

No. 668,167.

Patented Feb. 19, 1901.

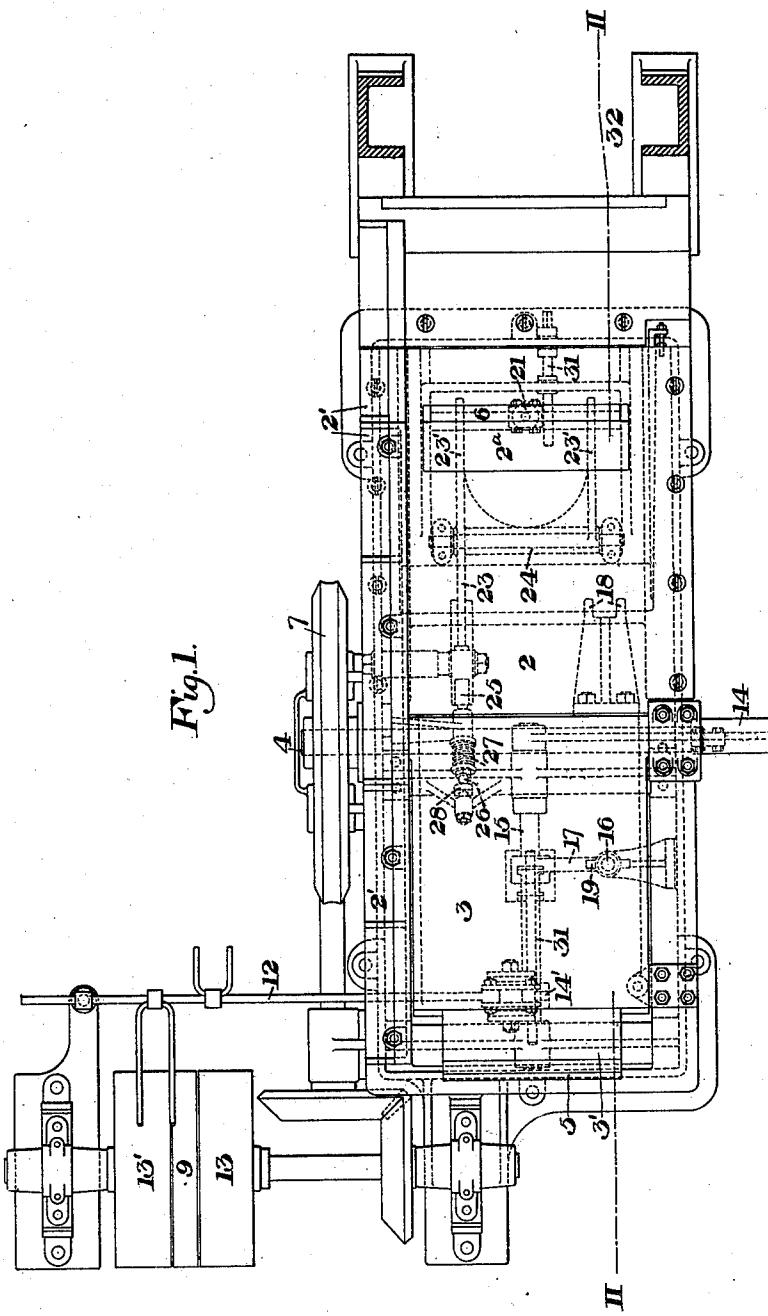
W. H. DONNER.

METAL BENDING MACHINE.

(Application filed Mar. 12, 1900.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES

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3 Sheets—Sheet 2.

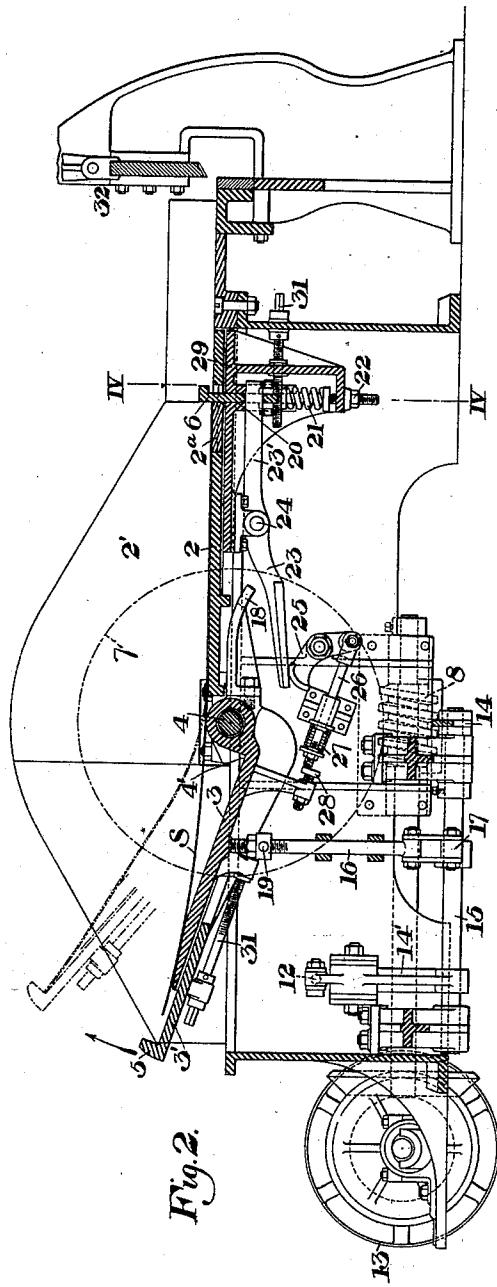


Fig. 2.

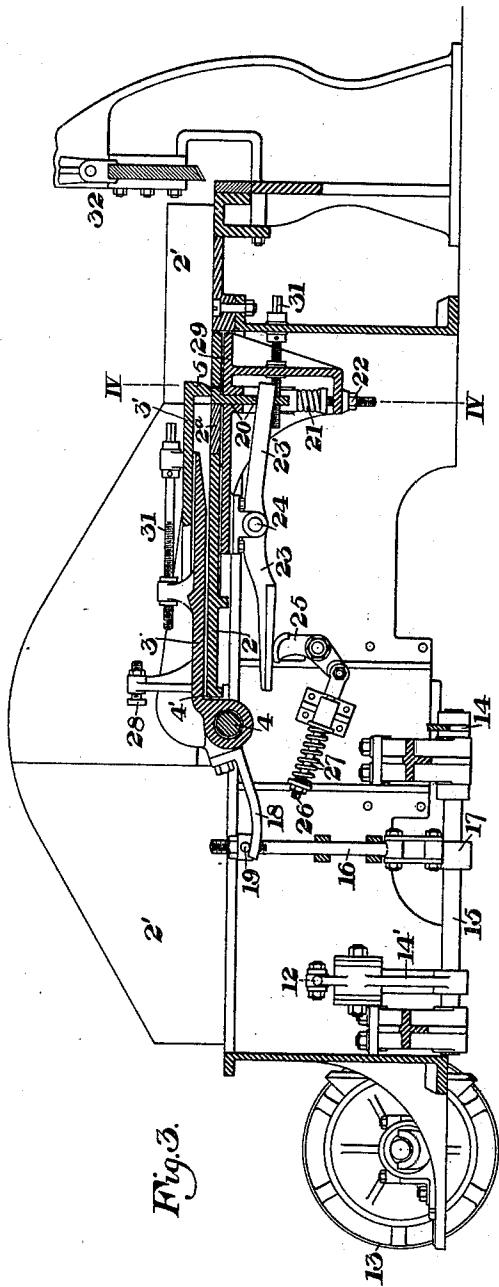


Fig. 3.

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3 Sheets—Sheet 3.

Fig. 6.

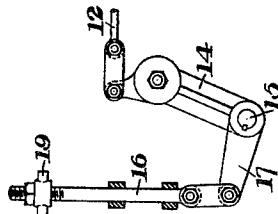


Fig. 4.

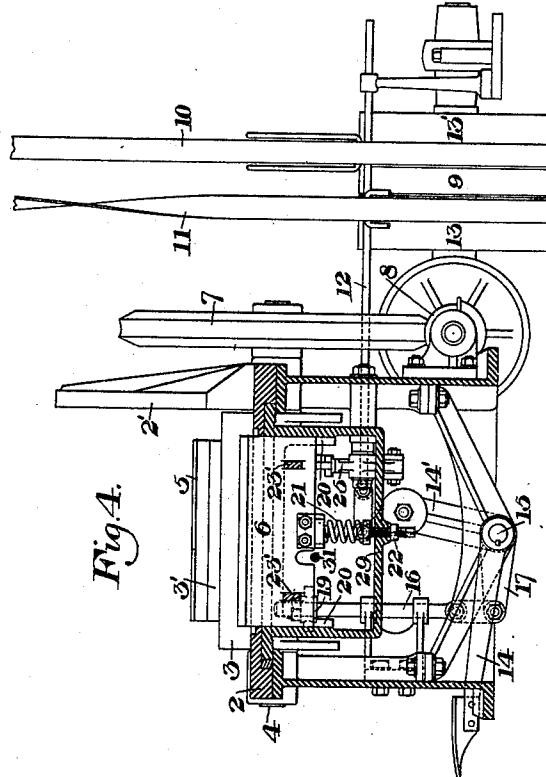
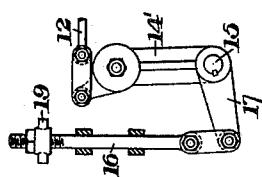


Fig. 5.



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UNITED STATES PATENT OFFICE.

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METAL-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 668,167, dated February 19, 1901.

Application filed March 12, 1900. Serial No. 8,246. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. DONNER, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Metal-Bending Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a plan view of my improved machine. Fig. 2 is a vertical longitudinal section on the line II II of Fig. 1. Fig. 3 is a view similar to Fig. 2, showing the parts of the machine in the position which they occupy when the sheet is bent. Fig. 4 is a vertical cross-section on the line IV IV of Figs. 2 and 3, and Figs. 5 and 6 are detail views.

15 My improved machine has a bed 2 and at one side of the frame a guide 2', against which the edges of the sheets to be folded are squared. This gage being at right angles to the axis of the movable folder, the sheets will be folded properly. This gage also serves to maintain the plates in the proper position 25 during the entire folding operation.

20 The folder 3 consists of a plate or arm fixed to a shaft 4, so that there shall be an intermediate space or depression 4'. By actuating said shaft the folder will be turned over 25 or closed upon the bed 2 and will double upon itself the metal sheet, which is confined at the ends against shoulders 5 6 on the folder and bed, respectively. Fig. 2 shows the machine in the position which it occupies when the 30 metal sheet S is laid upon it, the shoulders then being apart a greater distance than the length of a sheet. When the shaft 4 is actuated, the folder moves radially in the direction of the arrow, and as it rises the recti- 35 linear distance between the shoulders 5 and 6 shortens, and eventually the shoulder 5 will engage the end of the sheet, which being thus clamped at its opposite ends between the shoulders 5 and 6 the plate will be bent at the 40 middle line until the table reaches the closed position shown in Fig. 3, when it will be completely doubled upon itself.

45 The machine is designed for use in doubling metal sheets during the operation of rolling them, and its purpose is to facilitate and quicken this step of the work.

The motions above described are effected by the following mechanism: The shaft 4 is provided with a driving-wheel 7, preferably a worm-wheel, meshing with a worm 8, driven by suitable intermediate gearing from a belt-pulley 9, provided with direct and crossed belts 10 11 and with a belt-shifting rod 12, by which either belt may be shifted from its loose pulley 13 13' to the driving-pulley 9, and the shaft 4 may thus be driven in either direction. Other suitable mechanism capable of driving and reversing the shaft 4 may be substituted for these belts and pulleys.

14 14' are levers on a shaft 15, the lever 14 being adapted to be operated by the foot, and the lever 14' is connected to the belt-shifting rod 12. By depressing this lever the direct belt is shifted upon the pulley 9 and the shaft 4 is driven forward. The shifting-rod 12 is 19 moved automatically in the opposite direction to reverse the shaft 4 by suitable mechanism, preferably by a rod 16, which is connected by an arm 17, Figs. 5 and 6, to the shaft 15 and adapted to be moved by an arm 18 on the 24 folder 3, which when the folder reaches the end of its travel engages a shoulder 19 on the rod 16 and raises it, thus reversing the motion of the shaft 15, retracting the belt-shifting rod 12, and thus reversing the motion of 29 the shaft 4, so as to bring the folder back to the position shown in Fig. 2. When it reaches that position, the folder engages the rod 16 and moves it so as to shift the belts onto the loose pulleys, and thus to cause the machine 34 to stop.

The stop-shoulder 6, against which the end of the sheet S bears, is adapted to be withdrawn below the bed 2 at the conclusion of the bending operation, so as to permit the 39 doubled sheet to be removed from the machine, and this I preferably effect as follows: Said stop consists of a plate arranged to move vertically in a guide-slot 20 against the pressure of a spring 21, the tension of which may 44 be adjusted by a nut 22. A lever 23 is fulcrumed at 24. Its arms 23' are connected with the stop 6, and it is actuated by a cam-lever 25, which is adapted to be turned by a rod 26, acted upon by a spring 27. When 49 the folder is in the position shown in Fig. 2, a stop 28 engages the rod 26 and moving it

against the spring 27 turns and trips the cam 25, so as to allow the lever 23 to descend and the spring 21 to raise the stop 6. When the folder moves in the act of bending a sheet, 5 the stop 28 leaves the rod 26 and relieves the pressure thereon; but the tension of the spring 27 being less than that of the spring 21 the lever 23 remains stationary and the stop stays in the elevated position shown in Fig. 2.

10 When the bending is completed and the folder reaches the closed position shown in Fig. 3, a shoulder thereon engages the stop and pushes it down, thus permitting the spring 27 to turn the cam-lever 25 into the position 15 shown in Fig. 3, in which position it will serve as a lock and will uphold the lever 23, which in turn will hold down the spring 21 and stop 6, so that when the folder is again raised or opened the doubled sheet will be 20 free to be pulled lengthwise from the bed 2. At the end of the back motion of the folder the rod 26 is engaged, the cam-lever 25 turned into the position shown in Fig. 2, and the stop 6 will again rise.

25 The operation of the machine will be understood readily from the foregoing description. The operator places the metal sheet between the stops. The folder rises and doubles it and then moves back into open position 30 and comes to rest.

The position of the stop 6 is adjustable toward and from the shaft 4 by mounting it and the lever 23 on a sliding section 29, which is movable by screws 30, and the bed 2 may be 35 provided with a removable filling-plate 2^a to permit such adjustment. The folder 3 is also provided with an extensible portion 3' and adjusting-screws 31, by which its effective length may be varied and the machine thus 40 adapted for doubling sheets of different sizes. The shoulders or stops 5 and 6 are adjustable in order that when the curl end of the sheet and the opposite end are brought together the curl end may lap more or less past the other, 45 so as to lose as little of the sheet by scrap as possible when sheared. In practice the distance of the stops 5 6 from the center of motion 4 of the folder 3 to the ends of the sheet to be doubled varies, owing to the variations 50 in the amount of curl of the sheet. I provide for these inequalities by setting the stops in such positions as will provide a perfect adjustment of the folds to the sheet. I also find it convenient to arrange the shears 32 close 55 to the doubler, so that the doubled sheet may be sheared while the folder is being returned to its initial position, and thus effecting a saving of time, although the shears may be at a point removed from the doubler.

60 Within the scope of my invention as defined in the claims many changes may be made in the construction of the parts of the machine, since

What I claim is—

65 1. A doubling-machine comprising a relatively stationary bed, a pivoted folder movable toward said bed, and stops against which

the edges of the sheet bear; one of said stops being mounted upon the pivoted holder substantially as described.

2. A doubling-machine comprising a bed, a pivoted folder movable toward said bed, stops upon the bed and pivoted holder and means for withdrawing the stop in the bed to permit removal of the doubled sheet; substantially as described.

3. A doubling-machine comprising a bed, a pivoted folder movable toward said bed, said folder being adjustable in length; substantially as described.

4. A doubling-machine comprising a bed, a pivoted folder movable toward said bed, stops upon the bed and pivoted holder and means for adjusting the position of one of the stops; substantially as described.

5. A doubling-machine having a bed and movable folder, a spring-actuated stop on the bed, mechanism operated by the folder adapted to retract the stop, a lock for holding it in retracted position, and means for tripping such lock device on opening of the folder; substantially as described.

6. A doubling-machine comprising a bed, a pivoted folder movable toward said bed, stops on said bed and folder, means for withdrawing one of said stops to permit removal of the doubled sheet, and means for projecting it on opening of the folder; substantially as described.

7. A doubling-machine having a bed and movable folder, a spring-actuated stop on the bed, a lever 23 and a locking-cam 25 adapted to be tripped by opening of the folder, said stop being adapted to be retracted by the folder when the folder is closed; substantially as described.

8. A doubling-machine having a bed and movable folder, a movable stop adapted to be retracted by the folder when the latter is closed, and a locking device for the stop; substantially as described.

9. A doubling-machine having a bed, a squaring-gage, at one side thereof, the bed being open at the opposite side for the insertion of the sheets, a pivoted folder movable toward said bed and swinging in a plane parallel with the gage, and stops against which the ends of the sheet bear; substantially as described.

10. A doubling-machine having a bed, a movable folder, an adjustable stop secured thereto, and a second movable and adjustable stop adapted to be retracted by the folder when the latter is closed; substantially as described.

11. A doubling-machine having a bed, a pivoted folder, a stop secured thereto, adjustable toward and away from the axis of motion of said folder, a movable and adjustable stop secured to the bed adjustable longitudinally of its length and adapted to be retracted by the folder when the latter is closed; substantially as described.

12. A doubling-machine having a bed, and

a pivoted folder, and stops upon the bed and folder adapted to engage the ends of the plate, and adjustable at unequal distances from the axis of motion of the folder, whereby inequalities in the curl of the sheet are provided for; substantially as described.

13. A doubling-machine having a bed, a stationary gage at one side thereof adapted to square the side edges of the sheet, and a pivoted folder movable toward said bed arranged to swing in a plane parallel with the gage; substantially as described.

14. A doubling-machine having a bed, a squaring-gage at one side thereof adapted to contact with and square the side edges of the sheets during the folding operation, and a folder having its pivotal axis at right angles to said gage, said folder being movable toward the bed of the machine and swinging in a plane parallel with the gage; substantially as described.

15. A doubling-machine having leaves, at least one of which swings toward the other

during the folding operation, and a stationary squaring-gage arranged to contact with the side edges of the sheets during the folding operation; substantially as described.

16. In a doubling-machine, a swinging leaf, having a stop mounted thereon, said stop being adjustable toward and from the axis of said leaf; substantially as described.

17. A doubling-machine having a bed, a squaring-gage at one side thereof, adapted to square the side edges of the sheets during the folding operation, a folder having its pivotal axis at right angles to said gage, said folder being movable toward the bed of the machine, and stops against which the ends of the sheet bear; substantially as described.

In testimony whereof I have hereunto set my hand.

WILLIAM H. DONNER.

Witnesses:

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C. P. BYRNES.