2 Sheets--Sheet 1.

G. W. & C. P. HOWELL.

Metal-Creasing Machine.

No. 159,096. Patented Jan. 26, 1875.

Fig. 1.

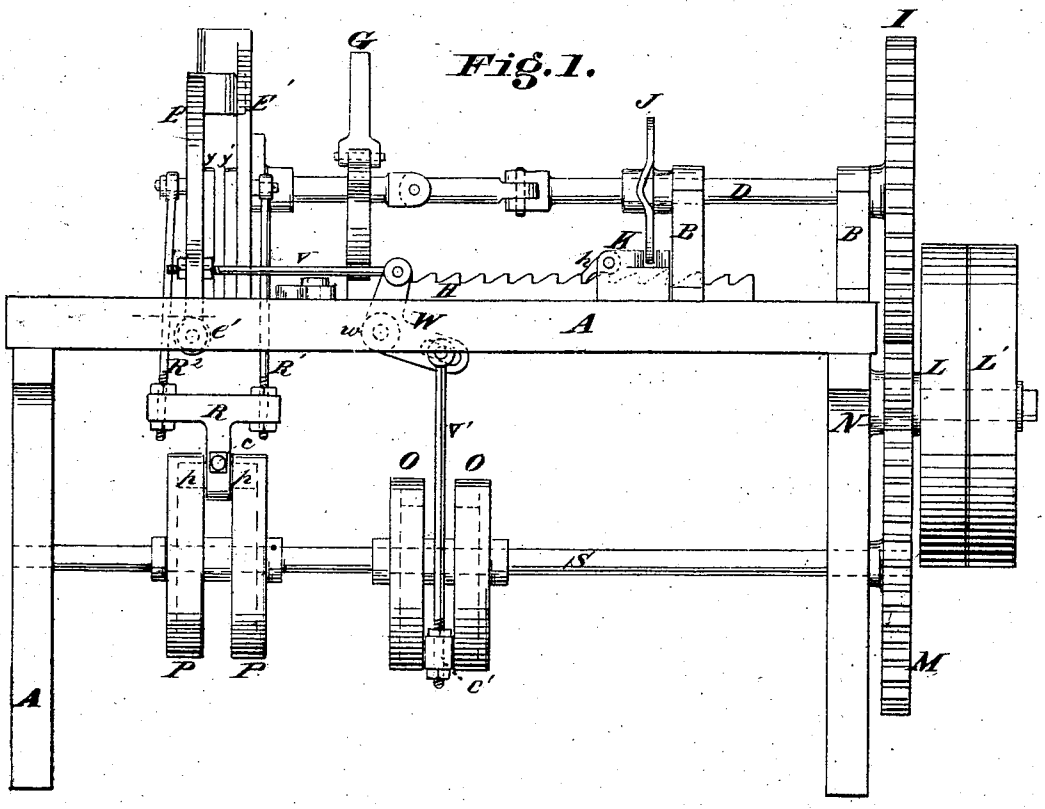
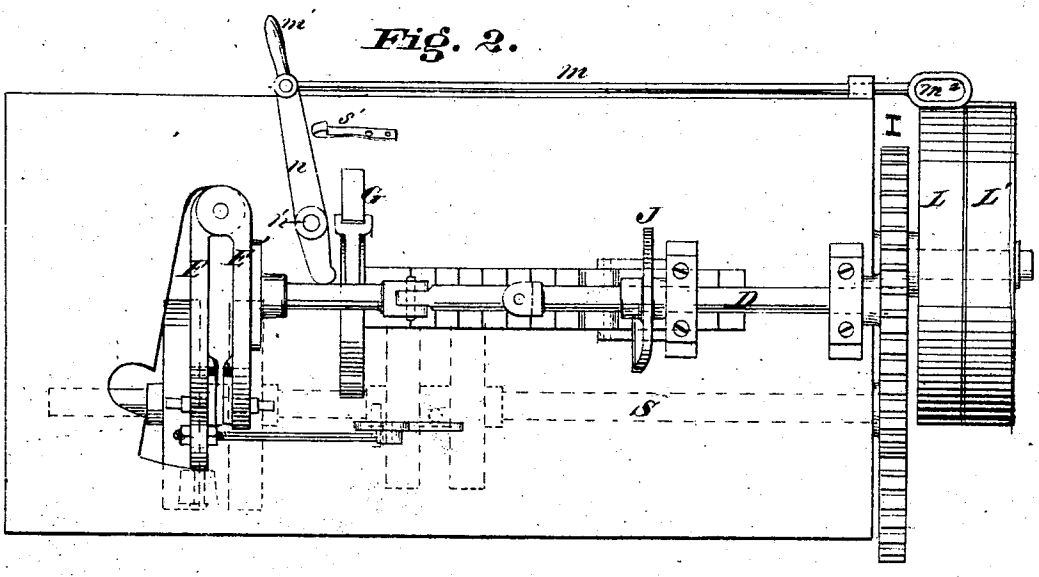


Fig. 2.



Attest.

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2 Sheets--Sheet 2.

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Fig. 3.

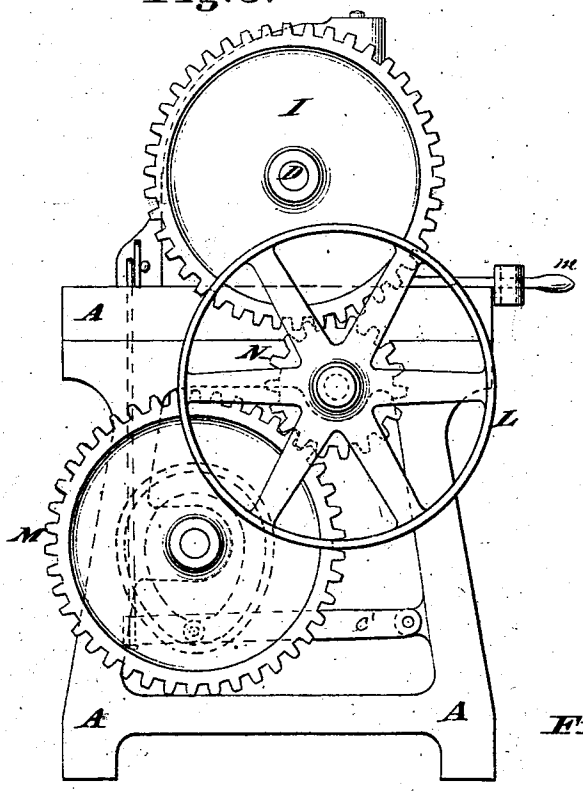


Fig. 4.

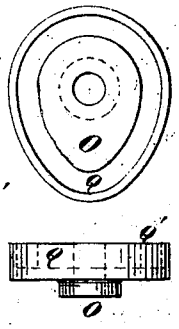
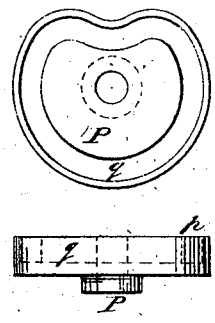


Fig. 5.



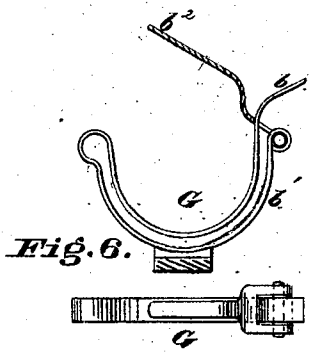


Fig. 6.

Fig. 7.

Fig. 8.

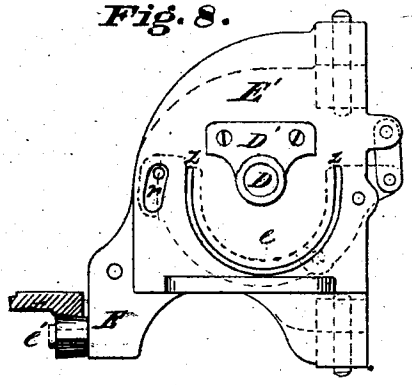


Fig. 9.

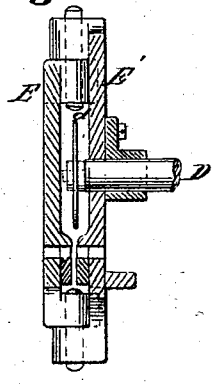


Fig. 10.

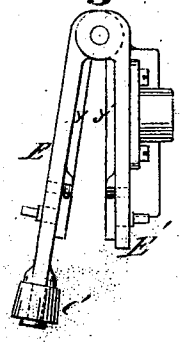
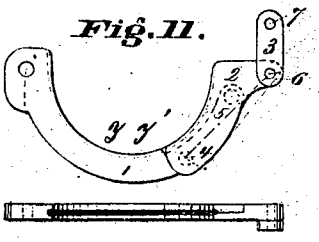


Fig. 11.



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UNITED STATES PATENT OFFICE.

GEORGE W. HOWELL AND CHARLES P. HOWELL, OF COVINGTON, KENTUCKY; SAID C. P. HOWELL ASSIGNOR TO GEORGE W. HOWELL.

IMPROVEMENT IN METAL-CREASING MACHINES.

Specification forming part of Letters Patent No. **159,096**, dated January 26, 1875; application filed November 7, 1874.

To all whom it may concern:

Be it known that we, GEORGE W. HOWELL and CHARLES P. HOWELL, of Covington, in the county of Kenton and State of Kentucky, have invented certain new and useful Improvements in Machines for Forming Creases in Metal, of which the following is a specification:

This invention relates to a hand or power machine for making creases or corrugations in sheet metal, from which pipe-elbows may be formed.

The invention consists mainly of a former, having an axle-bearing on the end of a driving-shaft, with which it revolves concentrically, while both revolve eccentrically to the metal blank to be creased. The semicircular sheets of metal are held by suitable mechanism while the same are being creased. The creases in the metal blank are made between two linked jaws, arranged to move on two centers. The metal blank is embraced upon its inner and outer periphery by a yoke, consisting of two semicircular leaves, whereby the semicircular form of the blank is maintained while being fed into the machine.

The invention consists of certain other construction and combination of parts, all of which will be fully hereinafter described.

Figure 1 is a side elevation of a machine embodying our invention, and Fig. 2 a plan of the same. Fig. 3 is an elevation of the right end of Fig. 1. The other figures illustrate parts of the machine in detail, and will be more fully described hereafter.

The machine may be mounted on any suitable frame, which is here represented by A, having journal-brackets B B for the shaft D to revolve upon. D is the main shaft, upon which are mounted the driving-spur I, feeding-cam J, and former *d*.

In order that the former *d* may be adjusted so as to form creases of various depths, the journal-bearing D′ is made adjustable, and to accommodate changed positions of this bearing the shaft D is provided with joints; but when the depth of crease desired is ascertained, and the journal D′ made to suit the formation of such creases, it is evident that the joints in the shaft may be dispensed with.

The manner of attaching the former to the main shaft is clearly shown in Fig. 7, where *i* is a pin on the end of the shaft, and eccentric to the center thereof, upon which the former *d* concentrically revolves.

The diameter of the former *d* is made to very nearly correspond with the diameter of the pipe to be formed, and this for the reason that the strain on the pipe metal, while the crease is being formed, is very much less, being more distributed than it would be if a much smaller wheel were employed, and hence inferior metal can be used. When the diameter of the former is ascertained, the depth of the crease to be formed will depend on the eccentricity of the driving-shaft D to the metal blank or circuline slot *z*, and its width and shape will conform to that of the periphery of the former *d*.

E E′ are plates supporting the hinged jaws *y y′*. Our construction being to make the inner one, E′, rigid, with a fixed bearing for the shaft D, an adjustable journal-box may be used in addition thereto, as shown at D′, Fig. 8. The outer plate, E, is hinged to E′, as shown in Figs. 2 and 10, and opens and closes as the creases are successively formed in the metal. Circuline slots *z* are cut in plates E E′, as shown in Fig. 8, of sufficient depth in E′ to allow the sheet metal to feed to the former, and in E to allow the same, after the corrugation has been formed, to pass through. *e* is a swage-block, formed in the plates by the slot *z*, and is circuline, and of the size of the pipe to be made. Between the plates E E′, and attached to them, are two jaws, *y y′*, which act as dies, between which the creases in the metal are made by the revolving former *d*, to conform to the shape of their interior surfaces, which should be circuline. They are operated by the lever R, which is provided with an axle, carrying two friction-rollers, *p p*, working in the cam-grooves *q q* of pulleys P P, Figs. 1 and 5. To the cross-head of R is rigidly attached an extension-rod, R′, the upper end of which is attached to the jaw *y′* by a pivot which plays in slot *r* of plate E′, Fig. 8. To the opposite end of said cross-head is loosely attached, in any suitable manner which will admit of a side move-

ment of plate E, another extension-rod, R^2, which is attached to jaw y in a similar manner to that of R^1 to y'. As the cam-pulleys P P, which are rigidly attached to the shaft S, are revolved, and at the right time, lever R, with its connecting-rods, forces the jaws $y\,y'$ upward, when they engage the sheet metal and firmly hold it against the swage-block until the crease is formed between them, and as soon as this is done they are carried down again by the same cam movement, and the metal is released.

In order the more securely to retain the metal blank in position during the operation, a groove may be provided in the outer jaw, y, as shown in plan, Fig. 11, in which the first corrugation rests while the second is being formed, and so on successively. If desired or found necessary, the number of such grooves may be increased, so as to rest several corrugations at the same time; and in order the more freely and quickly to release the metal, the jaws $y\,y'$ are hinged and move on two centers, as shown in Figs. 8 and 11. Parts 1 and 2 are pivoted together at 4, part 1 having 5 for a center, where it is pivoted to the plate next to it, and part 2 being loosely connected to link 3 at 6, which link is pivoted at 7.

By this arrangement the pivoted ends of the jaws will be allowed to drop a sufficient distance to free the metal immediately after the formation of each crease.

It is necessary that the lever R should move in very nearly the same vertical plane, and to secure this it is connected to the rear of the frame by a rod, c, loosely attached at both ends, or a slotted frame may be provided for R to play through.

W is a bell-crank, having a pivoted fulcrum, w, and its upper arm connected to plate E by the rod V, rod V′ being attached to its lower arm, and being provided with an axle on its lower end, which carries friction-rollers Q′, working in cam-grooves Q of pulleys O O, Figs. 1 and 4. Rod V′ and its friction-rollers are held in their proper vertical plane by a rod, c', loosely attached to said axle at one end, and to the side frame of the machine at the other end. The arms of the bell-crank are slotted, so as to admit of an adjustment of the connecting-rods to vary the play of plate E, which, by the movement of cam-pulleys O O, said rods, and cranks, is opened to release the metal after a crease is formed, and is closed in forming each crease, so as to cause the metal to be brought to fit the former d, which may be of any desired shape or thickness. These plates E E′ and jaws $y\,y'$ are represented open in a plan view, Fig. 10, where a friction-roller, e', which runs under the frame to prevent the plate from rising and to relieve the hinge from strain, is also shown. The same plates are shown closed in a cross-section on the plane of the shaft D in Fig. 9.

The first view in Fig. 6 is a side view, and the second a plan of a yoke employed to shape the metal blank, preserve its circulinity, and feed it into the machine. This yoke is attached to the forward end of ratchet H, which is operated by a pawl, h, pivoted to a carriage, K, which has a double-beveled slot on its upper face, through which a "nosed" cam, J, on shaft D revolves, and with each revolution advances the yoke one notch as the "nose" is passing through the slot, the carriage being immediately afterward carried back and firmly held in position by the flat part of the cam, while, at the same time, the pawl engages the next rearward notch of the ratchet.

The metal to be creased is placed with one end within the leaves $b\,b^1$ of yoke G, and the other projecting a sufficient distance through slot z to allow the formation of the first crease. The hinged lever b^2 is then closed over the end of b, which causes it to press the metal blank closely against b^1, and to so firmly clasp it that it will be fed to the former by the described movement of the ratchet.

The machine is so adjusted that a single revolution of shaft D forms one crease in the metal, and feeds it forward a sufficient distance to form the next successive crease.

Pulleys P P may be so constructed, by shaping the cam-grooves on their inner faces, and so adjusted, as to have the dies or jaws $y\,y'$ engage the metal and release the same at any desired point of the revolution of the former d; and the pulleys O O, with their cam-grooves, may likewise be so constructed and adjusted as to open and close the hinged plate E at any desired point of the revolution of said former d by obvious mechanical changes and adjustments.

The following is the mode of operation when adjusted: One or more pieces of metal bent in the form of a half-cylinder are placed with one end in slot z and the other in yoke G, with the concave portion fitting the swage-block e. The machine being driven by any suitable power applied to pulley L, shafts D and S revolve. Jaws $y\,y'$ are carried up to clasp the metal and hold it firmly against said swage-block. The former d forms a crease in the metal between the jaws $y\,y'$ almost entirely around (and all the way, if desired) the curved metal, and which crease should be very slight on one side, and about three-eighths of an inch in depth upon the opposite edge, when it is intended to be used for stove-pipe elbows, but may be any other depth desired, or similar to those shown in Letters Patent No. 121,104, granted to said George W. Howell, November 21, 1871.

Pulleys O O are so regulated that the dies $y\,y'$ commence to close while the former is in the crease, and continue closing as it revolves, the degree of proximity depending on adjustment of crank, &c.

As soon as one crease is formed, the jaws or dies drop, the plate E opens, and the metal blank is moved forward, as before described, ready to form another crease.

n is a lever, pivoted at n', and having a rod-connection, m, with an eye, m^2, through which the driving-belt passes.

After the last crease has been formed, the yoke G strikes against the inner end of lever *n*, and carries it forward, by which movement the belt is shifted from the driving-pulley L to a loose pulley, L′, and the lever is carried over a spring, S′, which holds it back until the next blank is placed in position, when the belt is replaced on the driving-pulley by a movement of handle m^1.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The former *d*, having an axle-bearing on the end of the driving-shaft D, with which it revolves concentrically, while both revolve eccentrically to the metal blank, in combination with suitable mechanism for holding semicircular sheets of metal while the same are being creased, substantially as described.

2. The linked jaws *y y′*, arranged to move on two centers, substantially as and for the purpose described, in combination with suitable mechanism for creasing semicircular sheets of metal between their surfaces.

3. The combination of plates E E′, jaws *y y′*, and former *d*, adapted to form curves and creases in sheet metal for pipe-elbows, all substantially as herein set forth.

4. Jaws *y y′*, in combination with the pulleys and levers described, for operating the same automatically, substantially as herein set forth.

5. Plates E E′, in combination with the pulleys, crank, and rods described, for automatically operating the same, as specified.

6. The nosed cam J, in combination with carriage K, pawl *h*, and ratchet H, substantially as described, and for the purpose specified.

7. In a pipe-elbow metal-creasing machine, the yoke G, having two hinged semicircular leaves, *b* b^1, adapted to embrace the metal blank on its inner and outer peripheries, and thereby preserve its circulinity while feeding it into the machine, substantially as shown and described.

In testimony whereof we have hereunto set our hands.

G. W. HOWELL.
C. P. HOWELL.

Witnesses:

JULIUS BRACE,
EDWARD BOYD.