No. 785,347. PATENTED MAR. 21, 1905.

O. S. BEYER.

DOUBLE SEAMING MACHINE.

APPLICATION FILED JAN. 9, 1903.

4 SHEETS—SHEET 1.

Fig. 1a

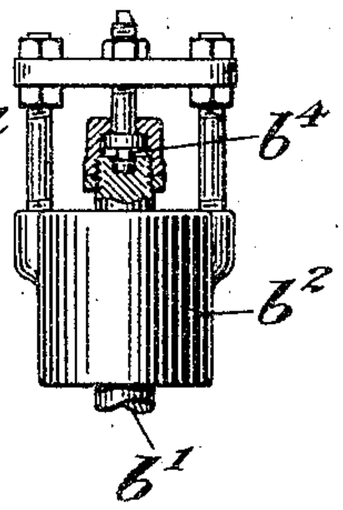


Fig. 1

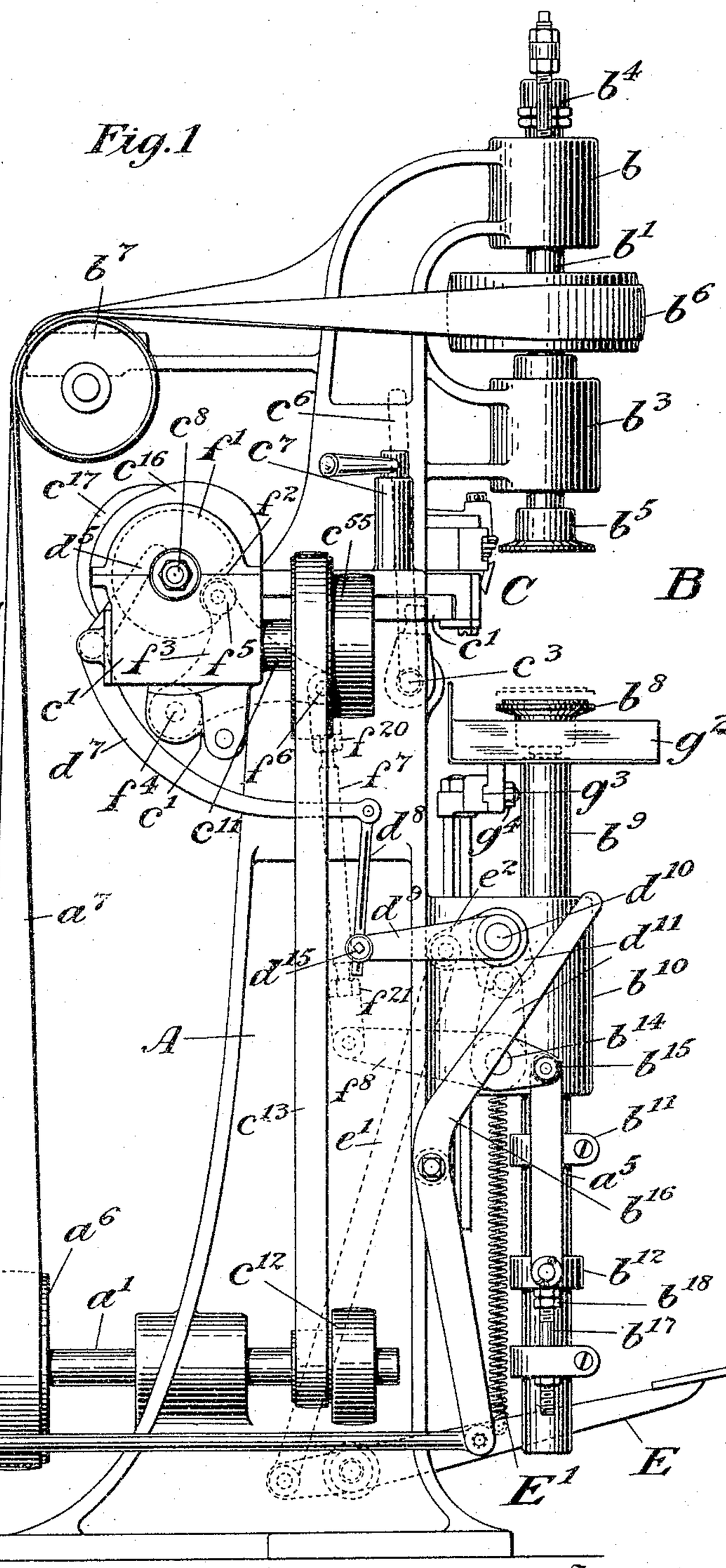
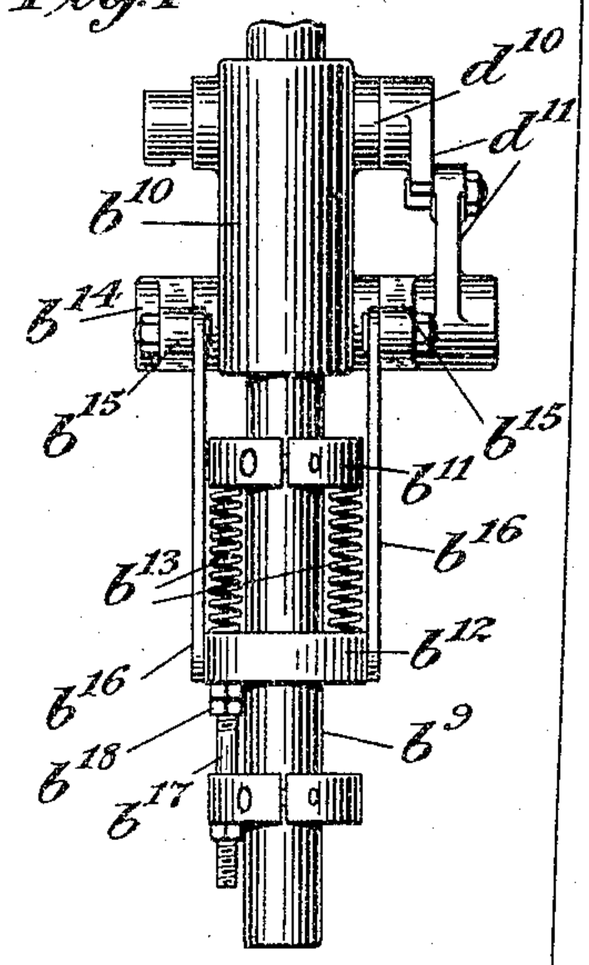


Fig. 1b



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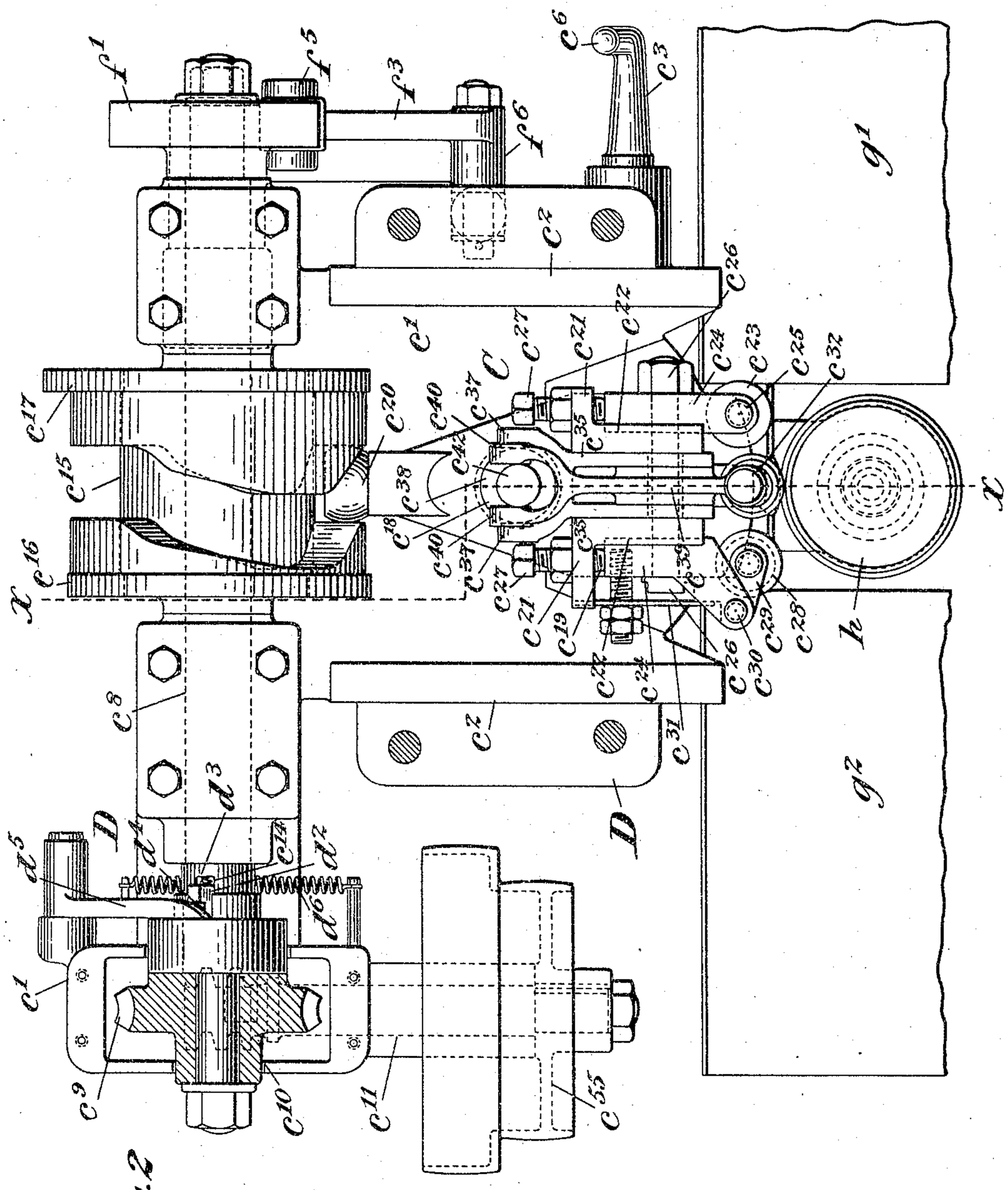
4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 3

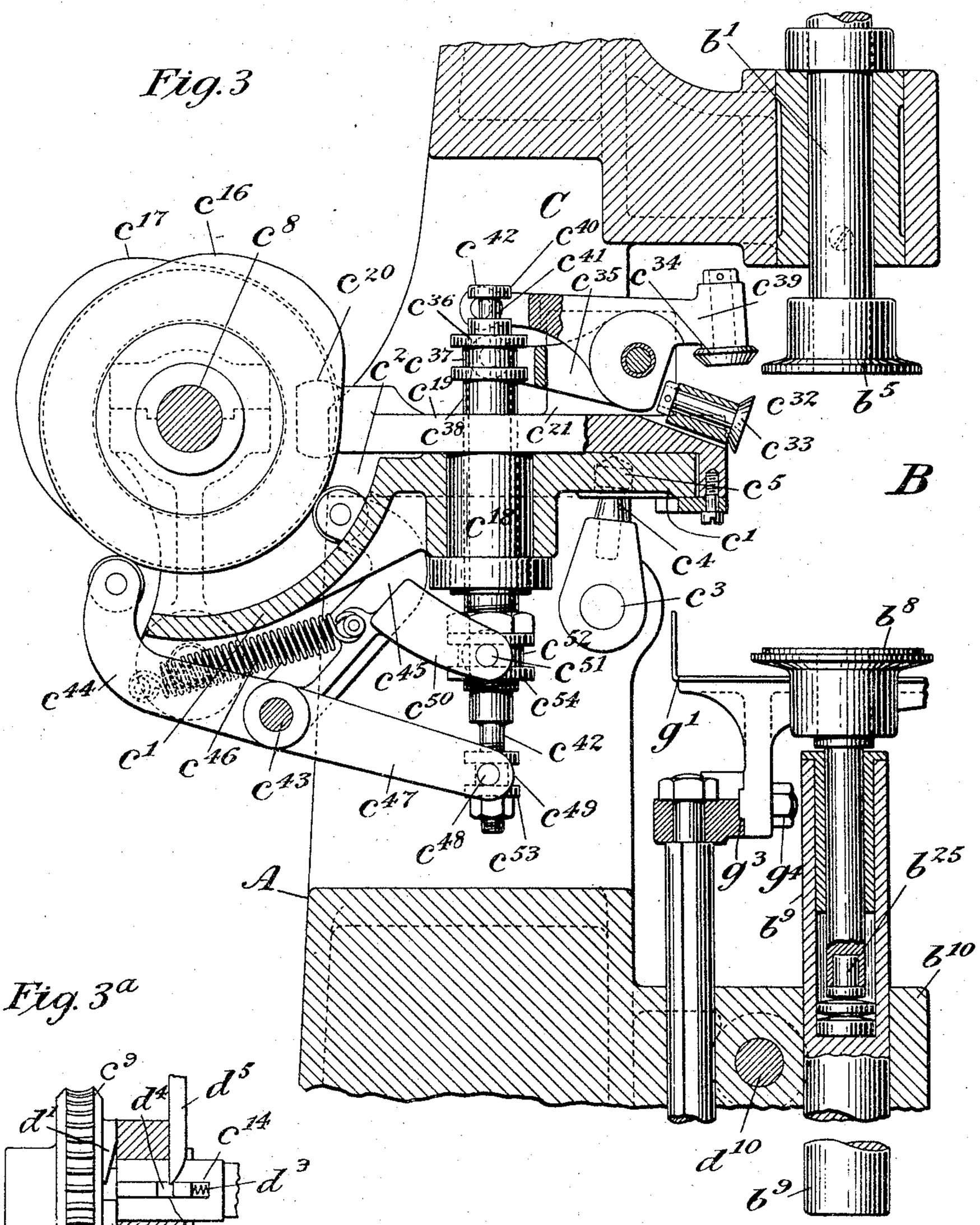

Fig. 3a

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4 SHEETS—SHEET 4.

Fig. 4

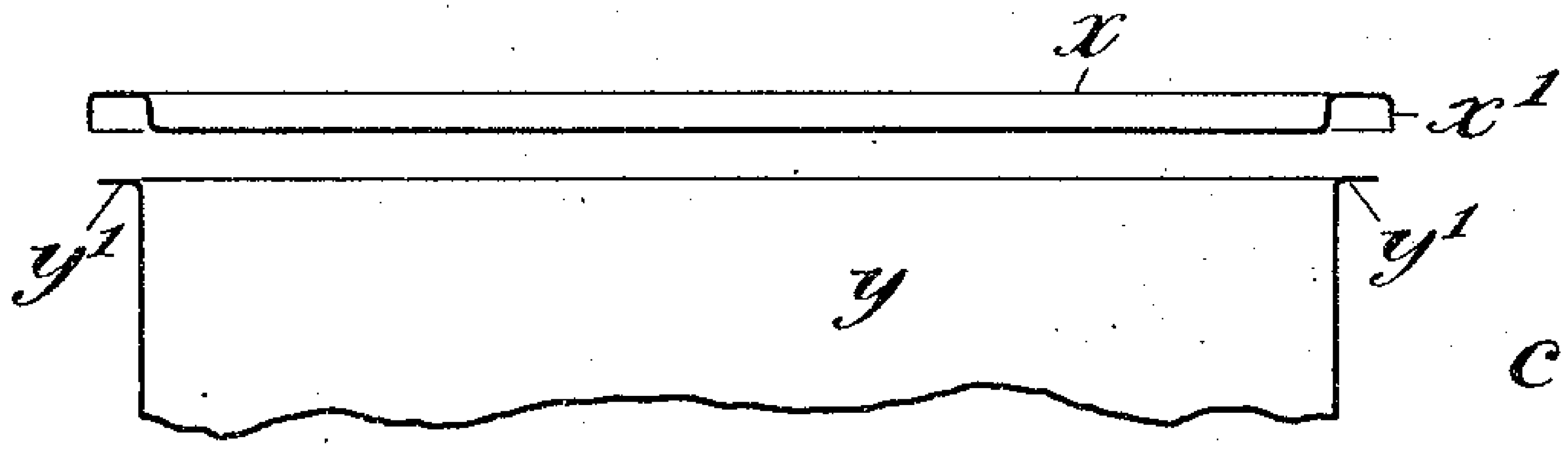


Fig. 5

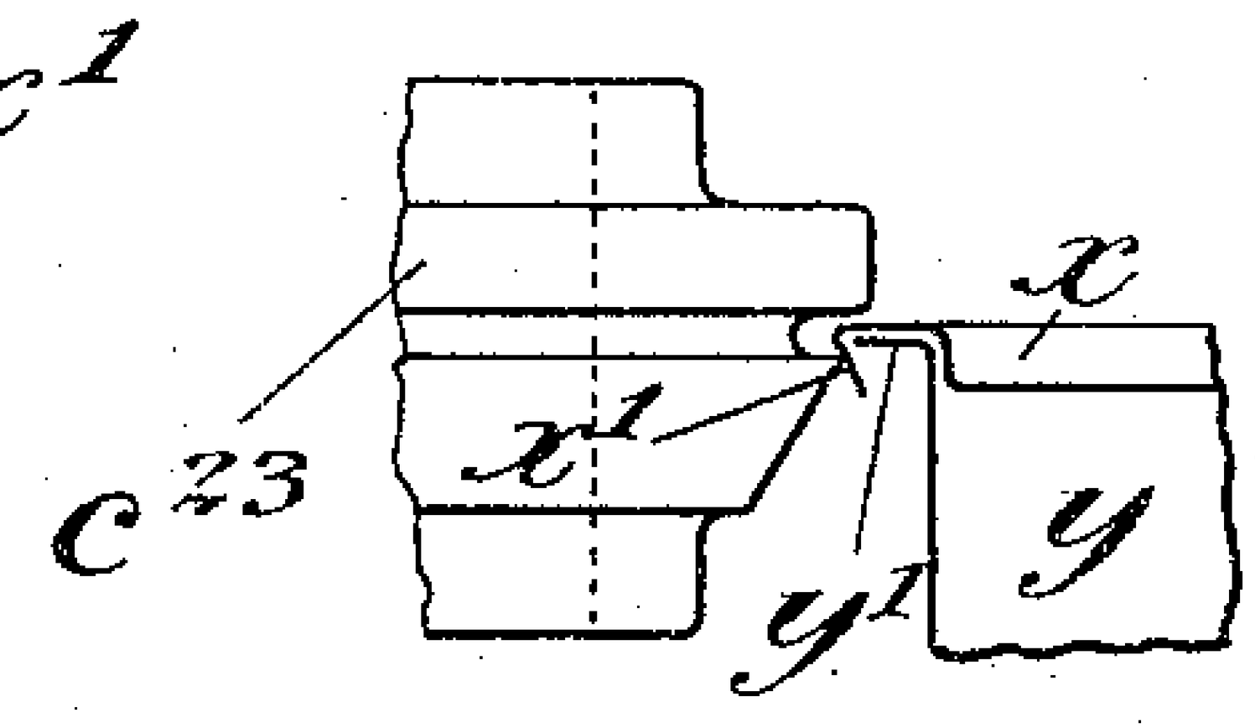


Fig. 4a

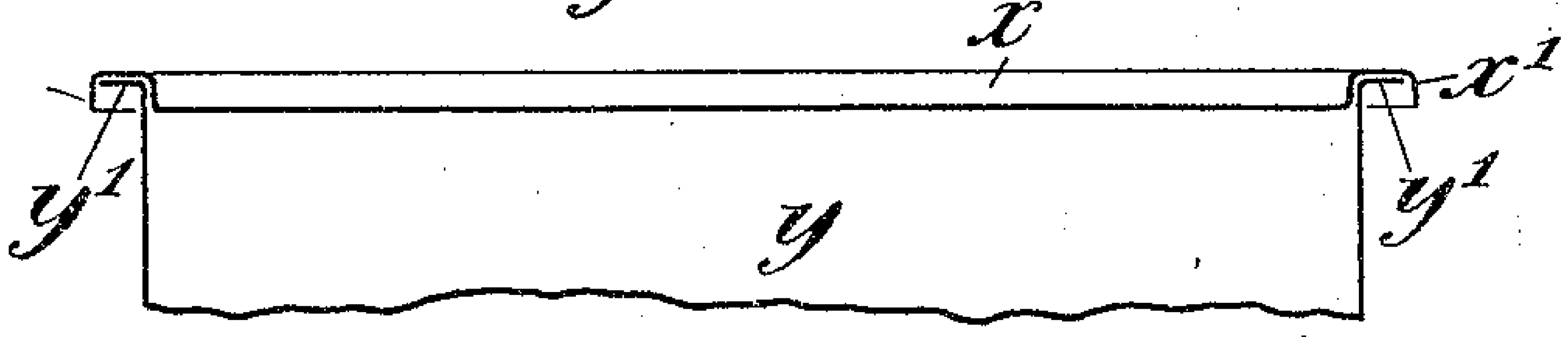


Fig. 6

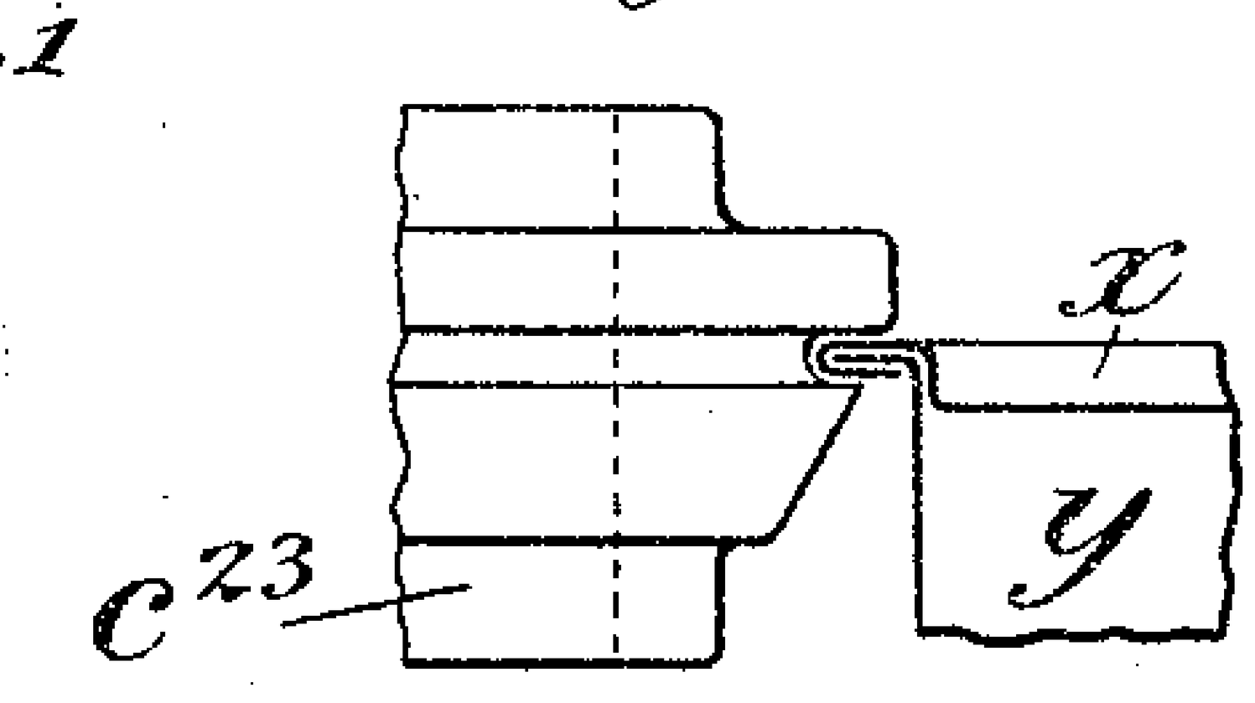


Fig. 10

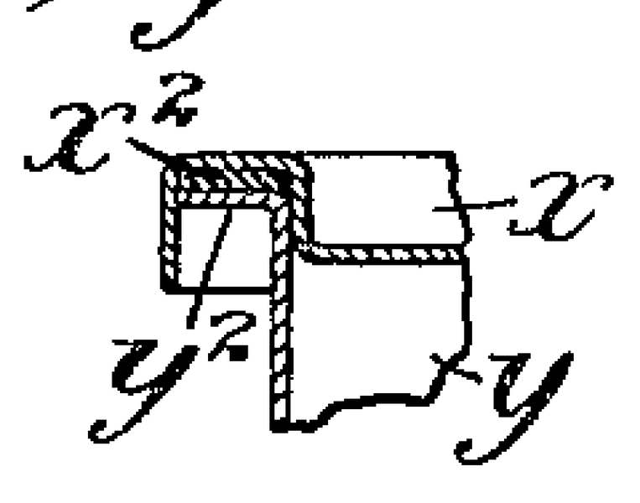


Fig. 10a

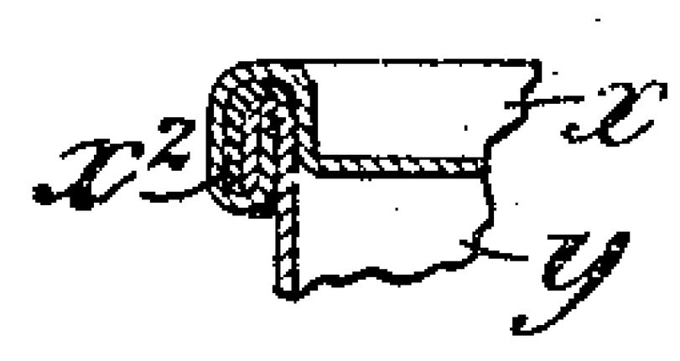


Fig. 7

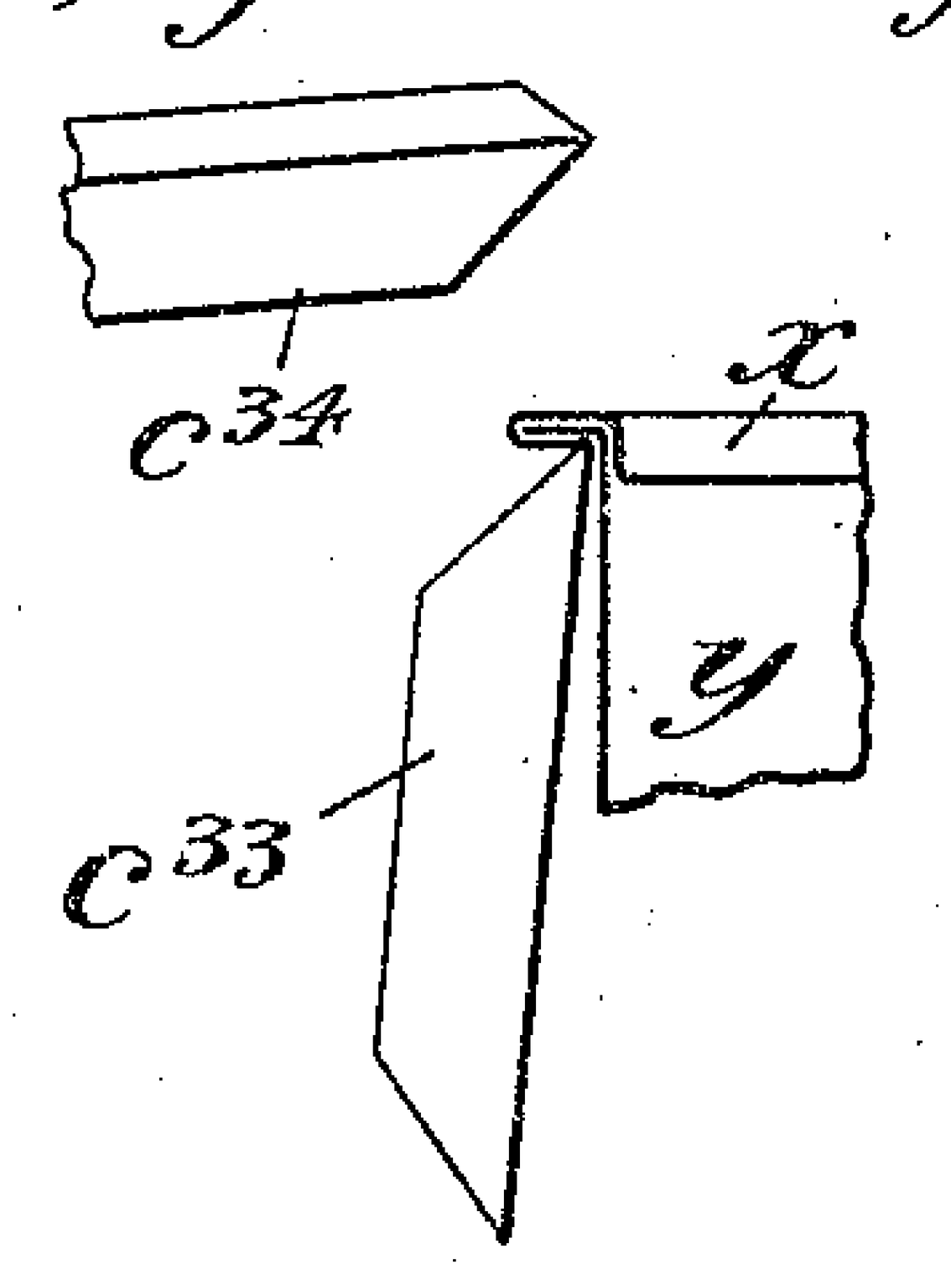


Fig. 8

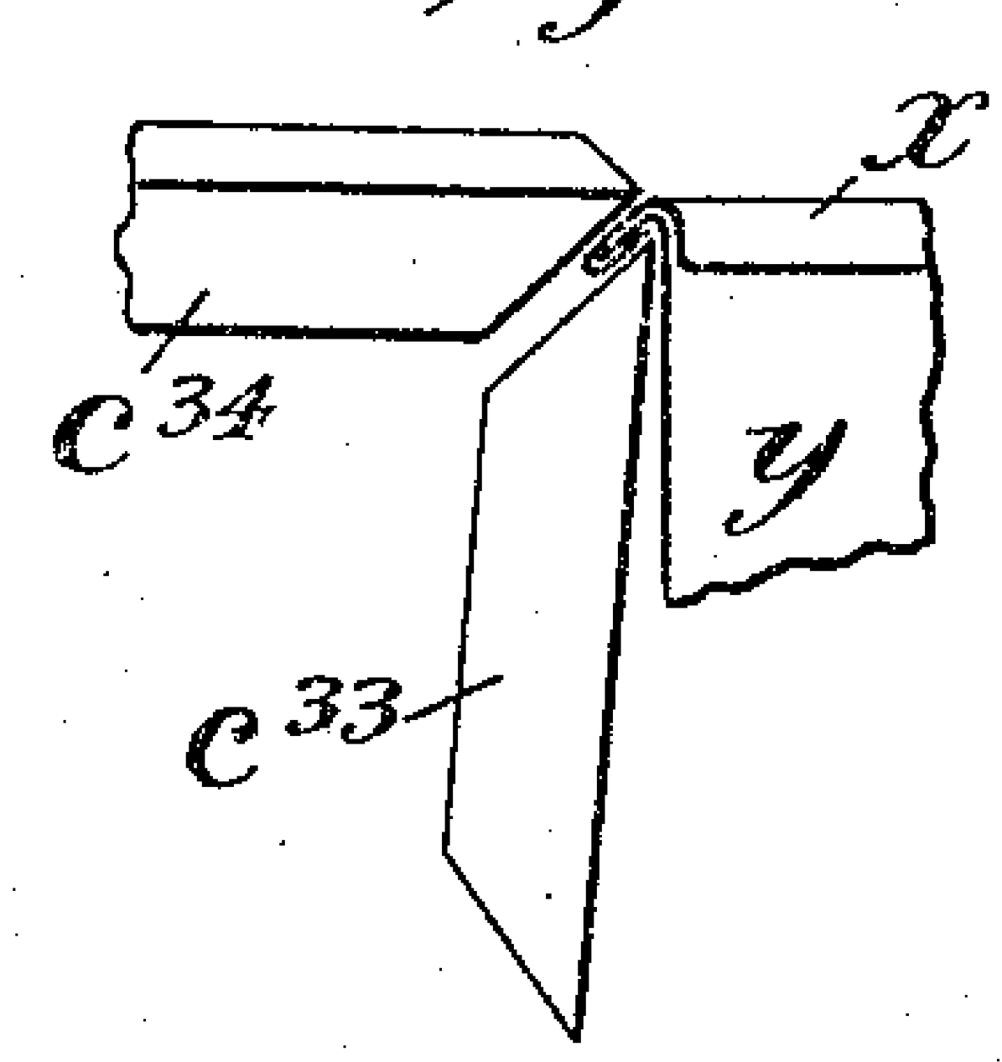


Fig. 9

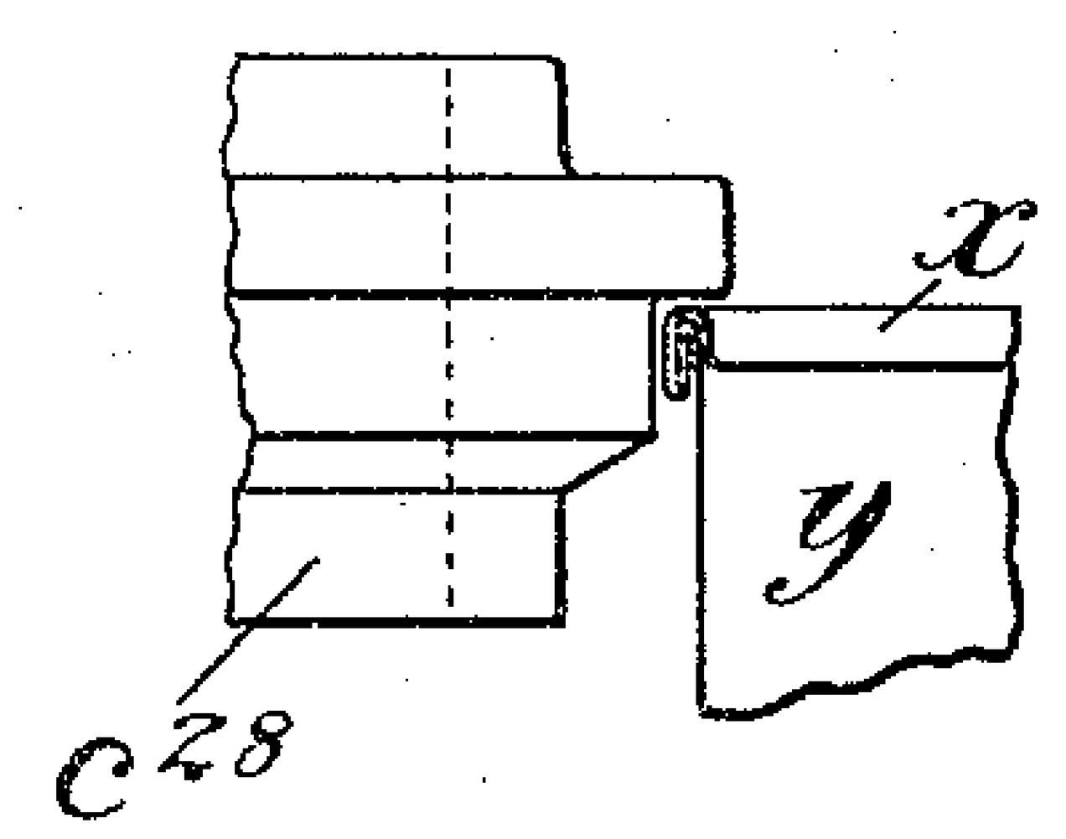


Fig. 11

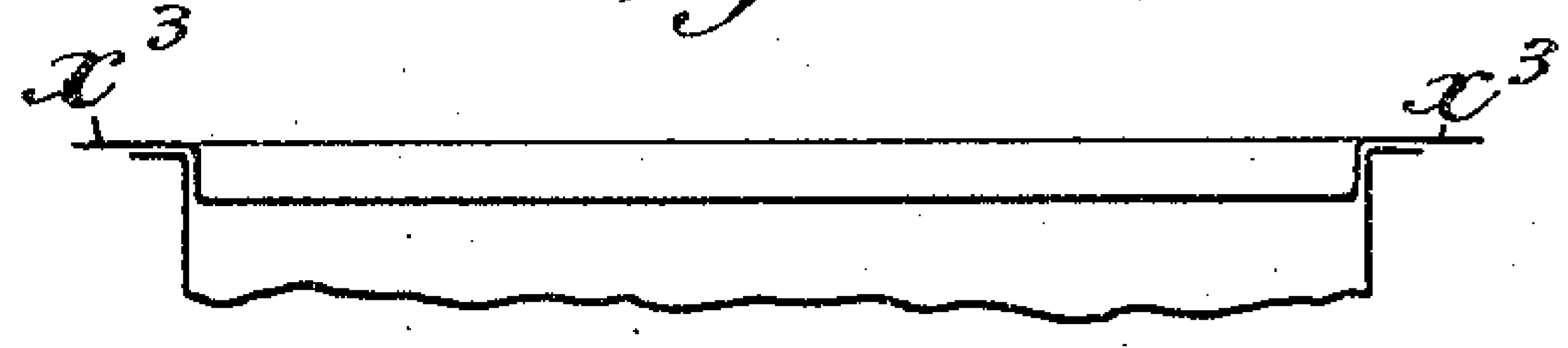


Fig. 12

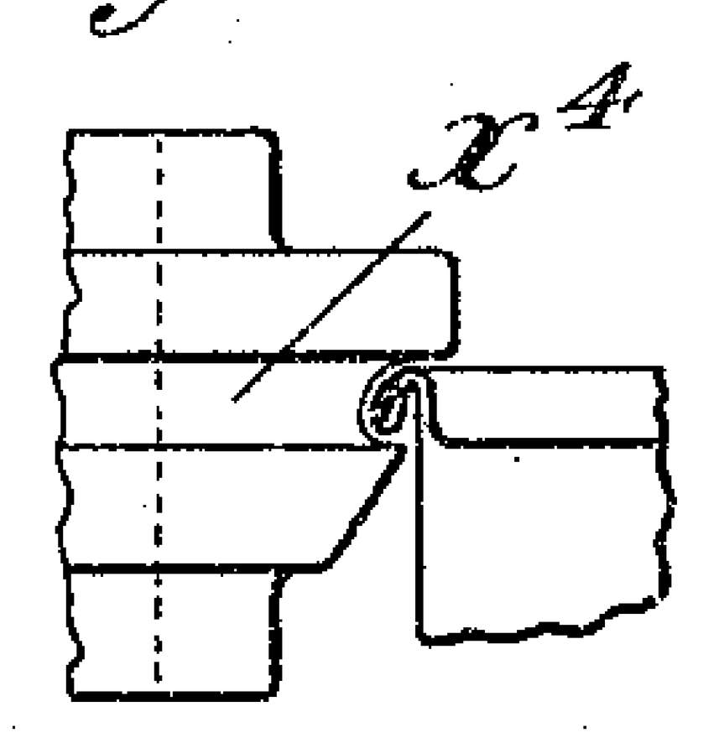


Fig. 13

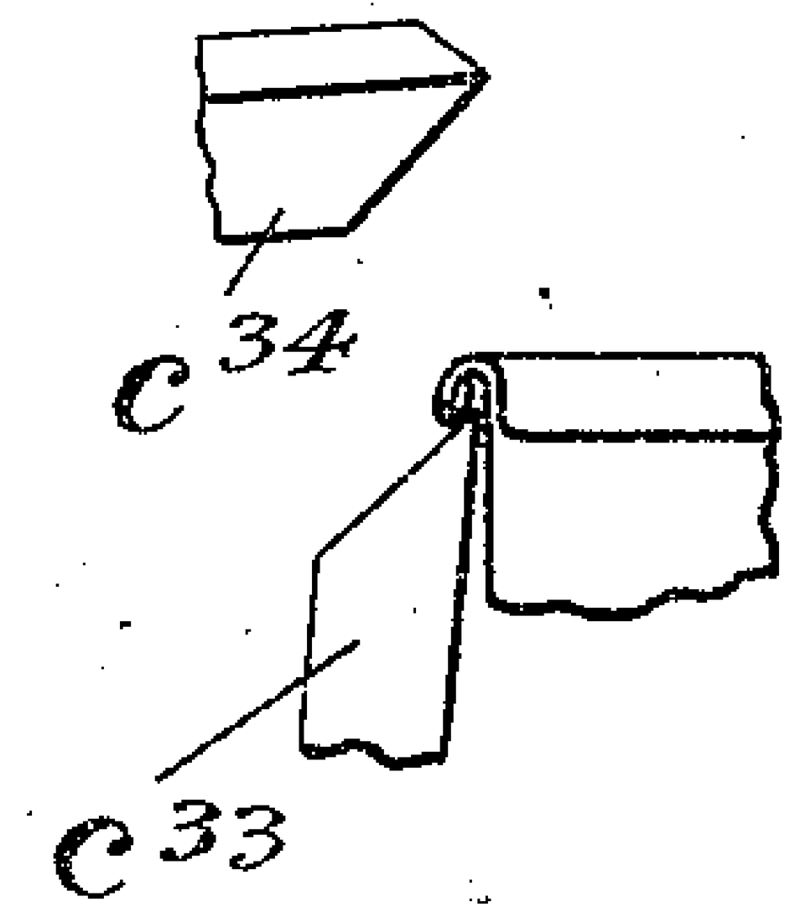


Fig. 14

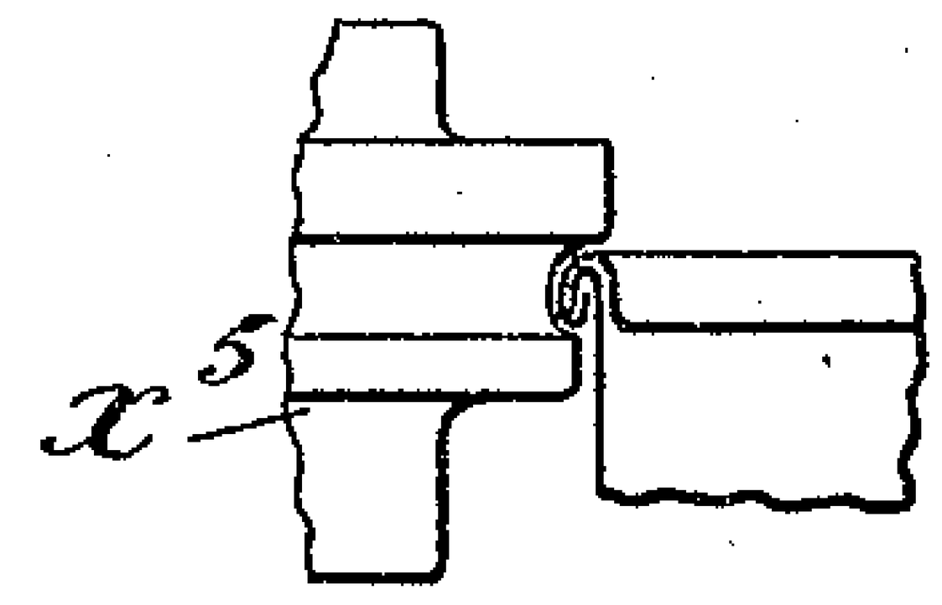
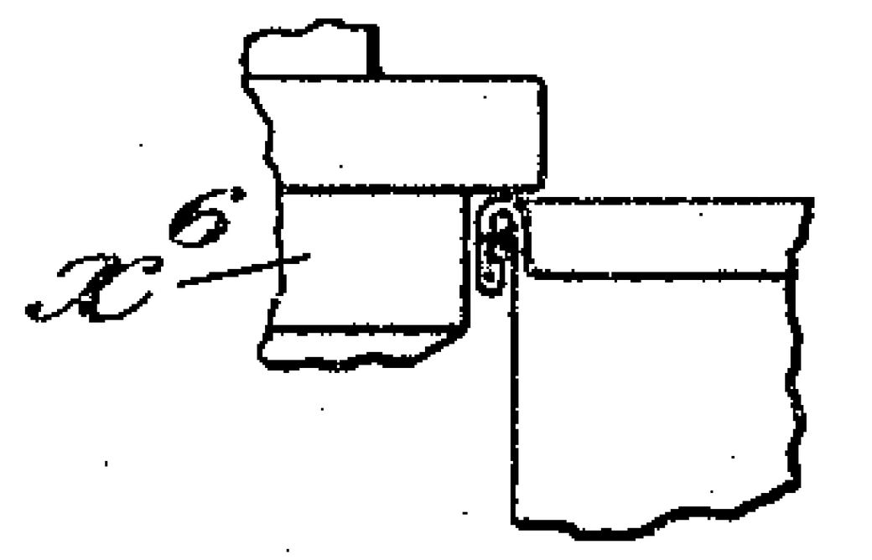


Fig. 15



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No. 785,347. Patented March 21, 1905.

UNITED STATES PATENT OFFICE.

OTTO S. BEYER, OF EAST RUTHERFORD, NEW JERSEY, ASSIGNOR TO E. W. BLISS COMPANY, A CORPORATION OF WEST VIRGINIA.

DOUBLE-SEAMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 785,347, dated March 21, 1905.

Application filed January 9, 1903. Serial No. 138,346.

To all whom it may concern:

Be it known that I, OTTO S. BEYER, a citizen of the United States of America, and a resident of East Rutherford, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Double-Seaming Machines, of which the following is a specification.

My invention relates generally to seaming-machines for joining the heads or ends of cans to the bodies of same, and has more particular reference to double-seaming machines for round or cylindrical-shaped cans.

I shall describe a double-seaming machine, automatic throughout embodying my invention and afterward point out the novel features in the claims.

In machines of this kind several seaming members are generally used and brought successively to act upon the flanges of the head and body of the can. The movement into and out of operating position of these members has been in a straight direction—in other words, a reciprocating motion has been employed. As the work—*i. e.*, the body and head—is rotating at a high rate of speed, it is advantageous to bring the seaming members very gradually to bear upon the flanges, and this is not possible to do with the reciprocating motion.

One object of my invention is to overcome this difficulty. Accordingly I move my seaming members in an arc of a circle substantially tangent to the seam to be formed, and preferably dispose the said seaming members in an arc of a circle on a common carrier member which is caused to turn from one side to the other or to oscillate or to rotate in opposite directions to bring the several seaming members successively into operating position. Although this is highly advantageous, it will be understood that it is not absolutely necessary, as the said seaming members could be moved by a cam or other means in two planes toward and away from the can with approximately the same result.

The heads of cans or other containing vessels are variously formed, and my machine, while capable of seaming the several styles known in the art, is especially designed to seam a can with a certain style of head, a style produced by the exigencies of trade, as will be understood from the following. When shipping cans to the packer, one head or end of the can is shipped separately. In order to get a tight joint, it has been found useful to provide the flange of the head, which generally is straight horizontally, with a rubber ring or with a ring of paste or paint. During the shipment above referred to this ring is frequently injured, and for that reason the said flange of the head is now usually turned down at its outer edge or "burred," so as to protect the rubber ring. To properly seam a can with a style of head of this character requires a three-step operation or the action of three seaming members, one member of which consists of two opposed conical deflecting-rolls. In the art seaming-machines having three seaming members have been previously constructed; but these have not been automatic in their operation. Another object is the production of a machine having three seaming members, one of which comprises two opposed conical deflecting-rolls, which are brought successively into operation by automatic means. In application for Letters Patent, Serial No. 105,846, filed on the 3d day of May, 1902, is shown a seaming-machine having two seaming members which automatically act upon the can-head after certain mechanism is started by the operator. My invention contemplates the extension of this to include the two deflecting-rolls above mentioned. As in the said application referred to above, the present application shows a clamp for holding the work, preferably in the form of a continuously-rotating chuck, and a rotatable pad carrying the work adapted to be elevated so that the work is clamped or held between it and the chuck, and thereby caused to rotate at a high rate of speed. Similarly, as in application Serial No. 105,846, the automatic means for operating the seaming members are located on a shaft at the rear of the machine, which is driven at a slow speed, making one revolution to each complete seaming operation, by means of a worm and worm-

wheel and other connections. A one-revolution clutch and a controlling device is also used in the present form, together with a treadle mechanism for starting the seaming operation and elevating the pad and for actuating the controlling device above referred to, which latter then in turn controls the treadle and through that the other members and connections operated by same and maintains them in the position to which they have been moved by the treadle for the proper length of time, after which it automatically releases the said treadle and members depending on same. In the present instance, however, a bracket adjustable toward and away from the clamp carries the seaming and other mechanism, the cam-shaft, motion-transmission mechanism, and suitable connections, as will be more fully hereinafter set forth.

The means for operating the opposed conical deflecting-rolls comprises, preferably, two vertical sliding members, one located inside the other, cam devices and connections for moving the said vertical sliding members in opposite directions, and suitable mechanism between the rolls and the said sliding members. It will be remembered that in the present construction the seaming members and carrier member partake of an oscillating motion, and for that reason the said sliding members are conveniently located inside of the pivot on which oscillates the said seaming mechanism and which for that purpose is made hollow.

My invention further comprises the features of construction and combination of parts, as will be more fully hereinafter set forth, and finally pointed out in the claims.

In the drawings I have embodied my invention in a suitable form; but changes in construction may of course be made without departing from the spirit of my invention.

In the said drawings, Figure 1 is a side elevation of a double-seaming machine embodying my invention. Fig. 1^a is a front view of the upper bearing of the chuck for rotating the work. Fig. 1^b is a front view of the means for raising the pad which supports the work. Fig. 2 is a plan view of the seaming members, the means for actuating same, and adjacent elements. Fig. 3 is a sectional view on the irregular line $x\ x$ of Fig. 2. Fig. 3^a is a detail view of the one-revolution clutch. Fig. 4 is a view of one end of a can-body and one form of head to be attached thereto. Fig. 4^a shows the head in position before the seaming operation commences. Fig. 5 shows the action of the first seaming member on the head and body at the beginning of its operation. Fig. 6 shows the completed action of the first seaming member. Fig. 7 shows the second seaming member about to act upon the seam. Fig. 8 shows the completed operation of same. Fig. 9 shows the action of the third seaming member. Fig. 10 is a fragmentary view, on a large scale, of a body and head having a rubber ring interposed before the seaming operation. Fig. 10^a is a view of the same parts after the seaming operation is completed. Fig. 11 is a view of one end of a can-body with a head in position different in form from that shown in the preceding views. Fig. 12 shows the action of the first seaming member on this form of head. Fig. 13 shows the second seaming member about to act upon the seam of this form of head. Figs. 14 and 15 show, respectively, the action of a round and a flat third seaming member on this form of head.

Similar letters of reference indicate corresponding parts in the different views.

The different parts of the machine are mounted in a suitable framework, as A, having the counter-shaft a' located in this instance at the base of the machine. This shaft is operated by means of the loose and fast pulleys a^2 and a^3, adapted to receive a belt which is shifted by the operator with the mechanism a^4, operated by the handle a^5 in a well-known manner.

The clamp B or other means for holding the work while the seam is formed consists in the present case in part of an upright spindle b', located at the upper end of the framework and mounted in the hangers b^2 and b^3, the upper of which is provided with the adjustable tightening device b^4 of a well-known construction. The spindle carries at its lower end a chuck b^5, which is preferably continuously rotated by means of the pulley b^6, idlers b^7, one on each side of the machine, but only one of which is seen, pulley a^6, and the belt a^7. The other part of the clamping device is in the form of a pad b^8, mounted on the upright spindle b^9, sliding in the bushing b^{10}. This spindle carries a fast collar b^{11} and a loose collar b^{12}, between which is interposed the springs b^{13}.

b^{14} is a horizontal rock-shaft mounted in the bushing b^{10}, provided with arms b^{15} on either side of the spindle b^9, connected to the loose collar b^{12} by means of the flat straps b^{16}.

b^{17} is a stop limiting the downward movement of the loose collar, taking in the present case the form of a collar provided with an adjustable screw b^{18}.

The pad b^8 is normally stationary, but when elevated so that the can carried by same is clamped between it and the chuck b^5 it of course partakes of the rotating motion of the said chuck. In order that it may run freely, the said pad is mounted in the spindle b^9, with an antifriction-bearing b^{25}, in a well-known manner.

C denotes the seaming mechanism proper, carried by a bracket c', slidable horizontally and longitudinally in the guides c^2 of the framework toward and away from the clamping device, so as to make it adjustable for different sizes of cans. This adjustment is obtained by means of the rock-shaft c^3, mount-

ed in the framework horizontally and transversely of the machine and carrying the projection c^4, protruding into the notch c^5 on the lower side of the said bracket and operated from the handle c^6. To tighten the said bracket in position after the proper adjustment has been obtained, a suitable clamp, as c^7, well known in mechanics is used.

At the rear of the machine the bracket c' carries a horizontal cam-shaft c^8 for operating the seaming mechanism extending transversely of the machine and driven at a slow speed through the worm-wheel c^9 and worm c^{10}, the latter mounted on the stub-shaft c^{11}, extending longitudinally of the machine and at right angles to the cam-shaft c^8 and carrying the cone-pulley c^{55}. The stub-shaft c^{11} and elements carried by same, as well as the cam-shaft, are movable with the bracket c', so that the power-transmission mechanism is adjustable with same. The cone-pulley c^{55} is connected with a corresponding cone-pulley c^{12} on the shaft a' by means of the belt c^{13}. Of course when the bracket c' is adjusted the cone-pulley on the shaft a' can be adjusted to correspond with the same.

The cam-shaft could of course be operated continuously; but it is preferred to operate it intermittently. To this end I place a one-revolution clutch, as D, upon the shaft c^8 and mount the worm-wheel c^9 loosely upon the same, so that the said worm-wheel is driven continuously. I then provide the worm-wheel with clutch-surfaces, as d', and cut a groove c^{14} in the shaft c^8 longitudinally of the same. In this groove is placed a bolt d^2, held normally against the clutch-surfaces d' of the worm-wheel by means of the spring d^3, so as to rotate the shaft c^8 with the worm-wheel. The said bolt d^2 projects above the periphery of the shaft c^8 and is provided with a transverse slot or cut-out d^4.

d^5 is a finger having a beveled point mounted on the bracket c', normally caused to bear upon the shaft c^8 by means of the spring d^6. As the shaft c^8 rotates the finger d^5 when in contact with the said shaft will enter the cut-out d^4 and gradually cause the bolt d^2 to be moved out of contact with the clutch-surfaces d', thus stopping the rotation of the shaft c^8. The finger d^5 is moved out of contact with the shaft c^8 by means of the lever d^7, connecting-rod d^8, and arm d^9, the latter attached to the rock-shaft d^{10}, which in turn is connected to the rock-shaft b^{14} by means of the arms d^{11}, so that both can be operated by means of a single treadle E or other mechanism connecting with the rock-shaft d^{10} by means of the lever c' and crank-arm e^2. In order to compensate for adjustment of the bracket c', the connections are made adjustable, as at d^{15}.

In the present instance the shaft c^8 is geared to make one revolution to every complete seaming operation. Hence it is necessary that after the finger d^5 has been moved out of contact with the shaft c^8 it should remain out of contact with same during about one revolution of the said shaft and also that the pad b^8 should remain elevated during the seaming operation. To relieve the operator of the necessity of keeping the treadle E depressed during this period, I provide means whereby the pad b^8 will remain in its elevated position and also whereby the clutch mechanism will remain in engagement to rotate the shaft c^8 during the proper length of time. This will conveniently consist of a cam f', making one revolution to each revolution of the shaft c^8 and preferably mounted on same, provided with a notch f^2. A bell-crank or other device f^3, pivoted on the bracket c' at f^4, has a roll f^5 in constant engagement with the cam f'. The bell-crank f^3 is connected at its other end f^6 to the rod f^7, attached to the arm f^8 of the rock-shaft b^{14}. These connections are also made adjustable to compensate for the adjusting movement of the bracket c', as at f^{20} and f^{21}. By this means when the treadle E is depressed the pad b^8 will be elevated and the finger d^5 moved out of contact with the shaft e^8, and simultaneously therewith the roll f^5 will be lifted out of the notch f^2. The treadle is depressed sufficiently long to enable the rotation of the shaft c^8 to move the cam f' far enough to allow the notch f^2 to pass the roll f^5, so that the return of the treadle by means of the spring E' is prevented during the remaining part of the seaming period by the cam f' and the roll f^5, with the consequent result of keeping the pad b^8 elevated and the clutch D closed. When the roll f^5 again reaches the notch f^2, the treadle and other connections are of course released and the pad b^8 moved down and the clutch D opened.

The cam-shaft c^8 carries three additional cams c^{15}, c^{16}, and c^{17}, conveniently formed as one element. Substantially central of the bracket c' is an upright and hollow pivot c^{18}, mounting a carrier member c^{19}, which turns on the said pivot in opposite directions by means of the roll c^{20} engaging with the cam c^{15}. At the end adjacent to the clamp for holding the work the said carrier member is provided with a plurality of seaming members, in the present instance three, arranged in an arc of a circle and caused to travel in an arc of a circle substantially tangent to the seam to be formed by the turning motion of the carrier member c^{19}.

The carrier member and the seaming members may be variously formed, but are preferably constructed as follows: The carrier member is provided with two supporting side pieces c^{21}, having guideways c^{22} on their outer sides running longitudinally of the machine. The first seaming member c^{23} in the form of a roll having a circumferential groove horizontally disposed is mounted in the said guideway c^{22} by means of the sliding piece c^{24}, bifurcated at the end, so as to support the roll

on the pivot c^{25}, thereby allowing it to turn freely when engaging the flanges of the can in a well-known manner. The sliding piece c^{24} is held in position by means of the transverse bolt c^{26} passing through the supporting side pieces c^{21} and is individually adjustable by the set-screw c^{27} at the end. The third seaming member c^{28} on the outer side of the other side piece c^{21} is constructed substantially similarly, but is allowed a slight play by being mounted on a bracket c^{29}, which turns on the pivot c^{30}, and is held normally in position up against one of the said side supporting-pieces c^{21} by the spring c^{31}. The second or intermediate seaming member c^{32} is composed of two opposed conical rolls c^{33} and c^{34}, one below and one above the plane of the seam to be formed in a well-known manner. These rolls of course partake of the horizontal turning movement of the carrier member, but also have a vertical movement toward and away from each other in order to properly act upon the seam. To this end the lower roll c^{33} is pivoted, so as to rotate freely in an arm c^{35}, located inside of the side supporting-pieces c^{21} on the bolt c^{26} and bifurcated at its rear end and provided with rolls c^{37}, projecting into the circumferential groove c^{36} of the vertical sleeve c^{38}, extending, preferably, through the pivot c^{18}, so as not to oscillate with the same. The upper roll c^{34} is similarly pivoted in an arm c^{39}, mounted on the transverse bolt c^{26} inside of the arm c^{35}, which latter is cut out, as shown, to allow the arm c^{39} to be mounted on the said bolt c^{26}. It is bifurcated at its rear end and provided with the rolls c^{40}, projecting into the circumferential groove c^{41} on the stem c^{42}, extending through the sleeve c^{38} and the pivot c^{18}, so as not to partake of the oscillating motion of the carrier. c^{43} is a shaft supported horizontally on the bracket c' and carrying loosely two arms c^{44} and c^{45}, having friction-rolls at their ends engaging in opposite directions and toward each other, respectively, with the cams c^{16} and c^{17}. A spring c^{46} serves to keep both arms against their respective cams. The arm c^{44} is provided with an extension c^{47}, bifurcated at its free end and provided with rolls c^{48}, projecting into the circumferential groove c^{49} of the stem c^{42}. The arm c^{45} carries an extension c^{50}, also bifurcated at its free end and provided with rolls c^{51}, projecting into the circumferential groove c^{52} of the vertical sleeve c^{38}. By these devices opposed movements are given to the two conical rolls, the stem c^{42} moving upward to cause a corresponding downward movement of the upper roll c^{34} and the sliding sleeve c^{38} moving downward to cause a corresponding upward movement of the lower roll c^{33}. To compensate for any adjustment of bracket c', the position of the grooves can be varied by moving the flanges c^{53} and c^{54} of same, the stem and sleeve being for that purpose threaded, as shown in Fig. 13. This adjustment obviously could be obtained by other means.

On either side of the clamping device for the work are located tables g' and g^2 of any suitable construction and preferably adjustable on the ways g^3 by means of a number of screws similar to g^4.

The operation of the machine is as follows: Assuming that power is applied to the counter-shaft a', the revolution of same will rotate the chuck b^5 continuously. The operator now places a can-body with head in position on the pad b^8 and depresses the treadle E, thereby elevating the said pad b^8 and also causing the finger d^5 to be lifted up from the shaft c^8, so as to close at one revolution clutch D and operate the said shaft c^8, while simultaneously with this the roll f^5 is moved out of the notch f^2, thus permitting the said rotation. As soon as the notch f^2 has passed the roll f^5 the operator can take his foot off the treadle, and the machine will continue to run, as previously explained. The parts are so arranged that at the beginning of the operation the two opposed conical deflecting-rolls will be tangent with the seam to be formed, but in different planes, so as not to come in contact with the flanges of the head and body of the can. This is best seen in Figs. 2 and 3. The rotation of the shaft c^8 will cause the cam c^{15} to turn the carrier member c^{19} so as to bring the first seaming member c^{23} toward the work and into operating position with relation to same. The carrier member is now turned back in the opposite direction, thus bringing the two opposed conical rolls into operating position. Simultaneously with this the sleeve c^{38} and the stem c^{44} are moved, respectively, downward and upward, thus causing the said rolls to engage with the seam, the arrangement being such that the lower roll reaches the seam first. The carrier mechanism is now moved again in the same direction, so as to bring the third seaming member c^{28} into operating position, thereby finishing the operation, after which the carrier mechanism is turned back to its central position. Just previous to this the notch f^2 has reached the roll f^5, again having made one complete revolution, thereby releasing the treadle, clutch, &c. Observing now the effect of the several seaming members upon the flanges of the head and body of the can, I shall first point out their action when a head with a "burred" flange is used. Such a head is shown in Figs. 4 and 4^a, where it is marked x and the body marked y, while the burred flange is denoted by x'. With this style of head the first seaming member takes the form of a roll c^{23}, having a circumferential groove horizontally disposed. This member upon coming in contact with the said burred flange x' crimps it in under the flange y' of the body y of the can, the beginning and end of this operation being shown in Figs. 5 and 6, re-

spectively. The two conical rolls now come into action, the lower one of which first moves into position, as shown in Fig. 7, after which the upper roll descends and deflects the seam, as shown in Fig. 8. The third roll finishes the operation by pressing the seam against the body of the can, as shown in Fig. 9. The rubber ring x^2, interposed between the flanges of the head and body, is shown on an exaggerated scale in Fig. 10, while the finished seam is shown in Fig. 10^a.

When the style of head shown in Fig. 11 is used where the flange x^3 is straight horizontally, the first roll, as shown in Fig. 12, will curl the flanges of the head and body, the said roll being for that purpose provided with a groove x^4 slightly wider than the one shown in Fig. 5. Then the conical rolls act in the same manner as previously described and as shown in Fig. 13, after which the seam is finished by either of the finishing-rolls x^5 or x^6, (shown, respectively, in Figs. 14 and 15,) depending upon whether a round or a flat finish is desired. The construction of these several seaming-rolls is well known, and no claim is laid to these. The conical rolls could be omitted; but a more perfect seam is obtained by having a three-step operation, and this construction is therefore the more desirable. The terms "curling" and "crimping" applied to the two constructions of the first roll are of course interchangeable so far as the claims are concerned, and the claims should be construed to cover both forms when either is mentioned. In the same manner the finishing-roll may produce either a flat or a round finish, as described.

The pivot c^{18} may of course turn with the carrier member or the latter may simply oscillate around it.

Having thus described my invention, what I claim is—

1. In a machine of the character set forth, the combination of a carrier member mounted on a pivot, a crimping-roll, two opposed conical deflecting-rolls, and a finishing-roll all mounted on the said carrier member, means for oscillating the said carrier member and for moving the conical rolls toward and away from each other, the arrangement being such that the said carrier member is automatically turned first in one direction so as to move the crimping-roll into operative position, then in the opposite direction to bring the conical rolls into position, the conical rolls then being moved toward and away from each other, and the carrier member then moving in the same direction as previously to move the finishing-roll into position.

2. In a machine of the character set forth, the combination of a carrier member mounted on a pivot, a crimping-roll, two opposed conical deflecting-rolls, and a finishing-roll all mounted on the said carrier member, means for oscillating the said carrier member, two sliding members located inside the pivot, and cams and connections for operating said sliding members in opposite directions to move the conical rolls toward and away from each other, the arrangement being such that the said carrier member is automatically turned first in one direction so as to move the crimping-roll into operative position, then in the opposite direction to bring the conical rolls into position, the conical rolls then being moved toward and away from each other, and the carrier then moving in the same direction as previously to move the finishing-roll into position.

3. In a machine of the character set forth, the combination of a carrier member, a plurality of seaming members mounted on same, means for oscillating said carrier member, and means for adjusting it in a straight direction.

4. In a machine of the character set forth, the combination with a carrier member of a plurality of seaming members, including conical deflecting-rolls, of means for oscillating said carrier member, and means for moving the conical rolls toward and away from each other, comprising oppositely-sliding members extending through the carrier member but not oscillating with the same.

5. In a machine of the character set forth, the combination with a carrier member of a plurality of seaming members, including conical deflecting-rolls, of a hollow pivot on which said carrier member is mounted, means for oscillating the said carrier member, sliding members located inside of the said pivot, and means for moving said sliding members in opposite directions to operate the deflecting-rolls.

6. In a machine of the character set forth, the combination with a crimping-roll, two opposed conical deflecting-rolls, and a finishing-roll, of automatic means to cause the said rolls to act in the order named to form a double seam.

7. In a machine of the character set forth, the combination with an adjustable bracket, of seaming members, and a cam-shaft with cams for operating said seaming members, all carried by said bracket.

8. In a machine of the character set forth, the combination with an adjustable bracket, of seaming members, a cam-shaft with cams and connections for operating the seaming members, and power-transmission mechanism for the cam-shaft, all carried by said bracket.

9. In a machine of the character set forth, the combination with an adjustable bracket, of an oscillating carrier member, seaming members carried by same, a cam-shaft with cams and connections for operating the seaming members and the carrier member, and power-transmission mechanism for the cam-shaft, all carried by said bracket.

10. In a machine of the character set forth, the combination with an adjustable bracket, of an oscillating carrier member, seaming members including opposed conical deflecting-rolls carried by same, a cam-shaft with cams

and connections for operating the deflecting-rolls and the carrier member, and power-transmission mechanism for the cam-shaft, all carried by said bracket.

11. In a machine of the character set forth, the combination of an adjustable bracket, a carrier member mounted on a pivot, a crimping-roll, opposed conical deflecting-rolls, and a finishing-roll on the carrier member, a cam-shaft, a cam and connections for oscillating the carrier member, two sliding members located inside the pivot, and cams and connections for operating said sliding members in opposite directions to move the conical rolls toward and away from each other, all carried by the bracket.

12. In a machine of the character set forth, the combination of an adjustable bracket, a carrier member mounted on a pivot, a crimping-roll, opposed conical deflecting-rolls, and a finishing-roll on the carrier member, a cam-shaft, a cam and connections for oscillating the carrier member, two sliding members located inside the pivot, and cams and connections for operating said sliding members in opposite directions to move the conical rolls toward and away from each other, and power-transmission mechanism for the cam-shaft, all carried by the bracket.

13. In a machine of the character set forth, the combination of two opposed conical deflecting-rolls, pivoted arms carrying said rolls, sliding members located one inside the other, and cams and connections for moving said sliding members in opposite directions so as to operate the rolls.

Signed at Brooklyn, New York, this 24th day of December, 1902.

OTTO S. BEYER.

Witnesses:

FREDERICK H. MCGAHIE,

J. C. MCCARTY.