S. G. Booth.

Corrugating Metal.

No. 10,732. Patented Apr. 4, 1854.

Fig. 1.

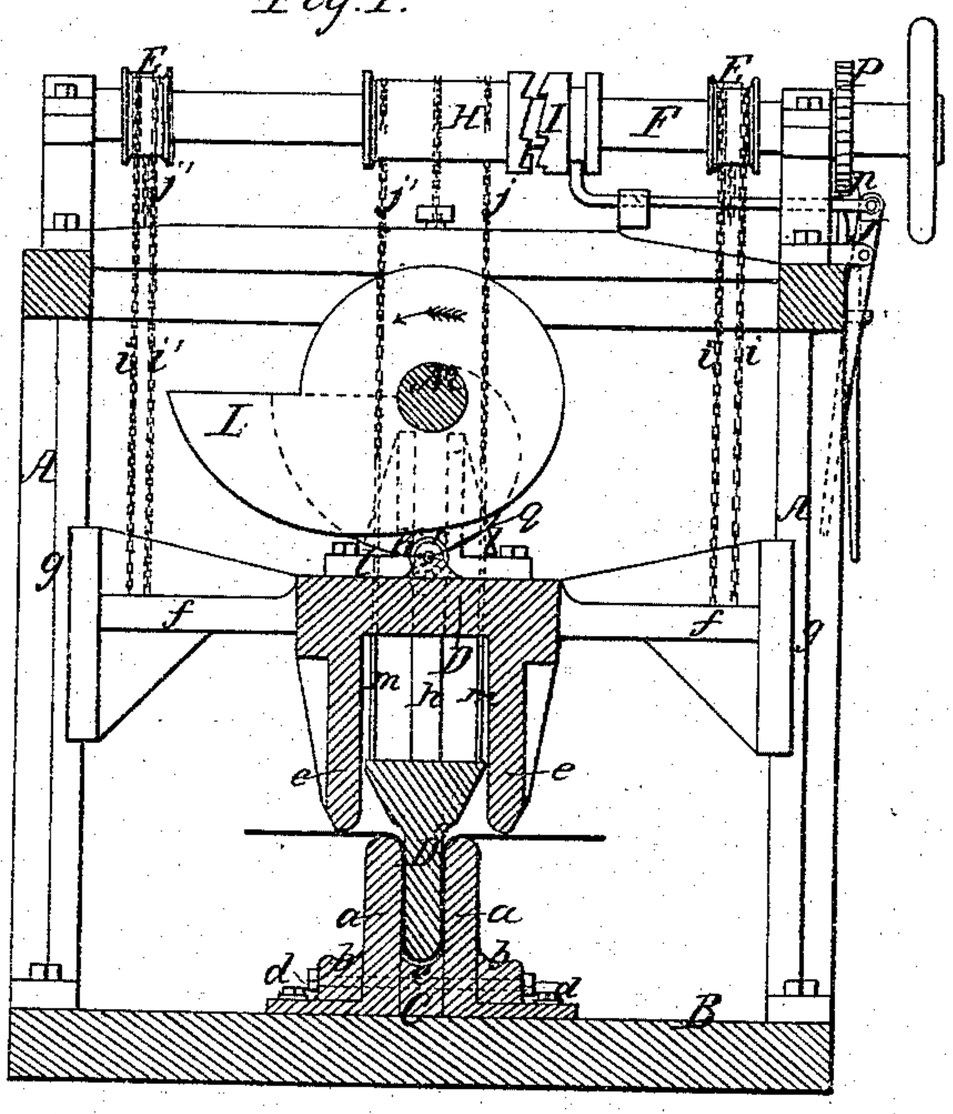


Fig. 2.

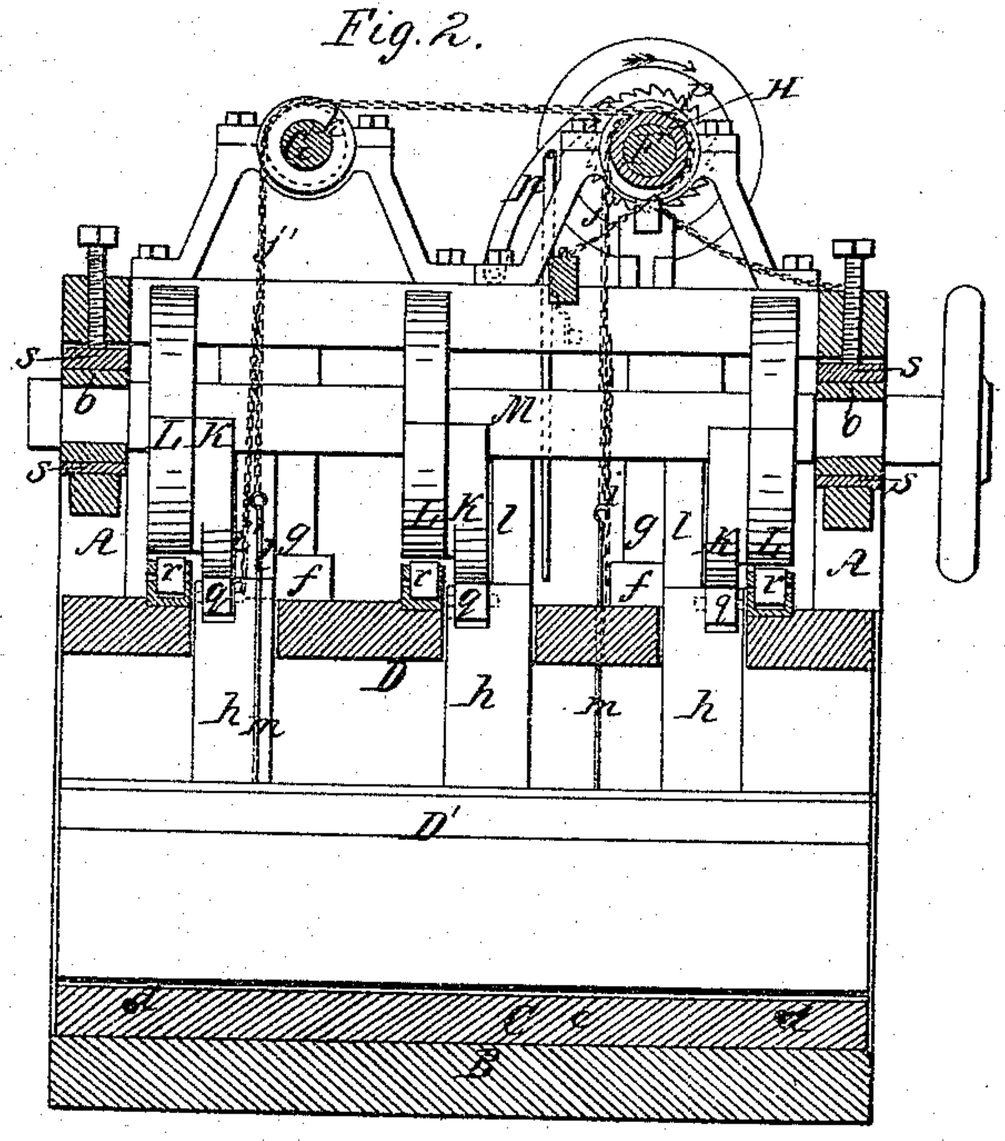


Fig. 3.

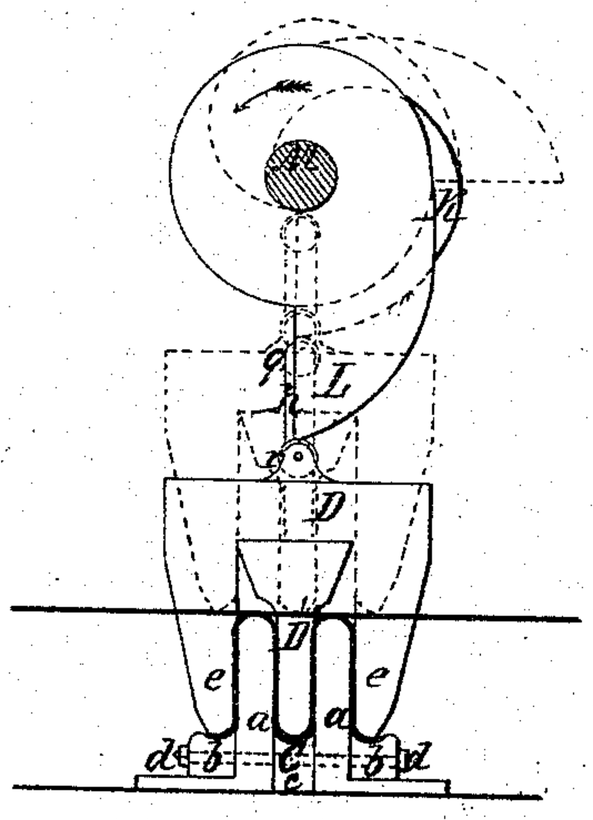
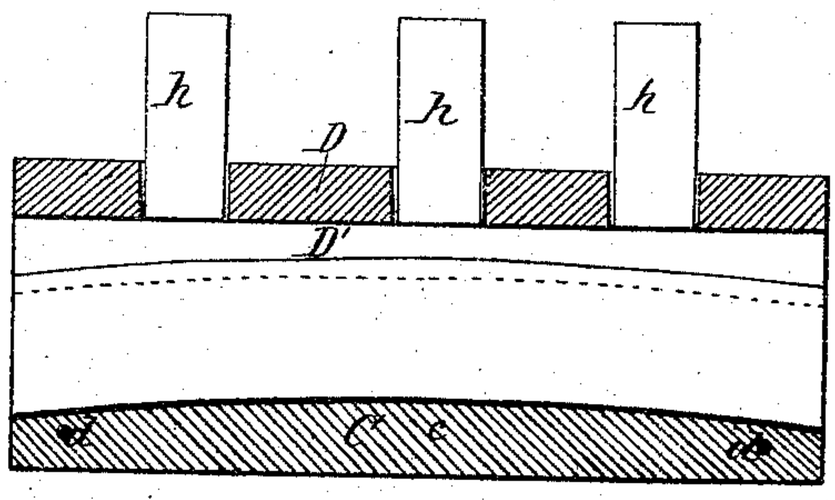


Fig. 4.



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UNITED STATES PATENT OFFICE.

SOLOMON G. BOOTH, OF NEW YORK, N. Y.

MACHINE FOR CORRUGATING SHEET-METAL.

Specification of Letters Patent No. 10,732, dated April 4, 1854.

To all whom it may concern:

Be it known that I, SOLOMON G. BOOTH, of the city, county, and State of New York, have invented a new and useful Improvement in Machinery for Bending or Corrugating Sheet-Metal to form beams for buildings, bridges, ships, and other structures or to serve other purposes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a transverse vertical section of a machine for corrugating metal beams, having my improvement; said section being taken close behind the front framing. Fig. 2, is a longitudinal vertical section of the same through the center. Fig. 3, is an end view of the swage and dies, and of the cams by which the latter are operated. Fig. 4, is a longitudinal vertical section of a swage and dies for forming corrugated beams of arched form.

Similar letters of reference indicate corresponding parts in the several figures.

This invention has for its object, the bending or corrugating of sheet metal, to make the beams known as "Montgomery's patent sheet metal beams," or for forming in sheet metal, corrugations of greater depth than can be formed by any of the means now in use, without injury to the metal.

The machinery which I employ, consists of a swage and die; but a die of ordinary construction would not make corrugations of the desired depth without breaking or tearing the metal.

My improvement consists in making the dies adjustable by forming the parts in separate pieces and adjusting the cams thereto in a manner hereinafter described, so as to be capable of making corrugations of any depth without difficulty.

It also consists of a certain arrangement of the mechanism which operates the dies; whereby the different parts of the die are enabled to be conveniently brought into operation successively, and all withdrawn from the swage after operation, simultaneously.

To enable those skilled in the art to make and use my invention, I will proceed to describe the construction and operation of the machine represented in the accompanying drawings.

A, is the framing of the machine; and B, the bed which supports the swage, C. The swage is made in parts to allow of the depth being varied. The parts consist of the two upright pieces, *a*, *a*, over and between which the corrugations are formed; the two side pieces, *b*, *b*, and center piece, C, by which the depth of the swage is varied. The two pieces, *a*, *a*, are formed with broad flanges to serve as a base for the swage, and as a means of securing it to the bed. The side pieces, *b*, *b*, rest upon the flanges of *a*, *a*, and the center piece, C, fits down close to the bed. All the parts are secured together by transverse bolts *d*, shown dotted in Figs. 1 and 3, and in section in Figs. 2 and 4. The depth of the swage is varied by using side and center pieces of various depths, or by placing packing pieces of various depths under the side and center pieces.

The die is constructed in two parts, D, D′, which may as well be considered as separate dies. The die, D, strides over the upright pieces, *a*, *a*, of the swage, and has two side pieces, *e*, *e*, which hang over the said upright pieces and have their inner faces parallel with the outer faces of the said upright pieces, and at such a distance from them as to leave room between them for the sheet of metal of which the beam is to be formed. It has four guide pieces, *f*, *f*, two on each side, which fit to suitable upright guides, *g*, *g*, and keep the die upright, but allow it to receive a vertical motion. The die, D′, fits between the upright pieces, *a*, *a*, of the swage, so as to leave the same space between it and the swage, as is between the swage and the outer die. It has upright standards, *h*, *h*, which pass freely through suitable openings in the top of the die, D, and work between guides, *l*, *l*, bolted to the top of D. These standards and guides serve to keep the die, D′, upright. The upper part of the die, D′, above the operative part, is made nearly as wide as the space between the side pieces of the die, D, and is made flat at the top, or of other suitable shape to fit close to the top of the inside of the latter die, as represented in black outline in Fig. 3. When the top or back of the die, D′, is in contact with the die, D, the bottom of the die, D′, and bottoms of the side pieces should be in the same plane, in order to make the bottoms of the corrugations of the beam in the same plane. The dies and swage are made of cast iron, and must be at least of the full length of the sheet of metal to be bent.

The die, D, is suspended by means of four chains, *i*, *i*, *i'*, *i'*, which are attached to two drums, E, E, secured upon a shaft, F, which I will call the lifting shaft, which is placed transversely to the die, in suitable bearings on the top of the framing. Two of these chains, *i*, *i*, pass directly from the drums to the die, and the others, *i'*, *i'*, pass first over a roller, *k*, on a shaft, G. The first two are attached to the die near one end, and the other two, near the other end. The die, D', is suspended by two chains, *j*, *j*, which are secured to a loose drum, H, upon the shaft, F. One of these chains passes directly from the drum, H, and the other passes first over a loose roller on the shaft, G. Both chains are attached to upright rods, *m*, *m*, which are secured to the die, D', and pass through holes in the top of the die, D. The loose drum, H, is coupled with the shaft, F, when necessary, by means of a clutch, I, which is operated by a lever, J. The shaft, F, is furnished with a ratchet, P, into which engages a pawl, *p*.

The dies, D, D', receive the pressure necessary to bend the metal from two sets of cams, K, and L, upon a shaft, M, which is suported in journal boxes, *o*, *o*, above the die, and occupies a position longitudinal to the die. The set of cams, K, are all alike, and act upon the die, D', whose standards, *h*, are each furnished with a roller, *q*, for the cam to act upon. The cams, L, are all alike, and act upon the die, D, which is furnished with a friction roller, *r*, for each cam to act upon. The cams, K, and L, are of such form and so arranged relatively to each other, that when the shaft, M, rotates in the direction of the arrow shown in Fig. 1, the cams, K, will act upon the die, D', and force it down before the cams, L, begin to force down the die, D, and that the former cams will hold the die, D', down, while the latter act upon the die, D. The journal boxes of the shaft, M, should be capable of being raised or lowered, to bring the cams to the proper heights to operate with various depths of swage and dies, and they may be kept at the proper height by packing pieces, *s*, *s*, shown in Fig. 2.

The operation of forming a beam with this machine is as follows: The first proceeding is to turn the shaft, M, to bring the cams in the positions represented in red outline in Fig. 3, to allow the dies to be raised. The dies are then both raised by coupling the drum, H, to the shaft, F, and turning the said shaft by any suitable means provided for the purpose, in the direction of the arrow shown in Fig. 2. The dies are kept suspended by the engagement of the pawl, *p*, with the ratchet, P, which prevents the turning of the shaft, F. The position of the dies, when raised, is indicated in Fig. 3, in red outline. The sheet of metal requires to be laid upon the swage, as shown by the straight blue line in Fig. 3, and the die, D', is set free to be forced down by the cams, by throwing out the clutch, I. Motion is next given to the shaft, M, by any suitable means, in the direction of the arrow shown in Fig. 1, and the cams K, are caused to force down the die, D', and force the metal down between the uprights, *a*, *a*, and bend it to the form shown in Fig. 1. The movement of the shaft may then be stopped until the pawl, *p*, is disengaged from the ratchet wheel, P, in order to allow the die, D, to descend, after which the motion of the shaft may be continued to bring the cams, L, into operation, to force down the die, D, to the position shown in black outline in Fig. 3, which bends the metal over the outside of the upright pieces, *a a*, of the swage, and gives it the form shown between the black outlines of the dies and swage in the latter figure. The bending is now complete, and the clutch, I, may be thrown into gear with the drum, H, to allow both dies to be raised simultaneously, by the turning of the shaft, F. When the dies have been raised, the beam may be removed, and the machine is ready to receive another sheet of metal, to be submitted to the same operations as have just been described.

The machine represented, only exhibits two dies, but it is evident, that a machine may be constructed, in which another, or others can be added, if desired, striding over the die, D, and operated by separate cams. It is capable of corrugating straight beams, by using a swage and dies, which are straight longitudinally, as represented in Fig. 2, or of corrugating and giving at the same time, an arched form, by employing an arched swage and dies to correspond, as shown in Fig. 4.

What I claim as my invention, and desire to secure by Letters Patent, is—

The construction and arrangement of the dies so as to adjust them to any depth of corrugation and thickness of metal by having the pieces *b*, *c*, *b*, separate from the parts *a*, *a*, so that they as well as the cam shaft can be raised and lowered to make a deeper or shallower corrugation, the whole being combined and arranged substantially in the manner and for the purpose set forth.

SOLOMON G. BOOTH.

Witnesses:
S. H. WALES,
JNO. W. HAMILTON.