} also fast on the shaft c adjacent the cam h^{10} already mentioned. The mechanism for operating the opposite end blades i is precisely the same as that already described for the end blade h, the various parts being correspondingly lettered.

In order to get the intermitting pressure on the end folding blades, as already described in connection with the side folding blades, we provide above said blades bearing blocks h^{10}, i^{10}, which are engaged at the proper times by the free ends k of strong levers k' mounted at k^2 in the brackets on the bed of the machine and pivotally connected at k^3 to rods k^4 connected at k^5, see Fig. 14, with levers k^6 loose on the rod or shaft a^4, and having at their opposite ends rolls k^7 engaging cams k^8 which at the proper time serve to bring a severe pressure upon the end blades, the rolls k^7 being normally held up against their cams by springs k^9 secured at one end to the frame of the machine and at their other ends to the rods k^4.

The operating shaft b is provided with a special cam n for raising the cross head n', said cam receiving a roll n^2 mounted in the free end of a lever n^3 fast on a shaft n^4 journaled in the frame of the machine and carry-

ing adjacent its ends arms n^5, having pivoted in their opposite ends n^6 lifting rods n^7 pivoted at n^8 in a yoke n^9 which supports at its ends guide rods n^{10} on the upper ends of which is mounted the cross head n'. The cross head n' has journaled in it a shaft n^{12} and cams which give all the longitudinal and up and down movements of the former relatively to the cross head. In order to give smooth movements and economize power we have provided a special compound lever, shown in Fig. 15, consisting of the main lever n^3, and an auxiliary lever n^{13} pivoted at n^{14} on the lever n^3 and adjustable relatively thereto by a screw bolt n^{15}, said auxiliary lever carrying a roll n^{16} engaging the peculiarly shaped cam n, which turns in the direction of the arrow, the operation of this compound lever being that all the lifting movements of the cam are accomplished by the short lever n^3, while the lowering movements thereof are effected by the longer lever n^{13}, n^3. The shaft n^{12} carries at one end a gear n^{17}, and this gear and all the other horizontal shafts before mentioned are operated from the shaft b by means of gears, shown in Fig. 2, b' designating a gearing on the end of the shaft b, meshing with an idler b^2 which serves to drive the gear c' which in turn drives a gear b^3 through an intermediate idler b^4, the gear b^3 meshing with the gear n^{17}.

The former or die, as herein shown, comprises two parts m', m^2, divided from each other longitudinally, as clearly shown in Figs. 6–9, each part being composed, as herein shown, of two end pieces m^3, m^4, and m^5, m^6 respectively, and intermediate pieces m^7, m^8, the parts m^7 m^8 being removably secured in fixed position at the middle of the die, and the other parts thereof being shown in the drawings as contracted. The parts m^3—m^6 and also the parts m^4 m^5 are carried in supports m^9 adjustably mounted in hangers m^{10}, whose several flanged upper ends m^{12}, slide in ways provided in opposite bridge pieces m^{13}, m^{14}, see Fig. 9. The front part m' (composed of the pieces m^3, m^4) slides in the front bridge piece m^{13}, and the rear part m^2 (the pieces m^5, m^6) slides in the rear bridge piece m^{14}. The bridge pieces are carried by riders or flanged heads m^{15} secured thereto by screws m^{16} and sliding transversely of the cross head in slots m^{17} in opposite frames m^{18}, m^{19}, each suspended at its opposite ends by a pair of bolts or spindles m^{20}, m^{21}, held normally raised by springs m^{22}, compressed between the flanged heads of the spindles and the top of the cross head. The bridge pieces m^{13}, m^{14} have projections m^{23}, m^{24}, to bear against the underside of the frames m^{18}, m^{19}, for transverse reciprocation in the slots m^{17}, and are cut away at their inner edges to provide openings m^{25} in which are blocks m^{26} having rolls m^{27} at their upper ends, said blocks being secured respectively to the front hangers m^{10} and being movable vertically with said hangers in ways m^{28}, secured respectively to the rear hangers m^{16}, this provision being for the purpose of causing said two hangers and the parts m', m^2 of the former to move together longitudinally when actuated by the rolls m^{27} and yet be capable of moving vertically independently of each other for a purpose presently to be described. The rolls m^{27} are operated by path cams n^{18}, n^{19}, fast on the shaft n^{12}, Fig. 4, which serve to effect all the longitudinal movements of the die or former. The vertical movements of the die or former in the cross head are effected by similarly shaped cams n^{20}, each of which is provided with slightly different cam surfaces at its peripheral edges, see Fig. 9, engaged respectively by rolls m^{29} carried intermediate the length of opposite independent levers m^{30}, m^{31}, pivoted at m^{32} to the cross head n', and resting at their free ends in sliding engagement respectively with the bridge pieces m^{14}, m^{13}, so that as the cam n^{20} rotates in the direction of the arrow, Fig. 9, the two parts m', m^2 of the former are held depressed by the projection 30 of the cam, and then they are both slightly raised as the point 31 of the cam n^{20} engages the rolls m^{29}, and again further raised at the point 32 thereof, and again both depressed by the projection 33, and slightly raised at 34. The front part m' of the former is next raised free of the cloth by the depressions 35 of the cams n^{20}, shown in dotted lines in Fig. 9, the rear part m^2 of the former not being effective at this time, but being depressed by the projection 36, and subsequently relieved of pressure at 37 and raised at 38, during which movements the front part m' of the former has been entirely out of contact with the cloth being folded. These movements cooperate with the other movements of the die or former, as will presently be explained, to effect an extremely accurate and rapid folding of the blanks.

The forward and back movements of the die or former are effected by an arm m^{33} fastened by screws m^{34} to the rear hanger m^{14} and having an overhanging or hook part m^{35} depending sufficiently to engage the front hanger m^{13} when both parts are flush with each other, as shown in Fig. 8, the front face of the front hanger m^{13} being cut away as indicated at m^{36}, and the arm m^{33} having a recess m^{37} to permit the front hanger m^{13} to move vertically independently of the rear hanger m^{14}, as previously explained. The arm m^{33} carries at its rear end a slide m^{38} in which reciprocates a bar m^{39} pivoted at m^{40}, see Figs. 8, 13 and 17, to a bracket a^6 on the frame of the machine, and adjustably mounted in a holder m^{41} also pivoted at m^{40}, said holder having a depending arm m^{42} carrying at its lower free end a roll m^{43} engaging the path cam m before referred to,

which moves the die forward and back as required. The bar m^{39} is adjustably mounted in the holder m^{41} by means of opposite screw bearing studs m^{44} which bear against a wedge-shaped block m^{45}, see Figs. 13 and 17, adjustably secured by a bolt m^{46} to the bar m^{39}, so that it will be evident that by adjusting the bearing studs or the wedge block, or either of them, the bar m^{39} may be given any degree of lost motion required for folding different thicknesses or numbers of plies of cloth. This provision is for the same purpose as the bearing studs f^{19} previously referred to, which enable us to get lost motion in the movement of the depressing rods f^{15} and levers f^{21}, this provision for lost motion in the vertical movements of the folding blades being provided to accommodate the machine accurately for folding different thicknesses of blanks. For example, referring to Fig. 15, it will be seen that the required pressure may be brought to bear on the cloth by the top stud f^{19}, but if there should be only one thickness of cloth, it would be unnecessary that the blade should rise as high as it should for, say, four thicknesses of cloth, and hence, inasmuch as the cam throws the lever f^{21} invariably the same distance, the desired degree in the throw or extent of rising movement of the blade is accomplished by lowering the bottom stud f^{19}. So, also, referring to Fig. 13, if one thickness of cloth is to be folded, it is desirable that the peripheral edge of the folded blank should be identical with the edge of a folded blank composed of, say, four plies of cloth, but to produce this result it is obvious that the die must move forward a little farther for the single-ply blank than it does for the four-ply blank, and hence the wedge m^{45} must be moved up or the studs m^{44} tightened, so as to decrease the lost motion of the bar m^{39}. This feature of our invention is of considerable practical importance when it is borne in mind that first-class work requires absolute precision and uniformity in the blanks.

For the proper operation of the die we make the gear wheels b^3 and n^{17} of special construction, so that the die will always begin its motions at precisely the same point, and when it is in final raised position, it will be left lowered relatively to the cross head and in exact vertical alinement over the collar blank, ready to be brought down directly thereupon in the further movements of the machine, without any further operation thereof.

The gear b^3 has a block b^5 which engages a projection n^{21} on the gear n^{17}, thereby starting the latter uniformly so that always the same feed of the gears b^3, n^{17} mesh with each other. On the opposite side of the gear b^3 is a raised toothed sector b^6 which engages an eccentric sector n^{22} of the pinion n^{17}, thereby rotating the latter after the cross head has begun to rise, and thus enabling the die or former to be lowered relatively to the cross head in position to rest upon the next blank when fed into the machine.

The feeding mechanism is shown best in Figs. 1, 4 and 5, where it will be seen that we provide at the rear of the back folding blade two V-shaped guides p which receive guiding lugs p' (Fig. 5) of a feeding plate p^2 on which the collar is placed (by hand or machine) to fit pattern blocks or ledges p^3 conforming to the shape and size of the particular blanks being folded. The blank having been placed on the feeding plate p^2, the latter is pressed against the guides p and raised toward the die, to be received and held by the retaining devices, shown herein as pins p^4 (Fig. 1) in the lower ends of plungers p^5 mounted in brackets p^6 depending from the cross head, said plungers p^5 being held yieldingly downward normally beneath the lower surface of the die or former by springs p^7, the feeding plate p^2 preferably containing areas of yielding material, such as cork blocks p^8 capable of receiving the repeated pin pricks of the pins p^4. We have found this apparatus the most desirable and satisfactory means for feeding blanks into a machine of this character, inasmuch as it enables the operator to have the fabric more or less under his direct control.

The spring depressed plungers p^5 act as holders to maintain the blank from shifting with the die when the latter is shifted. In order to prevent the blanks from shifting on the receiving pad e', we prefer to score or corrugate the receiving surface of the latter, as indicated at e^2, Figs. 3 and 11, where the folds are made. This shifting of the cloth on the receiving pad or bed of the machine has proved to be a very serious obstacle to the proper working of this kind of machines, and the tendency of the fabric to shift or become distorted has been particularly obstinate at the tab portion of collar blanks, and accordingly we provide, in addition to the scoring just mentioned, yielding gripping blocks e^3 shown in detail in Fig. 18, where it will be seen that the block projects normally above the receiving surface of the pad, said block fitting in a recess in said pad and being yieldingly supported by a spring e^4. This particular construction is of special advantage for the reason that it enables the gripping block to adjust itself to the special thicknesses which may exist at different parts of the tab, for example, as shown in Fig. 3 the gripping block extends at its back side to that portion of the collar which comprises all the thicknesses or plies of the blank, while the forward end part of the block is beneath that portion of the blank in which the lining plies are usually cut out for convenience of making the button holes.

We do not claim broadly the provision of a

yielding gripping device, but so far as we are aware nothing of this kind has ever been located at the reëntrant angle of the tab, and we have found that by providing this device at this particular point the shifting of the cloth not only at that point but at the adjacent parts of the end of the collar is prevented, and to this end also we provide a lump or raised portion h^{20}, i^{20}, on the adjacent end blades h, i, which partly stretches and lifts up the cloth at that point as the die descends on the blank, and coöperates with the gripping blocks e^3 to prevent the cloth tearing and shifting at this point.

We have already alluded to the provision of turn buckles, and in addition to those mentioned it will be observed that we provide turn buckles k^{10} in the rods k^4 and n^{23} in the rods n^7, the former of these serving to regulate the creasing pressure on the end blades and the latter the pressure of the holding die or former upon the blanks, it being understood that the extent of movement for bringing these pressures must be varied with extreme nicety to correspond to the requirements of different fabric and different thicknesses or numbers of plies of the blanks.

We have omitted herein to describe various details not forming part of our invention, as for instance the shifting mechanism at r, r', Fig. 1, and the heating chamber s and steam pipe s', Fig. 13.

We have already described many of the movements of our machine, and therefore deem it necessary at this point to describe only the folding movements as they take place in folding a blank.

It being supposed that the operator has placed a blank in proper position on the feeding plate p^2, and has placed the pointed guide lugs p' in the guides p of the machine, and raised the blades so as to leave the blank suspended from the pins p^4, the parts of the machine being in the position shown in Fig. 1, the cam n then continues to rotate in the direction of the arrow, until the roll n^{16} is permitted to descend along the incline of the cam, thereby lowering the cross head n' so as to bring the die into pressing engagement on the blank which is then between the die and the receiving pad of the bed of the machine. The blank rests flat out on the top of the receiving pad e', and on top of the edges of the blades f, g, h, i, excepting for the little portions of the blank which are slightly raised by the projecting corners h^{20}, i^{20}. When the die comes down the scored surface of the receiving pad and the yielding blocks e^3 grip the blank tenaciously at the edges and those points where there is the greatest tendency to shift. The first folding movement according to the present arrangement is accomplished by the end blades which are simultaneously lifted by the lever h^{12} actuated by a cam projection h^{17}, and swung inwardly by the deflection 40 of the cams h^{10}, i^{10}, but other orders of folding or sequence of moving the blades may be employed. Thereupon the cams n^{18}, n^{19}, in the cross head move toward the center the end parts of the die or former sufficiently to get them out from under the end blades and straight end folds, the die being first slightly raised by the depression 31 of the cam n^{20}; then also the cam m through the arm m^{33} moves the die forward sufficiently to get it from under the curved tab end folds and that portion of the end blades. Then pressure is brought to bear upon the end blades by means of the lever k' actuated by the projection of the cam k^8, Figs. 12 and 14. During this end pressing the die is moved bodily upward by its springs m^{22} and the depression 32 of the cam n^{20}, and having been lifted sufficiently to clear the end folding blades, it is brought back into position directly over the collar blank on the receiving pad by the combined action of the cam m and the cams n^{18}, n^{19}. The pressure on the end blades is then relieved and the end blades are swung back by their cams h^{10}, i^{10}, free of the folded blank and of the receiving pad, and the die descends and the projections 33 of the cams n^{20} depress the die or former again tightly upon the blank, at the same time further creasing and holding the end folds just made. As the die gets in place the front folding blade begins to rise from its recess below the receiving pad, and lies over the projecting edge of the blank to form the front fold, being actuated by the rod f^{15} and lever f^{21} operated upon by the deflection 41 in the face cam f^{23} for the lifting part of the movement of the folding blade, and by the lever f^5—f^{10} actuated by the rise 42 in the cam f^{13} for the inward movement of the blade. Next the die is permitted to rise slightly by the recess 34 of the cams n^{20}, and is retracted from beneath the front fold and blade by the arm m^{39} and the deflection 43 of the cam m, Fig. 13. As soon as the front half of the die has escaped from beneath the front folding blade the depression 35 of the cam n^{20} (Fig. 9) permits the front half of the die to rise, and thereupon the front creasing pressure mechanism is brought to bear upon the front folding blade by the further rotation of the cam f^{23}. In this position the whole die is at once brought forward by the latter part of the deflection 43 of the cam m, so as to bring the back part of the die or former in position on the blank for making the back fold, the die being tightly pressed on the blank by the projections 36 of the cams n^{20}. The back blade is then raised by the rod g^8 acted upon by the deflection 44 of the cam g^{17}, and is simultaneously moved forward by the lever g^3 engaging the projection 45 of the cam g' so as to lift up the projecting edge of the blank and lay it over on the rear edge of the

former or die and make the back fold. The whole die then moves forward, the back part thereof first having raised slightly (by the recesses 37 of the cams n^{20}), this movement being accomplished by the arm m^{39} and the deflection 46 of the cam m, and then the cross head rises slightly (by the projection 47 of cam n, Fig. 15), and next the back part of the die is raised even with the front part by the engagement of the sector b^6 of the gear b^3 with the sector n^{22} of the gear n^{17} (Fig. 2), which rotates the shaft n^{12} and brings into operation the deflections 38 of the cams n^{20}.

While the last mentioned movement is taking place pressure is being brought upon the back folding blade by means of the eccentric path 48 in the cam g^{17}, and then the further rotation of the shaft n^{12} by the sectors b^6, n^{22}, causes the parts to be brought again into the position shown in Fig. 9, the cross head meanwhile rising and continuing to rise until the parts are in the position shown in Figs. 1, 2, and 15. The front and back folding blades continue pressing the blank until the operator has placed another blank in position on the pins p^4 as the cross head was rising and the latter has got ready to descend, whereupon the blades quickly rise slightly and move back from the folds of the folded blank then down and inwardly into position with their top surfaces flush with the top of the receiving pad, and then the operator picks off the folded blank, and the operations already described are repeated. We make provision for slightly raising the folding blades from the blank each time before they are to be drawn away from the same, in order that there may be no tendency to move back or disturb the creased folds just made.

One primary object of our invention has been to provide mechanism whereby each fold could be creased with heavy pressure and for a relatively long time in the process of folding, and this is particularly true of the top folds, these folds being the front and back folds in the order of folding as herein shown and preferably employed, for it will be understood that having thus pressed and ironed with the long creasing pressure the top or overlapping folds of the folded blank, there is little possibility that the end folds can become unfolded.

Usually collars and the like are made of three or more plies (the face, one or more interlinings, and the back), the blanks being dampened before going into the machine, and our machine renders it perfectly feasible to fold a whole collar, irrespective of the number of plies which it may contain, at one operation, inasmuch as the quick and enormous pressure that is brought to bear upon the blades permanently creases the folds into their desired ultimate shape before the plies have had a chance to dry out, and therefore, the creases being thus made under this enormous and quick pressure, are rendered permanent.

For the purpose of some of the claims hereof, the following explanations may be made. The pad which supports the blanks to be folded, will be seen to be of such size and shape that the unfolded blanks project beyond the pad at all edges. Owing to this, none of the folders are required to be maintained in a plane above the top of the pad but all of them may be dropped. This permits the free, in fact universal, horizontal movement of the die or templet. The die being constructed to be when expanded of the full size and shape of the folded blank, this feature is obviously important. When the folders drop, their upper sides are at least as low as the upper side of the pad. This is the condition which exists while the pad is supporting a blank that is unfolded but is in proper position to be folded. The die constitutes a means for holding the blanks on the pad during the infolding operation. Its lateral shifting movements are in a plane substantially parallel with the surface of the supporting pad. The movable bottom plates of the die or templet may be designated as defining plates, and manifestly at least one of them must be movable to give the die capability of contracting or expanding. The vertical guide rods n^{10} and connected parts may be designated as mechanical fittings which permit the movement of the templet from its blank defining position to its elevated position and back again. The cams, slides, etc., which are carried upwardly and downwardly and move with the templet for actuating the templet plate, are connected for example by means of the bar m^{33}, well shown in Fig. 8, to an external device, which acting through said bar, controls the templet plate movements. The external device to which bar m^{33} extends, connects therewith in all positions of the templet, whether raised or lowered; this being accomplished by constituting the external device of the form of the vertical lever m^{39}, in engagement with which the outward end of bar m^{33} slides. The oscillation of the lever causes the bar to reciprocate inwardly and outwardly lengthwise of its own direction, and the bar being suitably connected to the mechanism of the templet, this results in the desired movements of the templet plates. As shown the upward and downward templet movements are along a right line.

Having described our invention, what we claim and desire to secure by Letters Patent is:—

1. In a machine for folding collars and the like, a bed to receive the blanks to be folded, means to hold the blanks in position, a folding blade for folding an edge of the blank,

and mechanism for moving said folding blade, said mechanism including a rod for raising and lowering the folding edge of the blade, an arm for moving said rod, and a lever for actuating said arm, said lever having two adjustable stops and said arm projecting at its free end between said stops, substantially as described.

2. In a machine for folding collars and the like, a bed to receive the blanks to be folded, means to hold the blanks in position, a folding blade for folding an edge of the blank, and mechanism for moving said folding blade, said mechanism including means for moving the blade up and down and for giving positive creasing pressure to the blade, and means for varying the extent of vertical movement of the blade, substantially as described.

3. In a machine for folding collars and the like, a bed to receive the blanks to be folded, means for folding the blanks, a die for resting upon the blanks, and means for shifting said die over said bed, said means including a bar, a lever for moving said bar, a wedge device adjustable on said bar, and stops carried by said lever for engaging said wedge device, substantially as described.

4. In a machine for folding collars and the like, a bed provided with a raised receiving pad on which the blanks to be folded are placed, said pad conforming in shape and size to the folded article, folding blades for folding a blank at all its edges, said bed being depressed or lower than said pad at all the edges thereof, and said folding blades normally occupying a position lower than and next to the receiving surface of said pad in position for the projecting edges of the blanks to rest over and on top of the folding edges of said blades, means for holding the blank on said pad, and means for moving said blades upwardly to turn up the edges of the blanks and inwardly to lay said upturned edges over on the blanks and down onto the laid over edges of the blank to fold the same, substantially as described.

5. In a machine for folding collars and the like, a bed to receive blanks to be folded, a collapsible die for holding a blank in position to be folded, means for lowering and raising said die, folding blades for folding the edges of the blank, certain of said blades making folds before other blades make folds, means for positively moving the blades up and down for pressing purposes and means for maintaining creasing pressure on said first mentioned blades until after the die has been collapsed, withdrawn and finally raised from the blanks, substantially as described.

6. In a machine for folding collars and the like, a bed to receive blanks to be folded, means to hold the blank on said bed, and a folding blade to fold an edge of said blank, said blade having means for moving the same in and out, and means secured to the blade adjacent the front edge thereof for moving the blade up and down and bringing an even and powerful creasing pressure directly at the front edge of the blade, substantially as described.

7. In a machine for folding collars and the like, a bed to receive a blank to be folded, a die to rest on the blank, means to move said die up and down, a blade for folding an edge of said blank, said blade being carried by an arm pivoted in the machine to swing said blade horizontally toward and from the blank, means to lift said blade, and means to swing said blade on its pivot, substantially as described.

8. In a machine for folding collars and the like, a bed to receive a blank to be folded, a die to rest on the blank, means to move said die up and down, a blade for folding an edge of said blank, said blade being carried by an arm pivoted in the machine to swing said blade horizontally toward and from the blank, the pivot of said blade being slidingly journaled in the frame of the machine, means to lift said blade and its pivot, and means to swing said blade toward and from the blank, substantially as described.

9. In a machine for folding collars and the like, a bed to receive a blank to be folded, said blank requiring a fold to be made about a reëntrant angle thereof, a blade for making said fold, said blade resting normally below the receiving surface of the bed with its upper surface substantially flush therewith, and said blade being provided at the corner thereof adjacent said reëntrant angle with a lump or raised portion, substantially as described.

10. In a machine for folding collars and the like, a bed to receive a blank to be folded, a folding blade to make a fold, a pressing lever pivoted at one end to bring creasing pressure at its other end upon said blade, a rod secured to said lever between said ends, and means to depress said rod, substantially as described.

11. In a machine for folding collars and the like, a bed to receive a blank to be folded, a folding blade to make a fold, a pressing lever pivoted at one end to bring creasing pressure at its other end upon said blade, a rod secured to said lever between said ends, means to depress said rod, and a turn buckle in said rod for regulating the creasing pressure, substantially as described.

12. In a machine for folding collars and the like, a bed to receive a blank to be folded, folding mechanism, a multi-part die to rest on the blank when the folds are made, said die comprising a front part and a separate rear part, and means for raising said two parts dissimultaneously, substantially as described.

13. In a machine for folding collars and the like, a bed to receive a blank to be folded,

folding mechanism, a multi-part die to rest on the blank when the folds are made, said die comprising a front part and a separate rear part each composed of a plurality of pieces, means for collapsing and expanding said two parts, and means for raising said two parts dissimultaneously, substantially as described.

14. In a machine for folding collars and the like, a bed to receive a blank to be folded, folding mechanism, a multi-part die to rest on the blank when the folds are made, said die comprising a front part and a separate rear part, means for raising said two parts dissimultaneously, and means for shifting the entire die transversely of said bed, substantially as described.

15. In a folding machine for folding blanks for collars and the like, a bed adapted to receive the blanks to be folded, folding mechanism, a multi-part die fitted to rest on the blanks when the folds are being made, said die comprising a front part and a separate rear part, the die having a fixed width by reason of its non-collapsibility in the direction of its width, and means for moving one of said parts vertically in advance of the other part, substantially as and for the purpose described.

16. In a folding machine for folding blanks for collars and the like, a bed adapted to receive the blanks to be folded, folding mechanism, a multi-part die fitted to rest on the blanks when the folds are being made, said die comprising a front part and a separate rear part, the die being collapsible lengthwise but having a fixed width by reason of its non-collapsibility in the direction of its width, and means for moving one of said parts vertically in advance of the other part, substantially as and for the purpose described.

17. In a machine for folding collars and the like, a die or former comprising front and rear parts having separate end pieces, separate hangers for said end pieces, bridge pieces having ways in which said hangers are mounted to slide longitudinally of said die, a frame carrying said bridge pieces, means for moving said hangers longitudinally of said bridge pieces, means for moving said bridge pieces vertically independently of each other, and means for moving said bridge pieces transversely of said frame, substantially as described.

18. A machine for folding collars and the like having a die or former comprising front and rear parts having separate end pieces, separate hangers for said end pieces, bridge pieces having ways in which said hangers are mounted to slide longitudinally of said die, a frame carrying said bridge pieces, a cross head carrying said frame, means for moving said hangers longitudinally of said bridge pieces, means for moving said bridge pieces, vertically independently of each other, means for moving said bridge pieces transversely of said frame, and means for moving said frame up and down in said cross head, substantially as described.

19. In a machine for folding collars and the like, a die or former comprising front and rear parts having separate end pieces, separate hangers for said end pieces, said end pieces being carried by supports adjustably mounted in said hangers, bridge pieces having ways in which said hangers are mounted to slide longitudinally of said die, a frame carrying said bridge pieces, means for moving said hangers longitudinally of said bridge pieces, means for moving said bridge pieces vertically independently of each other, and means for moving said bridge pieces transversely of said frame, substantially as described.

20. A machine for folding collars and the like having a die or former comprising separate front and rear parts, a cross head carrying the same, levers pivoted at opposite sides of said cross head and resting at their free ends upon said front and rear parts respectively, and cams journaled in said cross head and operating said levers, substantially as described.

21. In a machine for folding collars and the like, a bed to receive the blanks to be folded, folding blades for folding the several edges of the blank, a die for holding the blank, said die comprising independently vertically movable front and rear parts, a cross head carrying said die, means for moving the end folding blades to make the end folds of the blank, mechanism for moving the end portions of said die out from under the end folds and forward, means for restoring the parts of the die to their original relation, and engaging them again with the blank, means for operating a folding blade to make a longitudinal fold, means for moving the die from beneath said fold and raising the adjacent part of the die, substantially as described.

22. In a machine for folding collars and the like, a bed to receive the blanks to be folded, folding blades for folding the several edges of the blank, a die for holding the blank, said die comprising independently vertically movable front and rear parts, a cross head carrying said die, means for moving the end folding blades to make the end folds of the blank, mechanism for moving the end portions of said die out from under the end folds and forward, means for restoring the parts of the die to their original relation and engaging them again with the blank, means for operating a folding blade to make a longitudinal fold, means for moving the die from beneath said fold and raising the adjacent part of the die, and means for position-

ing the remaining depressed part of the die for the opposite longitudinal fold, substantially as described.

23. In a machine for folding collars and the like, a bed to receive the blanks to be folded, folding blades for folding the several edges of the blank, a die for holding the blank, said die comprising independently vertically movable front and rear parts, a cross head carrying said die, means for moving the end folding blades to make the end folds of the blank, mechanism for moving the end portions of said die out from under the end folds and forward, means for restoring the parts of the die to their original relation, and engaging them again with the blank, means for operating a folding blade to make a longitudinal fold, means for moving the die from beneath said fold and raising the adjacent part of the die, means for positioning the remaining depressed part of the die for the opposite longitudinal fold, and means for moving said depressed part of the die from beneath the fold last made, and raising the same adjacent the previously raised part of the die, substantially as described.

24. In a machine for folding collars and the like, a bed to receive a blank to be folded, folding mechanism for folding opposite edges thereof, a die or former to rest upon the blank, said die comprising independently movable parts adjacent said two opposite edges, means for moving said folding mechanism to make said two folds dissimultaneously, means for moving the part of the die adjacent the first fold made from beneath said fold when made, and raising the same, and means for then moving the opposite part of the die from beneath the second fold made and raising said part of the die, substantially as described.

25. In a machine for folding collars and the like, a bed to receive a blank to be folded, folding mechanism for folding opposite edges thereof, a die or former to rest upon the blank, said die comprising independently vertically movable parts adjacent said two opposite edges, means for moving said folding mechanism to make said two folds dissimultaneously, means for moving the part of the die adjacent the first fold made from beneath said fold when made, and raising the same, means for bringing creasing pressure upon the said first fold made, and means for then moving the opposite part of the die from beneath the second fold made and raising said part of the die, substantially as described.

26. In a machine for folding collars and the like, a bed to receive a blank to be folded, folding mechanism for folding opposite edges thereof, a die or former to rest upon the blank, said die comprising independently vertically movable parts adjacent said two opposite edges, means for moving said folding mechanism to make said two folds dissimultaneously, means for moving the part of the die adjacent the first fold made from beneath said fold when made, and raising the same, means for bringing creasing pressure upon the said first fold made means for then moving the opposite part of the die from beneath the second fold made and raising said part of the die, and means for bringing creasing pressure upon the said second fold and maintaining said pressure until the die is raised, substantially as described.

27. In a machine for folding collars and the like, a multi-part die comprising independent front and rear parts each including separate end pieces, and an intermediate part alining with said end pieces, said front and rear parts being independently movable in a vertical direction, substantially as described.

28. In a machine for folding collars and the like, a main frame, a cross head movable up and down in said frame, a die carried by said cross head and movable relatively thereto, a shaft journaled in said cross head for operating said die, gearing journaled in said frame, a pinion fast on said shaft and arranged to mesh at times with a gear wheel of said gearing, said gear wheel having a raised toothed sector, and said pinion having an eccentric toothed sector for meshing with said gear wheel sector, whereby the latter continues to rotate after said cross head has begun to rise, substantially as described.

29. In a machine for folding collars and the like, a main frame, a cross head movable up and down in said frame, a die carried by said cross head and movable relatively thereto, a shaft journaled in said cross head for operating said die, gearing journaled in said frame, a pinion fast on said shaft and arranged to mesh at times with a gear wheel of said gearing, said gear wheel having a raised toothed sector, and said pinion having an eccentric toothed sector for meshing with said gear wheel sector, whereby the latter continues to rotate said shaft after said cross head has begun to rise, said gear wheel also having a block and said pinion a projection to engage said block for starting the rotation of the latter on the downward movement of the cross head, substantially as described.

30. In a machine for folding collars and the like, a main frame, a cross head movable up and down in said frame, mechanism for moving said cross head including a cam, and a lever engaging the same, said cam having an eccentric surface of short radius for lifting the cross head, and said lever having a short portion engaging said lifting surface for effecting the lifting movement, and having a long portion coöperating with said cam for

giving an easy downward movement to said cross head, substantially as described.

31. In a machine for folding collars and the like, a main frame, a cross head movable up and down in said frame, mechanism for moving said cross head including a cam, and a compound lever operated by said cam, said lever consisting of a main short lever engaging the cam at its free end, and an auxiliary lever carried by said main lever and extending beyond the same, the free extended end of said auxiliary lever also engaging said cam, the short lever serving to lift the cross head while the auxiliary lever serves to lower the cross head, substantially as described.

32. In a machine for folding collars and the like, a main frame, a cross head movable up and down in said frame, mechanism for moving said cross head including a cam, and a compound lever operated by said cam, said lever consisting of a main short lever engaging the cam at its free end, and an auxiliary lever pivoted intermediate its length on said main lever, said auxiliary lever being arranged to engage the cam at its forward projecting end, and having at its rear end an adjusting device for adjusting the same relatively to the main lever, the short lever serving to lift the cross head, while the auxiliary lever serves to lower the cross head, substantially as described.

33. In a machine for folding collars and the like, a main frame, a bed on said frame for receiving blanks to be folded, a cross head movable up and down in said frame, a die carried by said cross head, mechanism for moving said cross head including a lifting rod, and a turn buckle in said lifting rod for varying the approach of said die to said bed according to different thickness of blanks, and for varying the pressure of said die on the blank, substantially as described.

34. A die having a pair of front parts and a pair of rear parts, both the said pairs of parts being contractible simultaneously in a lengthwise direction and one pair of parts being together movable vertically independently of the other pair.

35. A die having a pair of front parts and a pair of rear parts, the front parts being vertically movable relatively to the rear parts, the front and rear parts at the left being longitudinally movable in unison, and the front and rear parts at the right being longitudinally movable in unison, but in opposite direction to the movements of the parts at the left.

36. A die having a pair of front parts and a pair of rear parts, the front parts being vertically movable relatively to the rear parts, the front and rear parts at the left being longitudinally movable in unison, and the front and rear parts at the right being longitudinally movable in unison, but in opposite direction to the movements of the parts at the left, the front parts being relatively immovable laterally, relatively to the rear parts, rendering the die of fixed width.

37. A die having a pair of front parts and a pair of rear parts, the front parts being vertically movable relatively to the rear parts, the front and rear parts at the left being longitudinally movable in unison, and the front and rear parts at the right being longitudinally movable in unison, but in opposite direction to the movements of the parts at the left, the front parts being relatively immovable laterally, relatively to the rear parts, rendering the die of fixed width, but all the parts being laterally movable together for shifting the die bodily.

38. A die having a pair of front parts and a pair of rear parts, the front and rear parts at the left being longitudinally movable in unison, and the front and rear parts at the right being longitudinally movable in unison, but in opposite direction to the movements of the parts at the left, and the parts being so constructed and fitted that a vertical movement may be effected as between the front relatively to the rear parts, and means for effecting said movements.

39. A die having a pair of front parts and a pair of rear parts, the front and rear parts at the left being longitudinally movable in unison, and the front and rear parts at the right being longitudinally movable in unison, but in opposite direction to the movements of the parts at the left, the front parts being relatively immovable laterally, relatively to the rear parts, rendering the die of fixed width, and the parts being so constructed and fitted that a vertical movement may be effected as between the front relatively to the rear parts, and means for effecting said movements.

40. A die having a pair of front parts and a pair of rear parts, the front and rear parts at the left being longitudinally movable in unison, and the front and rear parts at the right being longitudinally movable in unison, but in opposite direction to the movements of the parts at the left, the front parts being relatively immovable laterally, relatively to the rear parts, rendering the die of fixed width, but all the parts being laterally movable together for shifting the die bodily, and the parts being so constructed and fitted that a vertical movement may be effected as between the front relatively to the rear parts, and means for effecting said movements.

41. A die having a pair of front parts and a pair of rear parts, the front and rear parts at the left being longitudinally movable in unison, and the front and rear parts at the right being longitudinally movable in unison, but in opposite direction to the movements of the parts at the left, the front parts being

relatively immovable laterally, relatively to the rear parts, rendering the die of fixed width, but all the parts being laterally movable together for shifting the die bodily, and the parts being so constructed and fitted that a vertical movement may be effected as between the front relatively to the rear parts, and means for effecting said movements; all combined with a bed, folding mechanism, an operating shaft, and mechanical connections intermediate the shaft and the die and folding mechanisms, whereby the die may be lowered upon the bed, with the blanks between the two, the ends of the blanks then infolded, the die then contracted endwise out of the folds, and then raised above the blanks and expanded to normal position above the blanks, then the folding mechanism retracted, then the die again lowered upon the blanks, then the rear blank edges infolded over the die, the die moved bodily out of the fold with sufficient endwise contraction, and raised at its rear and again restored to normal position while the infolding mechanism is again contracted, the die finally again lowered upon the blanks, the front edges infolded, the die moved bodily rearward and raised at its front, after which the parts return to original position that the folded blanks may be removed.

42. In a machine for folding the edges of blanks, the combination of a blank supporting pad of such size and shape that the unfolded blanks project beyond said pad at all edges, infolders adapted to occupy positions adjacent to said pad with their upper sides at least as low as the upper side of the pad while the pad supports a blank in position to be folded, a means for holding the blanks on said pad, and means for actuating said infolders to move upwardly and inwardly for folding the blank edges.

43. In a machine for folding the edges of blanks, the combination of a blank supporting pad of such size and shape that the unfolded blanks project beyond said pad at all edges, infolders adapted to occupy positions adjacent to said pad with their upper sides at least as low as the upper side of the pad while the pad supports a blank in position to be folded, a means for defining the edges of the blanks on said pad, and means for actuating said infolders to move upwardly and inwardly for folding the blank edges.

44. In a machine for folding the edges of blanks, the combination of a blank supporting pad of such size and shape that the unfolded blanks project beyond said pad at all edges, infolders adapted to occupy positions adjacent to said pad with their upper sides at least as low as the upper side of the pad while the pad supports a blank in position to be folded, a bodily shifting die for defining the edges of the blanks on said pad, and means for actuating said infolders to move upwardly and inwardly for folding the blank edges.

45. In a machine for folding the edges of blanks, the combination of a blank supporting pad of such size and shape that the unfolded blanks project beyond said pad at all edges, infolders adapted to occupy positions adjacent to said pad with their upper sides at least as low as the upper side of the pad while the pad supports a blank in position to be folded, a bodily shifting die for defining the edges of the blanks on said pad, and means for actuating said infolders in sequence to move upwardly and inwardly for folding the blank edges.

46. In a machine for folding the edges of blanks, the combination of a blank supporting pad of such size and shape that the unfolded blanks project beyond said pad at all edges, infolders adapted to occupy positions adjacent to said pad with their upper sides at least as low as the upper side of the pad while the pad supports a blank in position to be folded, a bodily shifting die for defining the edges of the blanks on said pad, and means for actuating said infolders to move upwardly and inwardly for folding the blank edges, and means for pressing folds between said infolders and pad.

47. In a machine for folding the edges of blanks, the combination of a bed, and projecting upward therefrom a blank supporting pad of such size and shape that the unfolded blanks project beyond said pad at all edges, infolders adapted to occupy positions adjacent to said pad with their upper sides at least as low as the upper side of the pad while the pad supports a blank in position to be folded, a bodily shifting die for defining the edges of the blanks on said pad, and means for actuating said infolders to move upwardly and inwardly for folding the blank edges.

48. In a machine for folding the edges of blanks the combination of a blank supporting pad of such size and shape that the unfolded blanks project beyond said pad at all edges, infolders adapted to occupy positions adjacent to said pad with their upper sides at least as low as the upper side of the pad while the pad supports a blank in position to be folded, a die constructed to be when expanded of the full size and shape of the folded blank, means for bodily shifting said die, and means for actuating said infolders to move upwardly and inwardly for folding the blank edges.

49. In a machine for folding collars and the like, a support adapted to receive the blank to be folded, a bodily shifting die of the full size and shape of the folded blank, means for positioning said die upon the blanks on said support, a plurality of folding blades, means for moving said blades dissimultaneously so as to fold the blank edges

adjacent thereto successively in order of time, means for bodily shifting the die with a movement in a plane substantially parallel to the said support out of the folded edges, and mechanism for bringing creasing pressure upon the said blades following each successive fold formation.

50. In a folding machine, in combination with infolders and infolder operating mechanism, a templet having at least one movable defining plate, fittings permitting movement of the templet from its blank defining position to an elevated position and back, mechanism moving with said templet for operating said plate, and continuous connections between said mechanisms in all positions of the templet, said connections including a device external of the templet, and a bar, as m^{33}, extending from said plate-moving mechanism to said device, said device being such as to cause said bar to reciprocate inward and outward lengthwise and said bar and plate-moving mechanism being so connected that said bar movements shall operate said plate-moving mechanism.

51. In a folding machine, in combination with infolders and infolder operating mechanism, a templet having at least one movable defining plate, fittings permitting movement of the templet along a right line from its blank defining position to an elevated position and back, mechanism moving with said templet for operating said plate, and continuous connections between said mechanisms in all positions of the templet, said connections including a device external of the templet, and a bar, as m^{33}, extending from said plate-moving mechanism to said device, said device being such as to cause said bar to move to and fro and said bar and plate-moving mechanism being so connected that said bar movements shall operate said plate-moving mechanism.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses.

WILLIAM W. DIXON.
WALTER L. DIXON.

Witnesses:
GEO. H. MAXWELL,
JOHN C. EDWARDS.