(No Model.) 2 Sheets—Sheet 1.

W. J. BAYRER.

SHEET METAL FOLDING MACHINE.

No. 549,050. Patented Oct. 29, 1895.

Fig. 1.

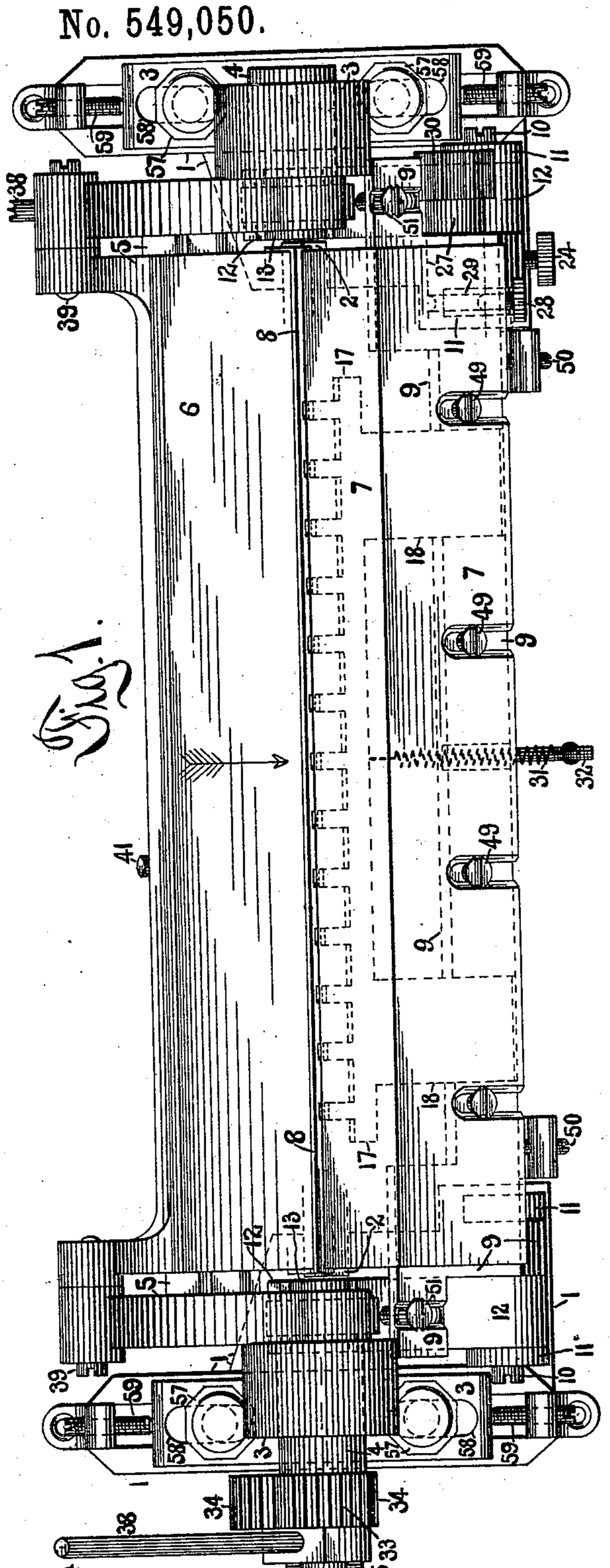
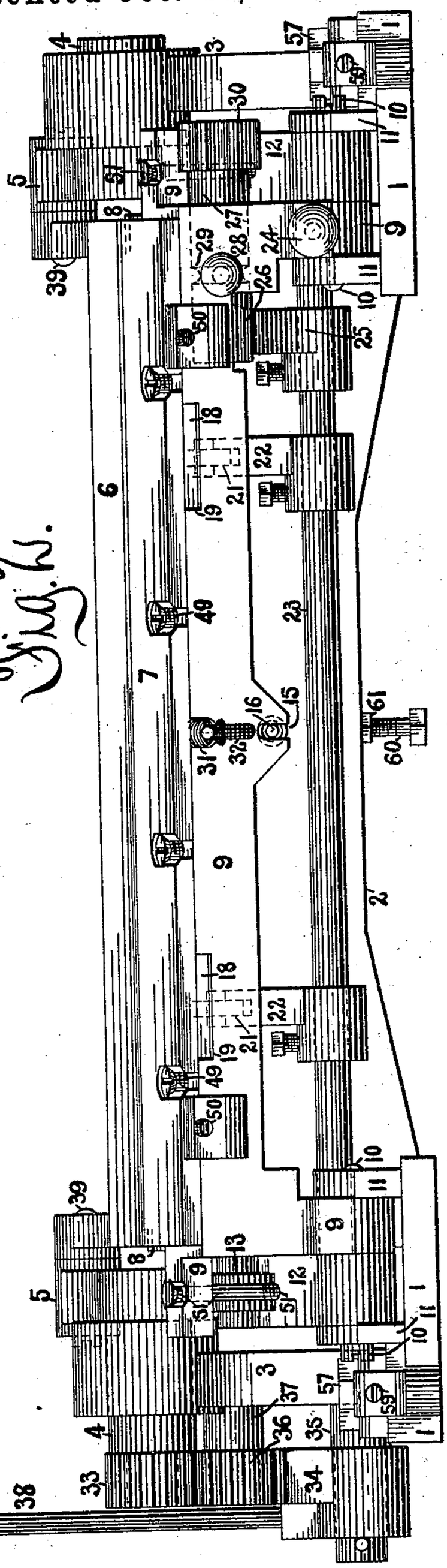


Fig. 2.



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Edson W. Parker.

William J. Bayrer, Inventor;
by Edwin S. Beecher, Attorney.

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

(No Model.) 2 Sheets—Sheet 2.

W. J. BAYRER.

SHEET METAL FOLDING MACHINE.

No. 549,050. Patented Oct. 29, 1895.

Fig. 5.

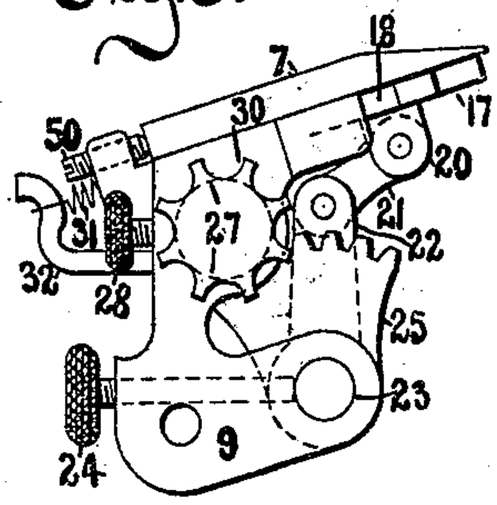


Fig. 8.

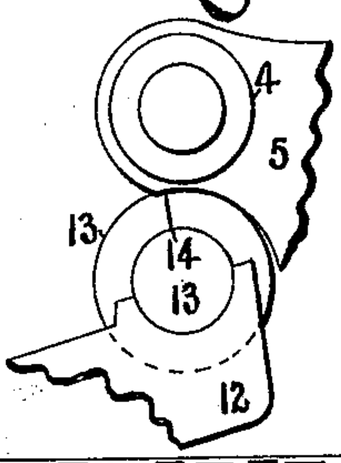


Fig. 3.

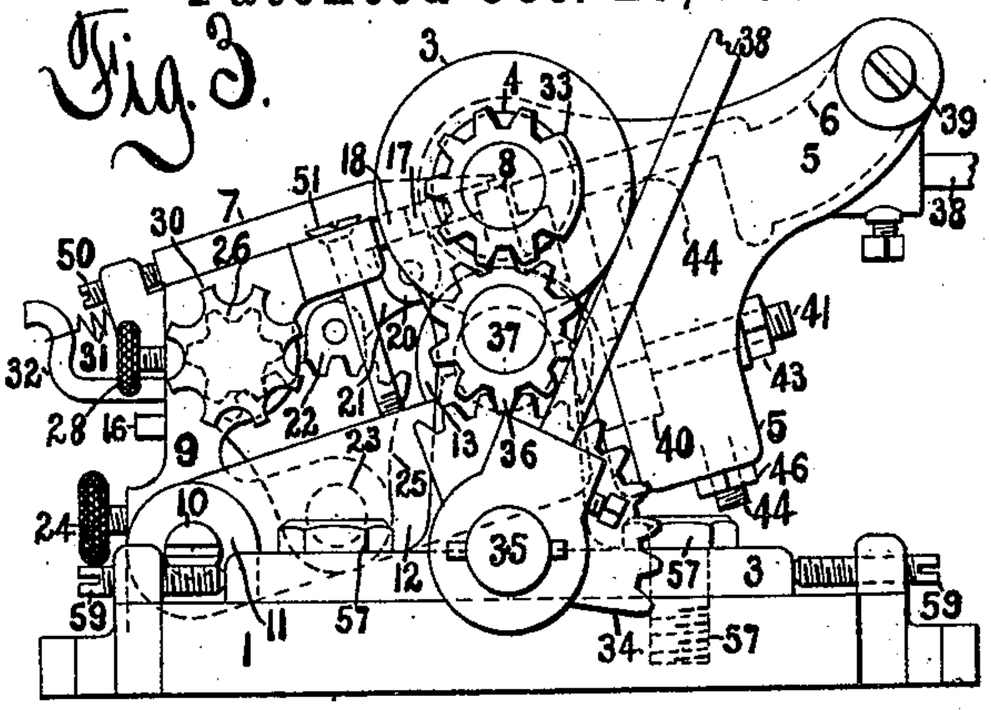


Fig. 6.

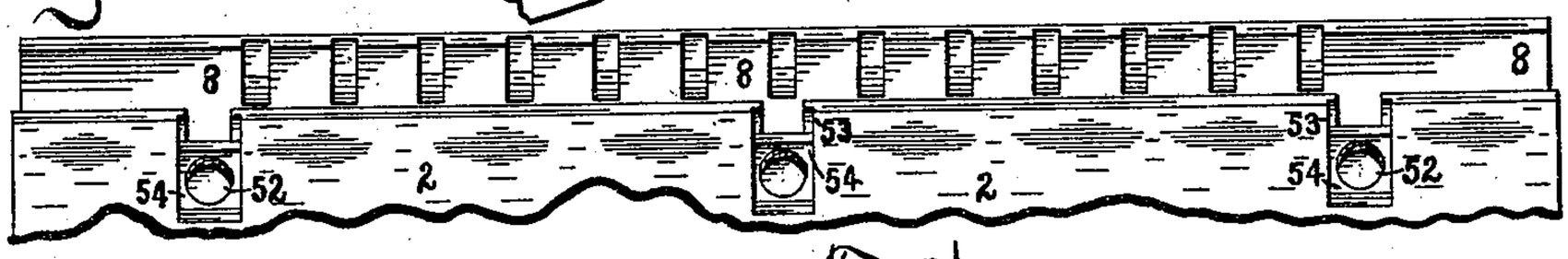


Fig. 7.

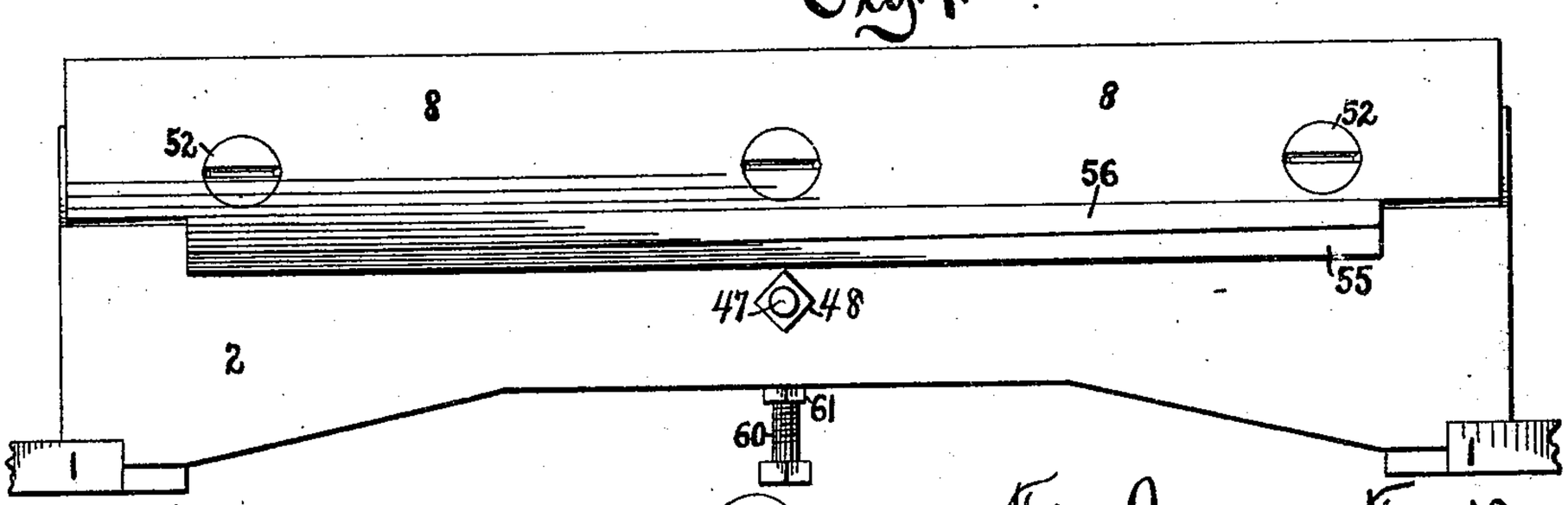


Fig. 4.

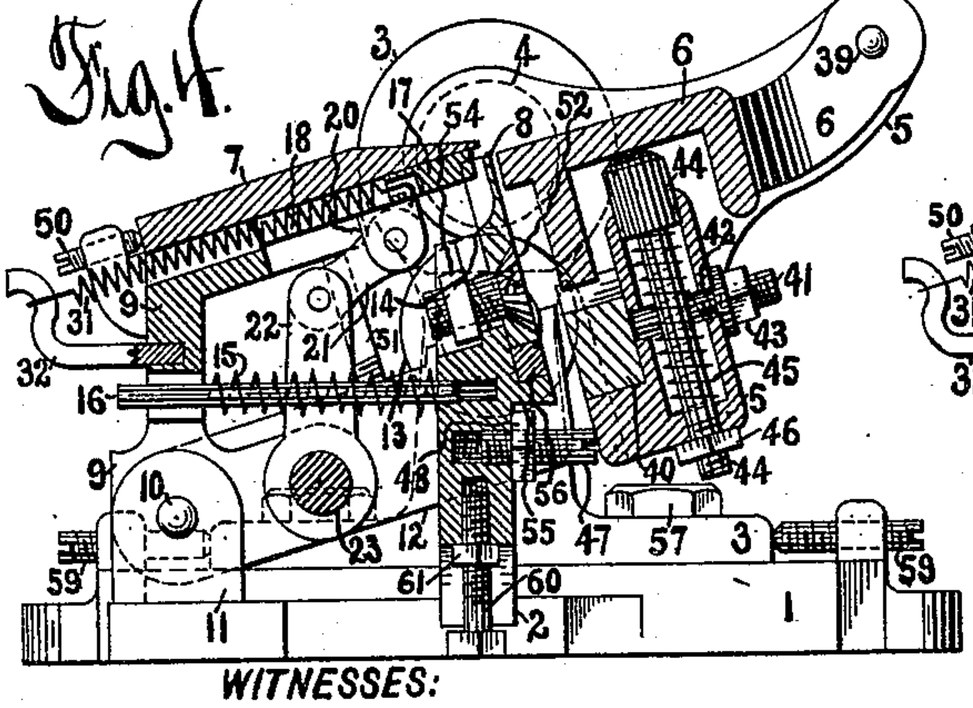


Fig. 9.

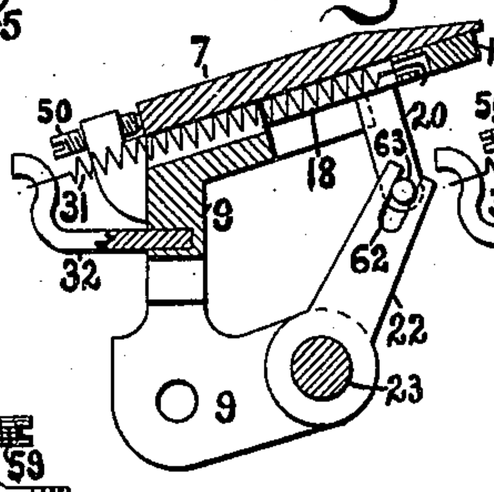
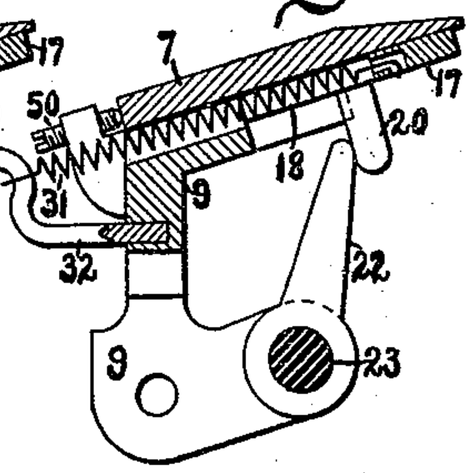


Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM J. BAYRER, OF MARION, ASSIGNOR TO THE PECK, STOW & WILCOX COMPANY, OF SOUTHINGTON, CONNECTICUT.

SHEET-METAL-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 549,050, dated October 29, 1895.

Application filed February 5, 1895. Serial No. 537,417. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. BAYRER, a citizen of the United States, and a resident of Marion, in the county of Hartford and State of Connecticut, have invented certain new, useful, and valuable Improvements in Machines for Folding Sheet Metal, of which the following, when taken in connection with the annexed drawings and characters of reference thereon, constitutes a description sufficiently full, explicit, and exact to enable others versed in the nearest relative art to make and use the same.

My invention relates to machines for folding sheet metal.

The chief object of my invention is to produce a machine for folding sheet metal which shall be simple and durable in construction, facile of manipulation, efficient in operation, and have a large capacity for work.

Other objects and advantages of my invention will hereinafter appear.

My invention consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

I attain the desired achievement by the mechanism illustrated in the accompanying drawings, which said drawings form a part of this specification, and represent, in—

Figure 1, a plan view of a machine embodying my invention; Fig. 2, a view in front elevation of said machine; Fig. 3, a view in side elevation of that machine, the toothed segments 33 34 and pinion 36 being shown at the opposite side of the machine from that on which these parts appear in Figs. 1 and 2; Fig. 4, a view in vertical transverse section of my machine, the cut surfaces all lying in a plane denoted by an arrow, Fig. 1, and the toothed segment 34 being removed; Fig. 5, a view in side elevation, showing detached portions of the machine; Fig. 6, a view in front elevation of parts of the machine; Fig. 7, a view in rear elevation of portions of the machine; Fig. 8, a broken view in side elevation, showing detached portions of the machine; Figs. 9 and 10, sectional views illustrative of modifications in the gage-adjusting mechanism to accomplish the same result.

In said drawings similar numerals of reference indicate corresponding parts throughout the several views.

Referring to the drawings, 1 1 designate the base-plates of the machine, which are connected by a cross-bar or upright 2, formed integral therewith. Said plates and upright form the main frame of the machine, on which the various working parts are supported. Bolted to the base-plates are standards 3 3, which afford bearings for the journals 4 4 of a swinging frame, (designated in a general manner by the numeral 5,) to which is joined and moves therewith a wing or table 6. Said swinging frame and the wing thereof constitute the folding-bar of my machine, which bar is old and is hereby disclaimed.

7 designates the usual folding-plate, around the thin edge of which the folding-bar turns, and 8 designates the usual jaw that co-operates with the folding-plate to hold the sheet of metal while it is being bent by the folding-bar. Said jaw is stationary and is attached to the cross-bar 2 of the main frame of the machine. Said folding-plate is rigidly secured to a frame, (designated in a general way by 9.) This frame is vibratory by being attached by pivot-bolts 10 to projections 11 on the base-plates of the machine. Levers 12 12 may be made integral with said swinging frame or separately and connected with the same, and, if separately, the pivot-bolts 10 may serve as fulcrums for the levers, as depicted in the drawings. In these levers are apertures and bearings, in which are placed friction-rollers 13. The shoulders of the journals 4 4 of the folding-bar (see Figs. 4 and 8) are cut away, as at 14, and otherwise properly shaped, as shown, to form cams for engagement with the friction-rollers 13 to move the levers 12, the frame 9, and consequently carry the folding-plate 7 into contact with the sheet of metal, and then cause it to co-operate with the jaw 8 to hold the sheet while it is being bent. The folding-plate and frame 9 are moved in the reverse direction by a spiral spring 15, Fig. 4, that is interposed between said frame and the upright 2 and encircles a rod 16, which is tightly driven into said upright. Underneath the folding-plate is the ordinary gage 17 for regulating the width of the lock to be turned or formed on the sheet

of metal. This gage is provided with two wings 18 18, Fig. 1, which slide in ways 19, Fig. 2, formed in frame 9. The gage also has under-side projections 20, Figs. 3, 4, and 5, to which are attached links 21, which connect the gage with rigid arms 22, Figs. 2 and 4, of a rock-shaft 23, extending or disposed longitudinally of the machine and for which the frame 9 has bearings, Figs. 2 and 5. Obviously movement of said rock-shaft will cause movement of the gage, and if no other means are provided the rock-shaft may be moved by hand by grasping one or both of the arms thereof. This rock-shaft may be prevented from turning by a thumb-screw 24, Figs. 2 and 5, in frame 9. Thus the gage may be held from moving out of the desired position. Although I have shown the said rock-shaft provided with two arms connected with the said gage, it is perfectly apparent that if applied to a short machine the said shaft may have only one arm connected with the gage, provided, of course, the arm is located centrally of the length of the gage.

The instrumentalities I preferably adopt for moving the rock-shaft 23 I will now proceed to describe. Rigidly mounted upon that shaft is a toothed segment 25 in mesh with a pinion 26, Figs. 2 and 3, which is formed on a shaft 27, Fig. 2, for which the frame 9 furnishes bearing, Figs. 1, 2, and 5, and which is held therein by a screw 28, which enters a circumferential groove 29, Figs. 1 and 2, in the shaft. This shaft has a handle 30, Figs. 1, 2, 3, and 5, by means of which it may be revolved to cause, through the described mechanism, movement of the rock-shaft 23, and consequently movement of the gage 17. Attached to said gage is a spiral spring 31, Figs. 1 and 4, which is also attached to a hook 32, which is driven into frame 9. Said spring of course acts to move the gage in one direction, (back away from the thin edge of the folding-plate,) although the gage-adjusting mechanism hereinbefore described is capable of moving it in both directions and is employed for the purpose of retaining the gage in proper position, regardless of play or wear in the said adjusting mechanism. The gage being constantly acted upon by the spring, it is apparent that during the operation of the machine it will never be displaced. The said spring being a yielding means for retaining the gage in its proper place, it of course does not interfere with or hinder movement of the gage by the adjusting mechanism, and therefore it does not require manipulation preparatory to adjusting the gage.

Referring to Figs. 1, 2, and 3 of the drawings, 33 designates a toothed segment, which is rigidly secured to one of the journals 4 of the folding-bar. 34 designates a like segment, which is loosely placed on a stud 35, that is secured to one of the standards 3, and 36 designates an intermediate pinion meshing with said segments and loosely mounted upon a stud 37, which is also secured to said standard. Affixed to the hub of the segment 34 is a handle or lever 38, by means of which the folding-bar may be turned through the described gearing. The relative sizes of the two said segments are such that the folding-bar may be moved quite rapidly, thus giving the machine a very large capacity, especially on comparatively thin sheet metal. This mechanism for imparting motion to my machine is of practical importance, because the machine is so constructed as to work very easily. For folding thick sheet metal the said lever 38 may be disconnected from the said segment 34 and attached to the folding-bar in the ordinary manner, as is most clearly shown in Fig. 3 of the drawings.

The swinging frame 5 and its wing 6 are pivotally connected or hinged together in the usual manner, as at 39 39.

40 designates the customary wedge-bar, Fig. 4, adjustably mounted in the frame 5 in the ordinary way—that is, it has a screw projection 41, passing through a slot 42 in said frame, on which projection there is a nut 43, which abuts against the frame to hold the wedge-bar in place. Said bar engages the wing 6, that the frame 5 may move the wing, as desired, and is used to vary the distance between the wing and the thin edge of the folding-plate 7 in order to obtain both close and open locks.

44 designates a bolt-shaped reciprocatory slide in frame 5, Fig. 4, the head of which engages the wing 6 and the shank of which is encircled by a spiral spring 45, one end of which is in contact with the head of the slide and the other with said frame, and which spring through said slide holds said wing so that the upper surface or top thereof will be, regardless of the position of the wedge-bar 40, in line with or higher than the top or clamping face of the jaw 8 when the folding-bar is in the position it occupies preparatory to feeding a sheet of metal to the machine. Said wing being supported as stated, it is obvious that the feeding of the sheets of metal to the machine is thereby facilitated or quickened, because the operator may then slide a sheet of metal on said wing and over said jaw and against the gage 17, the jaw being not the obstruction in the way of such feeding it otherwise would be in case of forming open locks. The described mechanism for holding up the wing 6 being yielding, it is apparent that it will not interfere with the action of the folding-bar. The actuation of said wing by the spring 45 may be properly limited by a nut 46 on slide 44. A screw projection 47, Fig. 4, of the cross-bar or upright 2 limits movement of the folding-bar. A jam-nut 48 thereon prevents that projection from turning.

The folding-plate 7 is held upon the frame 9 by screws 49, the thread ends of those screws being in the frame and the plate being slotted, as shown, for the reception of the screws and to allow adjustment of itself. Set-screws 50, passing through lugs on the frame 9 and

engaging the front edge of the folding-plate, are means whereby that plate may be moved toward the axis of the folding-bar and also held from slipping on said frame during the operation of the machine. The folding-plate being adjustably secured to frame 9, and therefore being adjustable in relation to the axis of the folding-bar, it is perfectly apparent that when the thin edge of the plate is worn the plate may be removed, repaired, and reset. By having the folding-plate adjustable I am thereby enabled to form a more open lock on the metal with my machine than is otherwise obtainable. In connection with this it may be well to state that the farther the thin edge of the folding-plate is from the axis of the folding-bar the more open the lock will be. It is to be observed that by adjusting the folding-plate so that the thin edge thereof instead of being parallel with the axis of the folding-bar will be slightly inclined relative thereto tapered locks may be made with the machine.

Screws 51, Figs. 1, 2, 3, and 4, are entered in slotted extensions of the swinging frame 9, Figs. 1 and 2, and have their threaded ends in the levers 12 12, Figs. 1, 2, 3, and 4. Thus the said frame and said levers are adjustably connected and for the mere purpose of taking up wear.

Bolts 52, Figs. 4, 6, and 7, hold the jaw 8 on the upright 2, the upright being chambered, as at 53, Fig. 6, to receive said bolts and the nuts 54 thereof and to permit adjustment of said jaw in relation to different thicknesses of metal. Integrally made with the upright 2 is a shelf 55, Figs. 4 and 7, on which is a wedge 56, which is employed to support the jaw 8 and to force it upward in adjusting it for different thicknesses of metal.

Cap-screws 57, having their threaded ends entered in the base-plates 1, hold the standards 3 on those plates, the feet of the standards being slotted, as at 58, for the reception of said screws and to permit adjustment of the standards. Screws 59 in lugs or projections on said plates are means whereby the standards may be moved. The described adjustability of said standards is advantageous in assembling the parts of the machine, and also I am thereby enabled to form a more open lock with the machine than could otherwise be made. Here it may be advisable to state that the adjustability of the standards renders the folding-bar adjustable in respect to the folding-plate.

In the upright or cross-bar 2 and located centrally of the length of the machine is a screw 60, on which is a jam-nut 61, by which the screw may be locked against turning. The base-plates 1 and said screw are the, as it may be said, three legs of the machine, and the screw may be adjusted to accommodate the legs to any unevenness of the bench upon which the machine is mounted. Provided with the said screw 60 the said cross-bar 2 may be lighter than it otherwise desirably could be, and strong enough to successfully withstand the strain thereon while the machine is in use.

It is to be remarked that some of the devices hereinbefore described admit of alteration without departing from the province of my invention. For instance, instead of being connected with the gage 17 in the preferred manner, each arm 22 of the rock-shaft 23 may be slotted, as at 62, and each projection 20 of the gage may be provided with a pin 63 for working in said slot, as shown in Fig. 9 of the drawings. Another method of connecting the said arms 22 of the said rock-shaft 23 with the said gage 17 is as follows: Inspecting Fig. 10 of the drawings, it will be noticed that an arm 22 of the rock-shaft 23 may bear directly against a projection 20 of the gage 17. By this construction the gage may be moved in one direction by the adjusting mechanism and oppositely by the spring 31. The principal objection to this construction may be found in the fact that the gage sometimes sticks in its bearings and refuses to be moved by said spring unless the spring is very powerful, which is not desirable. Therefore, in consideration of the modifications specifically described in the immediate preceding paragraph, which require no invention to perform, I wish it distinctly understood that in the forthcoming claims I do not choose to confine myself to control of the precise construction and arrangement of the parts of my machine as herein described, but do propose to cover all mere formal variations that fairly fall within the spirit and scope of my invention.

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

1. In a machine for folding sheet-metal, the combination, of the folding-plate 7, the moving frame 9 hinged or pivoted to the main frame of the machine, said plate 7 being mounted on said frame 9, levers for actuating said moving frame, cams acting upon said levers, and a jaw co-operating with said folding plate to hold a sheet of metal while it is being bent, substantially as described, and for the purpose specified.

2. In a machine for folding sheet-metal, in combination, the folding-plate 7, the moving frame 9 hinged or pivoted to the main frame of the machine, said plate 7 being mounted on said frame 9, a moving folding-bar, cams formed on, or carried by, said bar, connections between said frame 9 and said cams whereby the latter operate to move the former, and a jaw co-operating with the said folding plate to hold a sheet of metal, all substantially as and for the purpose specified.

3. In a machine for folding sheet-metal, the combination, with a folding-plate, of a swinging frame on which said folding-plate is mounted, cams operating to move said frame in one direction, a spring for moving it in the reverse direction, and a jaw co-operating with

said folding-plate to hold a sheet of metal, all substantially as described, and for the purpose specified.

4. In a machine for folding sheet-metal, the combination, of a folding-plate, a swinging frame carrying said folding-plate, a moving folding-bar, the levers 12, 12, for moving said frame, the friction rollers 13, 13, in said levers, cams on said folding-bar for engagement with said rollers to move said levers said frame and said folding plate, yielding means independent of the folding-bar for moving said frame in the opposite direction, and a jaw co-operating with said folding-plate to hold a sheet of metal, substantially as described, and for the purpose specified.

5. In a machine for folding sheet-metal, the combination of the adjustable non-pivotal gage 17, and the longitudinal rock-shaft 23 having one or more arms 22 connected with said gage, substantially as and for the purpose specified.

6. In a machine for folding sheet-metal, the combination of the adjustable gage 17, the longitudinal rock-shaft having one or more arms connected with said gage, the toothed segment on said shaft, and a shaft provided with a pinion in mesh with said segment, all substantially as and for the purpose set forth hereinbefore.

7. In a machine for folding sheet metal, the combination of the adjustable gage 17, mechanism for moving said gage in one direction, such mechanism not acting to move said gage while the machine is in operation, and yielding means independent of said mechanism for moving the gage in the reverse direction, substantially as described, and for the purpose specified.

8. In a machine for folding sheet-metal, the combination, with the adjustable gage 17, of mechanism for moving said gage in one direction, such mechanism not acting to move the gage while the machine is in operation, yielding means independent of said mechanism for moving said gage in the opposite direction, and means for preventing movement of said mechanism, substantially as described, and for the purpose specified.

9. In a machine for folding sheet-metal, the combination, with a folding-bar consisting of a swinging frame and a wing or table so articulated to such frame as to permit independent movement between them, of yielding means acting upon said wing or table to hold it in such position as will facilitate the feeding of the sheets of metal to the machine, substantially as and for the purpose specified.

10. In a machine for folding sheet-metal, in combination, a moving folding-bar, and a folding-plate, this plate being secured to a frame and adjustable thereon with reference to the axis of the folding-bar, substantially as described, and for the purpose specified.

11. In a machine for folding sheet-metal, in combination, a moving folding-bar, a folding-plate, this plate being secured to a frame and adjustable thereon with reference to the axis of the folding-bar, and screws for moving said plate on its frame, substantially as and for the purpose specified.

12. In a machine for folding sheet-metal, in combination, the folding-plate 7, the moving frame 9 to which said plate is affixed, the levers 12, 12, and bolts entering slots in said frame and connecting it with said levers, substantially as described, and for the purpose specified.

13. In a machine for folding sheet-metal, the combination, of the moving folding-plate 7, the upright 2, and the jaw 8 attached to said upright and adjustable thereon in relation to different thicknesses of metal, the upright being chambered as at 53 for the reception of the bolts and nuts that hold said jaw thereon, substantially as and for the purpose specified.

14. In a machine for folding sheet-metal, the moving folding plate 7, the upright 2, the jaw 8 adjustably attached to said upright, and a wedge for moving the jaw, in combination, and substantially as described, and for the purpose specified.

15. In a machine for folding sheet-metal, a folding-bar whose journals have stationary bearings that are adjustable in order to have said bar adjustable in respect to the folding-plate of the machine, substantially as and for the purpose specified.

16. In a machine for folding sheet-metal, a folding-bar, standards adjustably affixed to the main frame of the machine, those standards being provided with bearings for the journals of said folding-bar, and screws for adjusting the standards, in combination, and substantially as described, and for the purpose specified.

17. In a machine for folding sheet-metal, the base-plates 1, 1, and cross-bar 2, constituting the main frame of the machine, in combination with the jaw 8 on said cross-bar, the moving folding-plate 7, and the screw 60 in said cross-bar, substantially as described, and for the purpose specified.

18. In a machine for folding sheet-metal, the combination, of the moving folding-plate 7, the upright 2, and the jaw 8 secured to said upright and adjustable thereon in relation to different thicknesses of metal, substantially as described, and for the purpose specified.

19. In a machine for folding sheet-metal, the combination, with the adjustable gage 17, of a spring acting upon the said gage to move it back away from the edge of the folding-plate of the machine, said spring acting, not to move, but to prevent movement of, said gage, while the machine is in operation, substantially as described, and for the purpose specified.

20. In a machine for folding sheet-metal, in combination, a folding-bar, and adjustable standards having bearings for the journals of

said bar, the said standards being slotted for the reception of the screws that hold them on the main frame of the machine, substantially as described, and for the purpose specified.

21. In a machine for folding sheet-metal, a folding-plate, 7, adjustable in respect to the moving folding bar of the machine, this plate being slotted for the reception of the screws that hold it on its frame, substantially as described, and for the purpose specified.

22. In a machine for folding sheet-metal, in combination, a folding-plate, 7, a swinging frame, 9, carrying said plate, said plate being connected with nothing else, a jaw, 8, co-operating with said plate to hold a sheet of metal while it is being bent, and cams operating to move said frame, substantially as and for the purpose specified.

23. In a machine for folding sheet-metal, in combination, the swinging frame 5, the wing or table 6, pivoted to said frame 5, the wedge 40, for adjusting said wing or table 6, and the spring-pressed slide 44, for acting upon said wing or table 6, substantially as described, and for the purpose specified.

In evidence that the foregoing is claimed by me I have hereunto affixed my signature in the presence of two subscribing witnesses.

WM. J. BAYRER.

Witnesses:

EDWIN S. TODD,

FRANKLIN W. BATES.