

(No Model.)

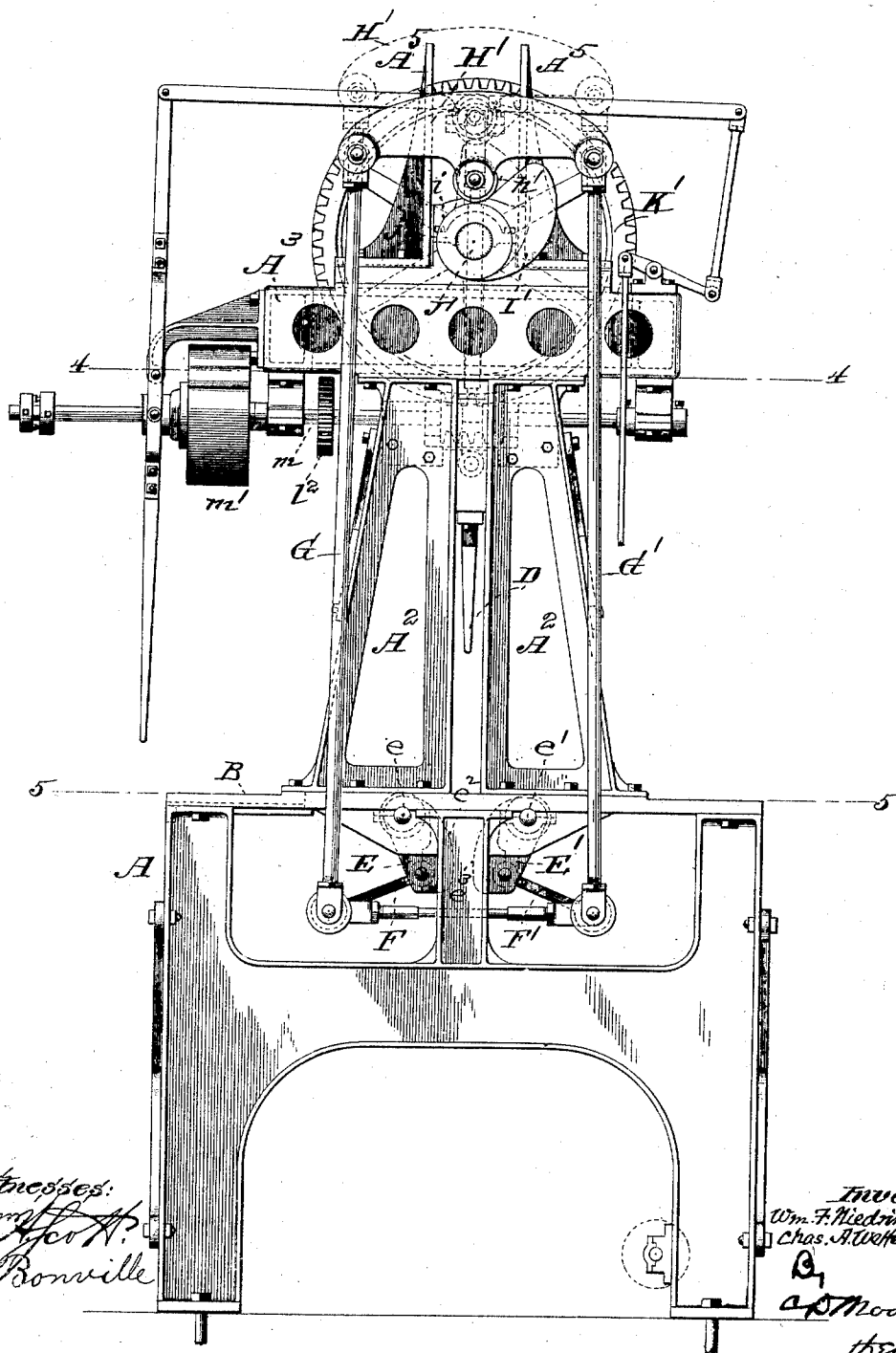
4 Sheets—Sheet 1.

W. F. NIEDRINGHAUS & C. A. WETTENGEL.
PLATE METAL FOLDING MACHINE.

No. 503,292.

Patented Aug. 15, 1893.

Fig 1.



Witnesses:
W. Geo. H.
A. Bonville

Inventors
Wm. F. Heddinghaus
Chas. A. Wollenger
B. C. Moody
their Attys.

(No Model.)

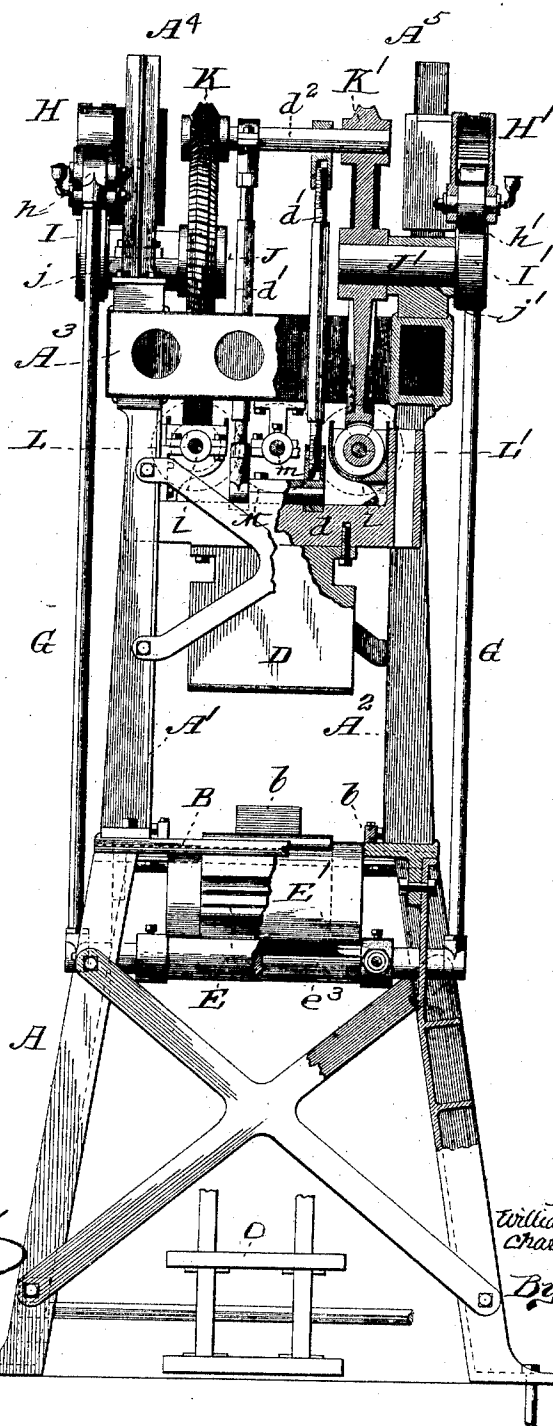
4 Sheets—Sheet 2.

W. F. NIEDRINGHAUS & C. A. WETTENGEL.
PLATE METAL FOLDING MACHINE.

No. 503,292.

Patented Aug. 15, 1893.

Fig. 2.



Witnesses:

J. M. H. H.
A. Bonville

Inventors:
William F. Niedringhaus
Charles Albert Wettengel

By *C. D. Moody*
their Atty

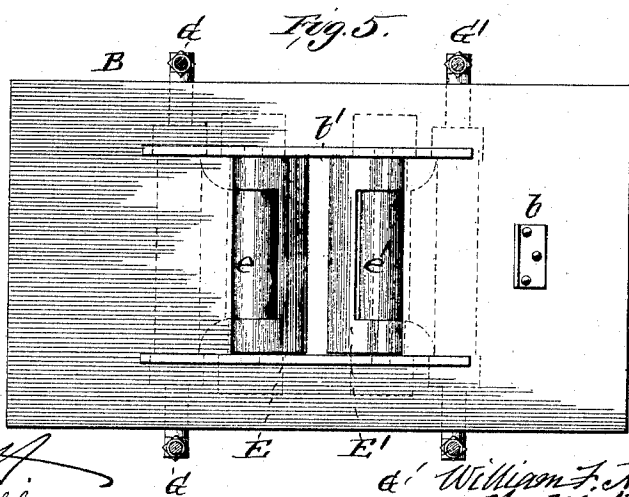
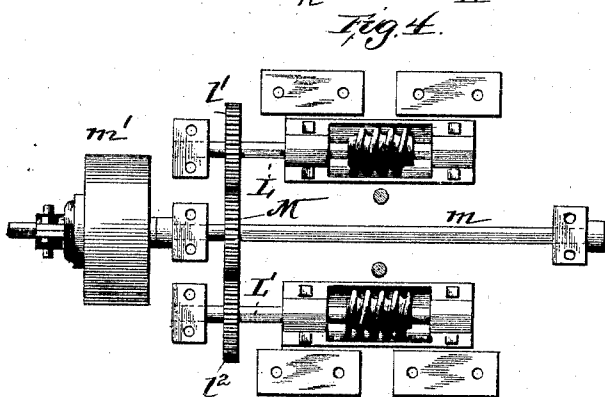
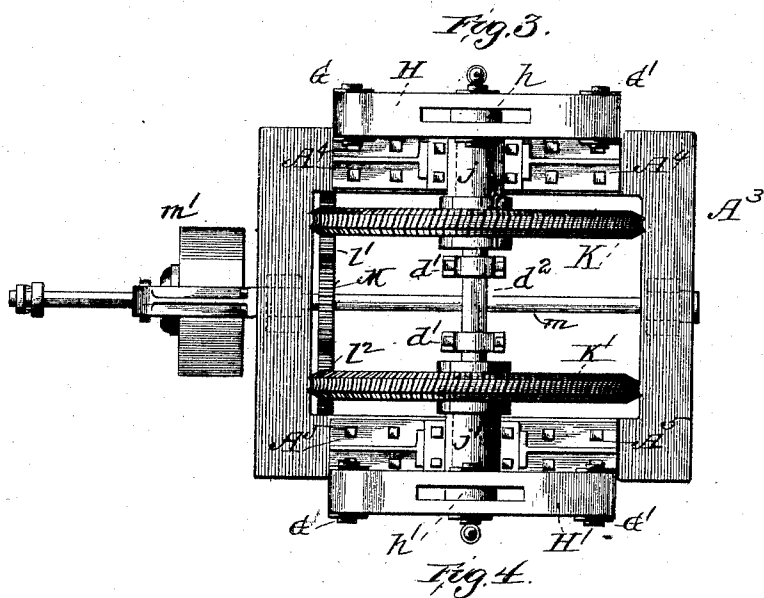
(No Model.)

4 Sheets—Sheet 3.

W. F. NIEDRINGHAUS & C. A. WETTENGEL.
PLATE METAL FOLDING MACHINE.

No. 503,292.

Patented Aug. 15, 1893.



Witnesses:

Wm. F. Scott
A. Bonville

Inventors:

Wm. F. Niedringhaus
Charles Albert Wettengel
By C. T. Moody their Atty

(No Model.)

4 Sheets—Sheet 4.

W. F. NIEDRINGHAUS & C. A. WETTENGEL.
PLATE METAL FOLDING MACHINE.

No. 503,292.

Patented Aug. 15, 1893.

Fig. 6.

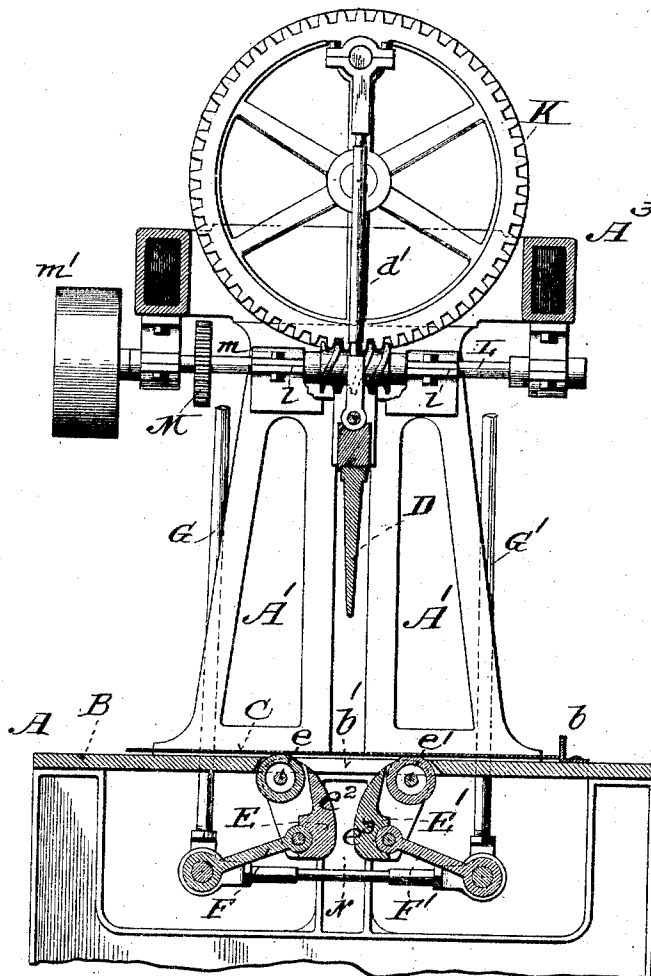


Fig. 7.

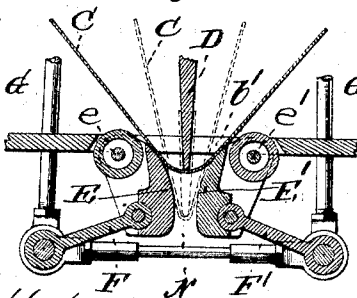
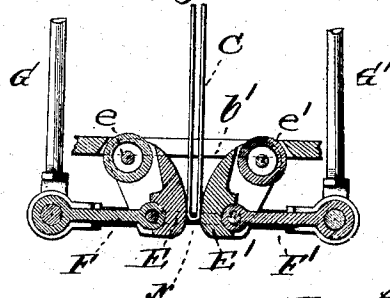


Fig. 8.



Witnesses:
Wm. F. Niedringhaus
A. Bonville

Inventors:
William F. Niedringhaus
Charles Albert Wettengel
By *A. Moody*
their Atty

UNITED STATES PATENT OFFICE.

WILLIAM F. NIEDRINGHAUS AND CHARLES ALBERT WETTENGEL, OF ST. LOUIS, MISSOURI, ASSIGNORS TO THE ST. LOUIS STAMPING COMPANY, OF SAME PLACE.

PLATE-METAL-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 503,292, dated August 15, 1893.

Application filed July 21, 1892. Serial No. 440,736. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. NIEDRINGHAUS and CHARLES ALBERT WETTENGEL, both of St. Louis, Missouri, have jointly made a new and useful Improvement in Plate-Metal-Folding Machines, of which the following is a full, clear, and exact description.

By means of the improved mechanism under consideration, metal plate, especially such as is employed in the manufacture of tin plate, can be readily prepared.

Considered generally, the machine in question comprises a slotted table upon which the plate to be folded is placed, a former having a reciprocating motion, and which in its movement encounters the plate, initiating the bending thereof and forcing it between a pair of jaws which receive and close against the partially-shaped plate and thereby complete the desired folding thereof, mechanism for operating the jaws, closing them as described to fold the interposed plate, and opening them to release and drop the folded plate, and to adjust the jaws for the reception of another plate, and mechanism for operating the former, elevating and depressing it at proper times, together with a suitable frame work for sustaining the described parts, all substantially as is hereinafter set forth and claimed, aided by the annexed drawings, making part of this specification, in which—

Figure 1 is a side elevation of the machine; Fig. 2, a front elevation partly in section; Fig. 3, a plan of the top portion of the machine; Fig. 4, a horizontal section on the line 4—4 of Fig. 1; Fig. 5, a horizontal section on the line 5—5 of Fig. 1; and Figs. 6 to 8 views in vertical section illustrating the different relative positions of the former and the folding mechanism during the doubling and folding of the plate.

The same letters of reference denote the same parts.

The frame work of the machine consists mainly, and preferably, of the base, A, two pairs of uprights, A', A', and A², A², which are supported upon the base, and at or toward the sides respectively thereof, and a rectangular frame A³ which is supported upon

the uprights, and which in turn supports guides, A⁴, A⁴, and A⁵, A⁵, at the sides respectively of the frame, substantially as shown.

B represents the table upon which the plate, C, to be doubled is placed. Its proper location upon the table is defined by means of suitable gages b, b. The table has an opening, b', in it of suitable width and length to permit of the plate being depressed through it; in width the opening should be sufficient to admit the widest plate, and in length it should be enough shorter than that of the plate to properly support the plate until the folding operation is initiated by forcing the plate through the opening.

D represents what may be termed a former. In its general outline it resembles a thin wedge. Its function is to depress the plate through the described opening in the table, initiate the doubling of the plate, and deliver it to that portion of the mechanism which serves to complete the doubling. This last mentioned mechanism is preferably in the form of two folders or jaws, E, E', which are adjusted and adapted to open more or less apart from each other to admit the plate, and, after receiving the plate, to be closed more or less toward each other and thereby complete the doubling of the plate. They also preferably are utilized as supports for the plate as it is being by the former depressed into its position for folding. To these ends, as the most desirable shape and arrangement, the jaws are pivoted at e, e', respectively, and have rounded faces, e², e³, respectively, and are so held with relation to the former as to jointly provide a tapered recess whose opposite ends are the faces e², e³, and they are adapted to be moved toward and from each other as is indicated substantially by their various positions shown in the drawings.

The preferred mode of actuating the jaws is that exhibited: By means of the links, F, F', they are respectively connected with the rods G, G'. That is, there is a pair of rods G, G, at one end of the machine, and another pair, G', G', at the opposite end thereof. The four rods extend upward and connect with the yokes H, H', at the upper part of the ma-

chine, and respectively at or toward the sides thereof. That is, two rods, G, G', at one side of the machine connect with one of said yokes, and the rods, G, G', at the opposite side of the machine connect with the other of said yokes, and substantially as shown. The yokes, and preferably by means of the rollers *h*, *h'*, respectively, ride upon the cams, I, I', respectively. Said cams are fastened respectively to the shafts J, J'. The shafts are held and journaled respectively in the bearings *j*, *j'*, and are provided respectively with the gears, K, K'. These gears are in the form of worm gears and are respectively in engagement with the worm shafts L, L' respectively. Said last named shafts are journaled in suitable bearings, *l*, and they are also respectively provided with the gear wheels *l'*, *l''*. These last mentioned gears are in engagement with a central gear wheel, M, which is fastened to the driving shaft *m*, and to which rotary motion can be imparted by means of the pulley *m'*, which is fastened to said driving shaft. Instead of worm gearing spur gears are equally effective.

The operation of the machine is substantially as follows: A plate, C, having been placed in position on the table, and motion having been imparted to the operating mechanism, the former, which by means of the cross-head *d*, and the rods *d'*, *d''*, and the wrist pin *d''*, is connected with the worm wheel gears K, K', is forced downward into contact with the upper side of the plate, and as the former continues to descend it presses the plate downward to a bearing upon the jaw-faces, as shown in Fig. 7: in this position of the plate and the former the jaws are opened wide, and they are stationary; the former continues to descend and the plate is thereby borne downward into the position shown in the broken lines, same figure; the former has now reached the lower limit of its stroke, and begins to ascend, and after it has risen sufficiently to be out of the way the jaws begin to close; that is, the cams I, I', begin to uplift the yokes, and in consequence the rods, G, G', move to raise the links F, F', into a horizontal position, and, the jaws move toward each other: the action of the rods and links is analogous to that of a toggle; the jaws act upon the partially-doubled plate, which has been left between them, and the folds of the plate approach each other; this operation continues until the plate has been sufficiently doubled and the folds thereby at the upper edges thereof brought sufficiently close to each other (this position is shown in Fig. 8) to permit of the doubled plate to fall through the opening, N, between the jaws when they are again opened apart from each other into their original position: that is, the jaws close and double the plate as described and then open, and the folded plate now drops through the opening N, and is thereby discharged from the machine: in practice the plate may

fall onto a carrier, O, and thereby be delivered to any desirable point: meanwhile as the jaws have thus closed and opened the former has been raised to its up-position as shown in Fig. 1; the cams now cease to act upon the yokes, the rollers, *h*, *h'*, now riding upon the round part, *i*, of the cams, and the jaws in consequence being stationary: the former is now in position to repeat its action, and the operation of folding a second plate is proceeded with and so on as each plate is folded.

We desire not to be restricted to the particular contour of jaw-face shown, as this particular feature of the construction can be modified somewhat and good results obtained. It is also possible to provide a bearing for the plate as it is compressed by the former which is distinct from the mechanism—the jaws—used for completing the doubling. We prefer however to have the jaws to form the double work of supporting the plate while it is being depressed by the former, and of completing the doubling of the plate after it has been depressed. And we also consider the special curvature of jaw-face shown the best one for the purpose under consideration as thereby the strain upon the plate, both when it is being forced downward by the former and afterward when it is being compressed by the jaws, is favorably distributed upon the plate. The relative position of the jaws is also such as to provide the most desirable form of tapered recess for the plate to be depressed into. So far as the depression of the plate by the former is concerned it is not entirely essential that the recess shall be a tapered one. A tapered recess however is considered desirable.

We claim—

1. A plate metal folding machine having a table, a former, and a tapered bearing beneath said table, said table having an opening for the plate to be folded therethrough, said former being wedge-shaped, and having a reciprocating movement into and out of said opening, and said tapered bearing consisting of jaws adjusted to be moved apart from or to be closed upon each other, and when brought sufficiently close to each other providing an opening for the plate when folded to be discharged therethrough, substantially as described.

2. In a plate metal folding machine, a pair of jaws said jaws being relatively shaped and arranged to form a tapered recess to receive a partially folded plate, and being adjustable toward and from each other, by means of the connecting rods, cams, yoke and rollers, as described for the purpose of compressing said plate and discharging it thereafter, substantially as described.

3. The combination of the former, the table beneath it having an opening, the jaws E, E', having respectively bearing faces *e*², *e*³, the rods G, G', connected with said jaws by links, the yoke at the upper part of the ma-

chine connecting with said rods, and the rollers, cams, shafts and gears, all operated as and for the purposes set forth.

4. The combination of the former, the table having an opening, the adjustable jaws
5 beneath the opening, the rods G, G', and the links connecting the rods and jaws, the yokes connecting with the rods, and the cams, at the upper part of the machine, the shafts J, J',
10 operating said cams, and the gears, the wrist pin, the rods d', and the cross head d, con-

nected to the former, the several parts operating in the manner and for the purposes set forth.

Witness our hands this 29th day of June, 15
1892.

WILLIAM F. NIEDRINGHAUS.
CHARLES ALBERT WETTENGEL.

Witnesses:

JOSEPH BROWN,
E. HAUSMAN.