(No Model.) 3 Sheets—Sheet 1.

F. B. SHUSTER.

SHEET METAL STRAIGHTENING AND CUTTING-OFF MACHINE.

No. 602,273. Patented Apr. 12, 1898.

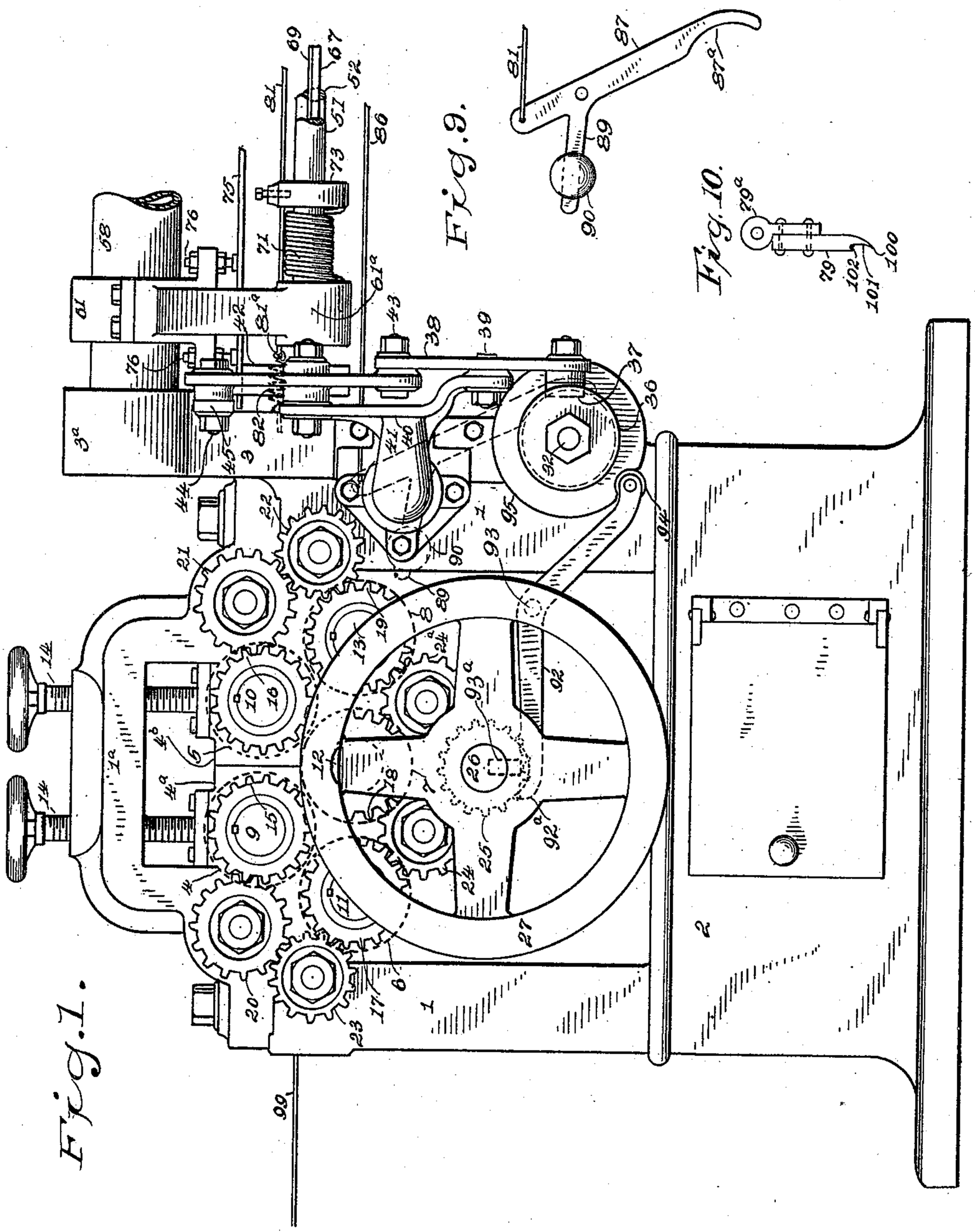

Fig. 1.

Fig. 9.

Fig. 10.

WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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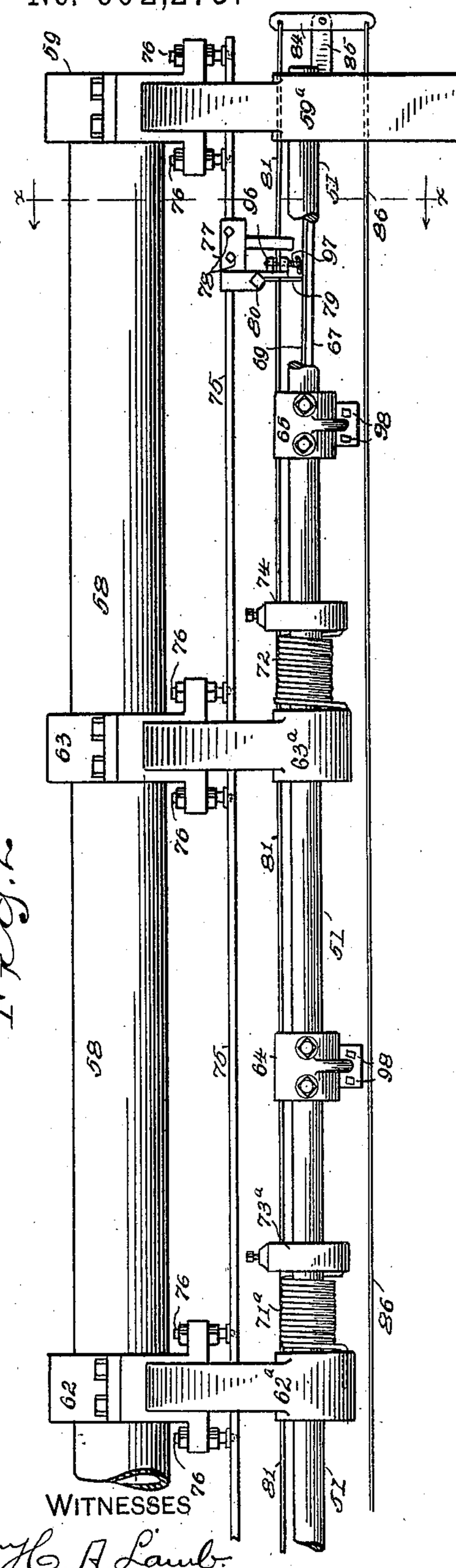

Fig. 2

Fig. 3.

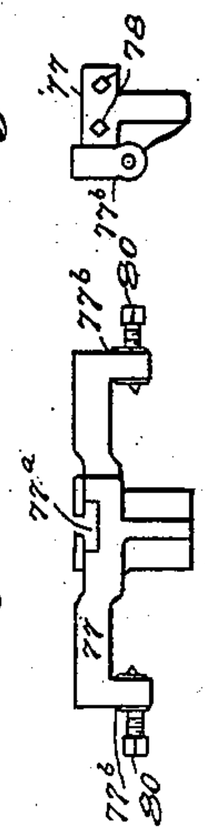

Fig. 5.

Fig. 6.

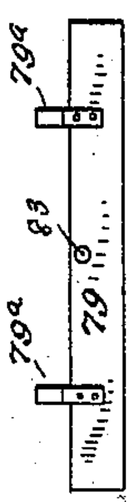

Fig. 8.

Fig. 7.

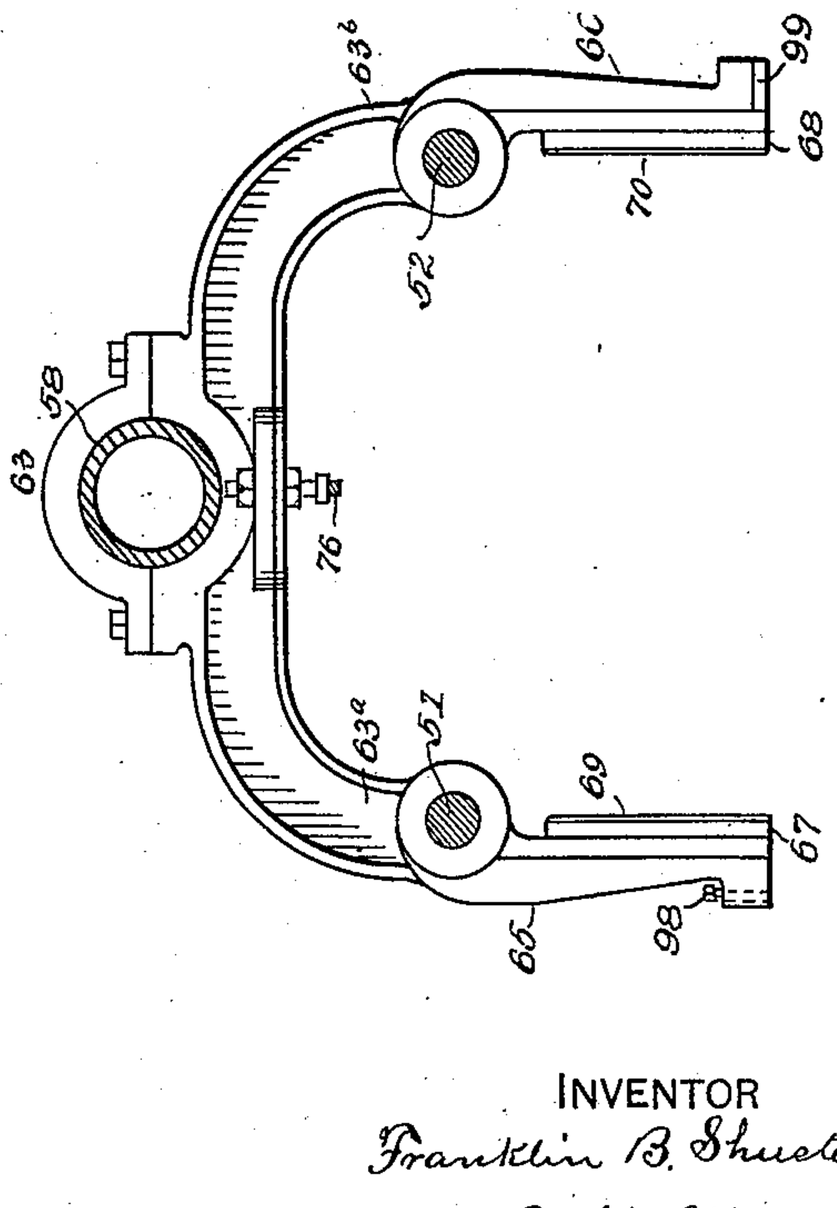

Fig. 4.

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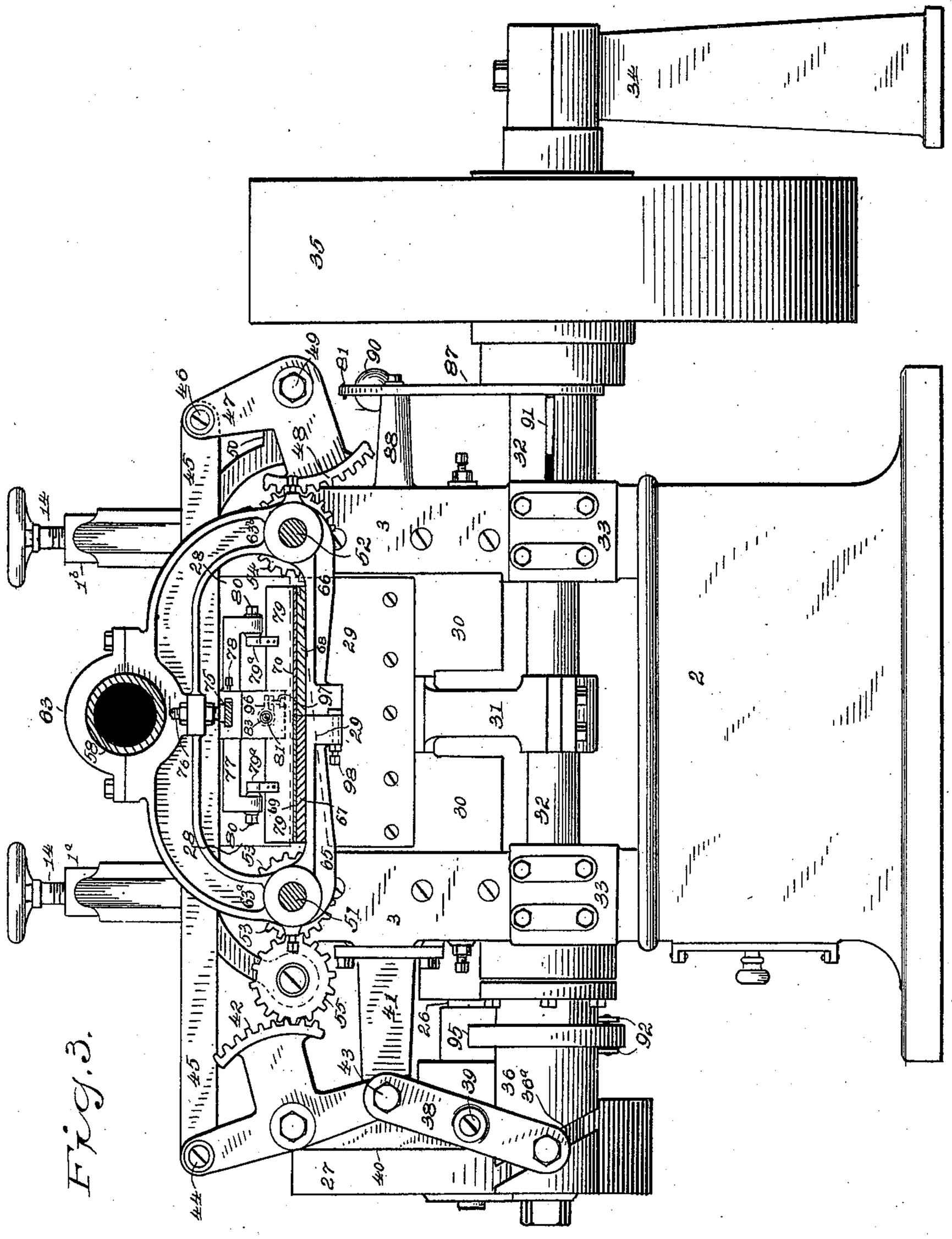

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

FRANKLIN B. SHUSTER, OF NEW HAVEN, CONNECTICUT.

SHEET-METAL STRAIGHTENING AND CUTTING-OFF MACHINE.

SPECIFICATION forming part of Letters Patent No. 602,273, dated April 12, 1898.

Application filed June 15, 1896. Renewed September 18, 1897. Serial No. 652,177. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN B. SHUSTER, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Sheet-Metal Straightening and Cutting-Off Machines, of which the following is a specification.

My invention relates to a machine for automatically straightening sheet metal and cutting off the same into predetermined lengths; and it consists in certain details of construction that will be more fully set forth in the accompanying specification and such features as are believed to be new and novel particularly pointed out in the claims.

To enable others to understand my invention, reference is had to the accompanying drawings, in which—

Figure 1 represents a side elevation of the roll-supporting head and its supporting-standard, end elevation of the cutting-off press integral with the head, and broken view of the machine extension, consisting of the large tubular supporting-shaft and table-operating rods and table. Fig. 2 is a broken continuation of the extension shown at Fig. 1, showing the tables in closed position and the end standard for supporting the extension. Fig. 3 is a front elevation of the machine and extension on line *x* of Fig. 2. Fig. 4 is a detail front elevation of one of the table-rod supports, sectional view of the tubular shaft from which each support is suspended, sectional view of the table-operating rods in the free ends of said support, and tables mounted on such rods, such tables shown in open position, so as to allow the metal severed strips to drop therefrom. Fig. 5 is a detail front elevation of the trip-plate support. Fig. 6 is a detail end elevation of the same. Fig. 7 is a detail front elevation of the trip-plate. Fig. 8 is a detail end elevation of the same. Fig. 9 is a detail side elevation of the trip-lever for operating the clutch mechanism of the cut-off press. Fig. 10 is an enlarged detail view of the trip-plate so constructed with a view to its being engaged by very thin metal.

Its construction and operation are as follows:

1 represents the roll-supporting head or frame, mounted upon the hollow base 2.

3 is the cutting-off-press frame, preferably made integral with the head 1.

4, 5, 6, 7, and 8 are the straightening-rolls. (Shown in dotted position between the uprights of the head.)

9, 10, 11, 12, and 13 are shafts for such rolls. The upper rolls 4 and 5 are journaled in the boxes 4^a and 4^b of the uprights 1^a and 1^b and are vertically adjustable therein by means of the screws 14, the lower rolls being journaled in stationary boxes (not shown) of said frame.

15, 16, 17, 18, and 19 are gears mounted on the projecting ends of said roll-shafts, and 20, 21, 22, 23, 24, and 24^a are intermediates that register with the roll-gears and the driving-gear 25, mounted upon the driving-shaft 26, and 27 is a driving-pulley for the rolls, also mounted on the end of said shaft.

28 (see also Fig. 3) is the upper or stationary knife or cutter placed at the upper part of press-frame 3, and 29 is the angular vertically-operating cutter or knife attached to the gate 30. 31 is a pitman connecting such gate with the crank part of the shaft 32, which shaft is journaled in the boxes 33 of the frame. The shaft 32 projects out of said frame and is journaled in the standard 34. 35 is the driving-pulley for such shaft. 36 is a cam-sleeve on the opposite end of said shaft, whose path or groove 36^a carries the roll 37 on the end of the lever 38. This lever is centrally pivoted on the stud 39 in the lower end of the arm 40 of the standard 41, attached to the frame 1. Pivotally supported on the upper end of arm 40 is the toothed segment 42. The lower arm of this segment is pivotally supported on the stud 43 in the upper end of the lever 38. The upper end of the said arm is pivotally supported on the stud 44 on the end of the cross-bar 45. The opposite end of this cross-bar is pivoted on the stud 46 in the end of the bell-crank lever 47, carrying at its opposite end the toothed segment 48. This bell-crank lever is pivotally supported on the stud 49, projecting from the lug 50 of the frame 1.

Rigidly mounted on the inner ends of the table supporting and operating rods 51 and 52 are the gears 53 and 54. The segment 48 registers directly with the gear 54, while seg-

ment 42 registers with the intermediate gear 55, which in turn registers with the gear 53. This arrangement rotates the rods 51 and 52 in opposite directions.

58 is a large tubular supporting-shaft rigidly supported in the circular head 3ª of the press-frame 3 and the opposite end in the table-rod support 59 of the outer standard 60, Fig. 2. The tubular shaft 58 is made longer or shorter, according to the size of the machine required. In the present instance this shaft is about twelve feet in length, and the table-rod supports 61, 62, and 63 suspended from this shaft are placed about three feet apart and in form are a duplicate of each other, (see Figs. 3 and 4, where the arms 63ª and 63ᵇ are fully shown,) while in the side elevations, Figs. 1 and 2, one only, 61ª, 62ª, and 63ª, is shown. The support 59 is similar in construction to the intermediate supports, but, as before mentioned, is rigidly attached to the end standard 60, so that only one of its arms 59ª is shown.

In the lower end of the several arms of the supports are journaled the table-rods 51 and 52, and mounted on these rods are the table-supporting arms 64 and 65, Fig. 2. It will also be understood that any number of these arms may be used and that opposite the arms on the rod 56 are also other or companion arms mounted on the rod 52, (see also Figs. 3 and 4,) where one only, 66, is shown. These several arms are rigidly attached to the side rods 51 and 52, so as to turn with such rods in the manner presently to be more fully described. The table proper is represented by the wooden strips 67 and 68, Fig. 4, and these strips are preferably continuous—*i. e.*, the strip 67 is supported upon the upper surface of the table-arms on the rod 51, while the strip 68 is likewise supported upon the table-arms of the rod 52, so that when these arms are brought into a horizontal position, as shown at Fig. 3, their upper surface will form a continuous unbroken table. I prefer to line the upper surface of these table-strips with the thin metal strips 69 and 70, so that when the machine is operating on polished metal sheets such sheets will not become marred or scratched.

About each of the table-operating rods 51 and 52 and close to each arm of the several rod-supports are coiled springs to assist in closing the table, three of which springs, 71, 71ª, and 72, being shown on the rod 51. The free ends of these springs are anchored in the rod-supporting arms 62ª and 63ª, while the opposite ends of such springs are anchored in the face of the collars 73, 73ª, and 74, attached to the table-rod.

75 is a trip-supporting rod (preferably flat) held suspended above the tables by the adjusting-screws 76 of the table-rod supports 61 62, &c.

77 is a trip-supporting frame having the opening 77ª, Fig. 5, to embrace the rod 75, combined with the set-screws 78 for securing such support in any of its adjusted positions along its rod.

79 is the trip-plate, whose ears 79ª are pivotally supported on the pointed screws 80 of the downward-projecting ears 77ᵇ of the support 77.

81 is a wire having the eye 81ª at its inner end, which connects with the coiled spring 82, anchored to the press-frame 3. The other end of this wire, after passing through the hole 83 of the trip-plate 79, is attached to the lever 84, pivoted to the stud 85, Fig. 2. To the lower end of this lever is attached the wire 86, which wire runs back to the machine-head and is connected (see Figs. 1, 3, and 9) to the upper end of the trip-lever 87, pivotally supported on the stud 88 of the machine-frame. This lever is provided with the arm 89, carrying the adjustable weight 90. The opposite end of this lever has the curved portion 87ª, so as to partially encircle the driving-shaft 32 of the cutting-off press. 91 is a key operating in a keyway in such shaft and engages with the driving-pulley hub to throw the cutting-off press in operation. The arrangement of the lower part of the lever 87 and key 91 being a common form employed for utilizing power, no further description will be needed.

92, Figs. 1 and 3, is a lever pivoted on the stud 93 and performs the same function for the gear-driving shaft 26. The end 92ª of this lever engages with the movable key 93ª, while the opposite end carries the roll 94, which roll is adapted to engage with the circumference of the flange 95, in whose face is formed a semicircular groove whose purpose will hereinafter be more fully explained.

96 is a clamp embracing the upper wire 81 and is located immediately in the rear of the trip-plate 79. 97 is the tightening-screw for securing said clamp in position. When, therefore, the trip-plate is shifted, the clamp will also be moved so as to occupy the same relative position with it, as shown.

98 are screws in one set of the table-arms, which screws are adapted to engage with the face of the opposite arms, so as to compensate for any wear that may occur from constant contact of the meeting faces of the pairs of arms, in which case it might also be advisable to insert in the opposite arm (see arm 66, Fig. 4) the piece 99, against which piece the points of the screws 98 will engage.

The trip-plate 79 hangs, as before mentioned, just clear of the supporting-table, so that the end of the metal sheet will strike against such trip to operate it. When, therefore, very thin metal strips strike the trip, the tendency will be for such strips to curl up at the end and follow to a certain extent up the face of the trip until sufficient force has accumulated to open the trip, which will result in making a variation in the lengths between thin and thick metal. To prevent this, I have constructed the lower end of the trip hook-shaped, as shown at Fig. 10—*i. e.*, from the extreme point 100 there is provided the

upward curve 101, which curve terminates at the shoulder 102. Now when a thin piece of metal strikes the point 100 the tendency of the curve 102 will be to carry the end of such strip up to the shoulder 102, where it will stop, and further pressure of such strip will be exerted to open the trip and cut off the metal. This curved feature of the trip, combined with the stop, will always insure thin metal strips following up such curve and open the trip and not pass under the same or too far up the face of the trip.

Operation: The metal strip 99, Fig. 1, is delivered from a reel (not shown) and is carried through the straightening-rolls 4, 5, 6, 7, and 8, while the cutting-press mechanism remains stationary, and such strip is carried along the table until the end thereof strikes the trip-plate 79, which trip, engaging the clamp 96 on the wire 81, will actuate the lever 84 and the lower wire 86, which action will tilt the weighted clutch-lever 87, disengaging the lower end of such lever from the key 91 of the cutting-press driving-shaft 32. This will cause such shaft to rotate and carry the knife 29 up to sever the metal strip. As soon as the shaft 32 begins to rotate, the roll 94 of the lever 92 will be carried out of its circular seat in the face of the flange 95 and depress the roll end of such lever and cause its opposite end to engage the movable key 93 and stop the further feeding of the rolls, so that the metal will be cut off at any length within the capacity of the machine and determined by the position of the said trip-plate. In the meantime the cam 36 will operate the segment-gears 53 and 54 and open the tables and allow the severed metal strip to drop therefrom. When, therefore, the press-shaft 32 has completed its revolution, the tables will have been carried back to their closed position by the action of the cam and segment-gears before mentioned, and the roll 94 of the lever 92 will drop into its groove on the flange 95 and cause the roll-feeding mechanism to be brought into operation for the feeding forward of another length of metal, while in the meantime the spring 82 will carry the trip-plate back to its normal vertical position in readiness for the forward feed, and this operation will be repeated until all the metal is cut up.

The machine above described is entirely automatic. The metal is straightened and fed to a certain length, the further feeding of the rolls instantly checked, the metal cut off into predetermined lengths, and such lengths automatically delivered from the machine, all in one operation, which is greatly in advance of the old method, where the metal is simply straightened and carried to the cutting-off machine.

As the above-described machine is particularly adapted for straightening sheet metal, it is a matter of much importance, especially with polished metal, that the strips, when cut off, should be delivered from the machine without being scratched or marred. For this purpose the table opens centrally, or substantially so, and the two sections thereof gradually fall away from the strip, so that only the edges of such strip engage with the table in its descent.

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

1. The combination, in a sheet-metal straightening and cutting-off machine, of the straightening-rolls, a support therefor, means, substantially as shown, for operating such rolls, cutting-off mechanism placed forward of such rolls, an overhead supporting-shaft secured in position, substantially as shown, supports depending from said shaft, side rods journaled in the free ends of said supports, table-arms rigidly secured to said shafts, a platform or table on such table-arms, means, substantially as shown, whereby said rods are rotated in their supports and the said table-arms opened and closed, for the purpose set forth.

2. The combination in a sheet-metal straightening and cutting-off machine, of the straightening-rolls and cutting-off mechanism, such cutting-off mechanism placed forward of such rolls, means whereby both sets of mechanism are automatically and independently operated, an overhead supporting-shaft, table-rod supports depending therefrom, table-rods journaled in said supports, a series of table-arms rigidly attached to said rods, a platform mounted on said arms, said platform adapted, when placed in a horizontal position, to form a continuous table, and when said rods are rotated in their supports, the table will open in the center to deliver the metal strips, an adjustable trip to determine the lengths of the metal strips, for the purpose set forth.

3. The combination, in a sheet-metal straightening and cutting-off machine, with the straightening-rolls and cutting-off mechanism, of table-rod supports, a support therefor, rods journaled in such supports, table-arms rigidly mounted on such rods, platforms overlying such arms, gears rigidly mounted on the inner ends of said rods, segment-gears registering therewith, means for operating such segment-gears whereby the table-arms are opened and closed, springs mounted on such rods to assist in closing said table-arms, a trip-plate for determining the length of the metal strips and means whereby said trip-plate will actuate the cutting-off mechanism and cause the straightening-rolls to cease (temporarily) to rotate while the metal is being severed and the said table-arms are being opened, for the purpose set forth.

4. The combination, in an automatic sheet-metal straightening and cutting-off machine, of feeding and straightening mechanism, shearing-cutters through which the metal is fed from the said feeding and straightening mechanism, a two-section table forward of

said cutters, said table adapted to open centrally, each section moving in opposite directions so as to deliver the severed strips flatwise of the metal and thus prevent scratching or marking the face of such strips, combined with a trip to limit the forward feed of said strips, substantially as set forth.

5. The combination, in an automatic sheet-metal straightening and cutting-off machine, of feeding and straightening mechanism, shearing-cutters through which the metal strip passes from said feeding and straightening mechanism, a two-section table forward of said cutters, said table adapted to open in the center, each section having a radial movement on its support so as to deliver the severed strips flatwise, a tripping device pivotally supported above such table when the sections thereof are closed, a balanced trip-lever or other like device connected with the cutting-off mechanism, means for connecting such lever with the tripping device so that, when the end of the metal strip engages such tripping device the cutting-off mechanism will be actuated, substantially as specified.

Signed at New Haven, in the county of New Haven and State of Connecticut, this 3d day of June, A. D. 1896.

FRANKLIN B. SHUSTER.

Witnesses:
FRED. B. BUNNELL,
FRANK A. BUNNELL.