No. 676,818. Patented June 18, 1901.

J. HEINRICH & H. DORSCH.

APPARATUS FOR THE MANUFACTURE OF SHEET METAL, METAL FOIL, &c.

(Application filed Aug. 17, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

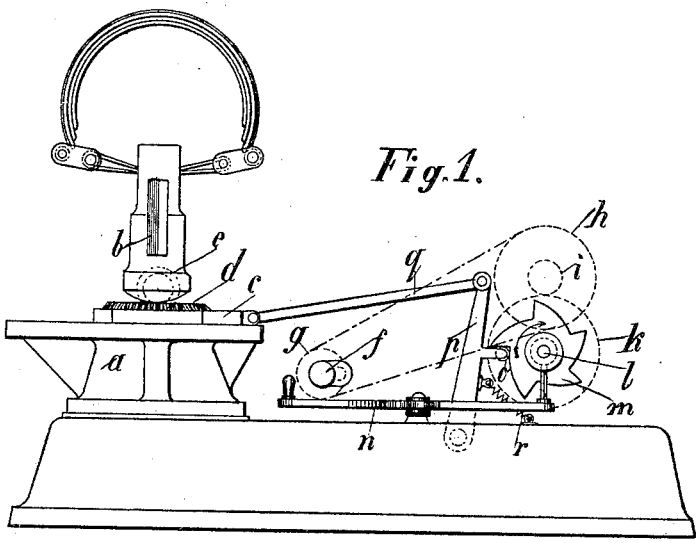
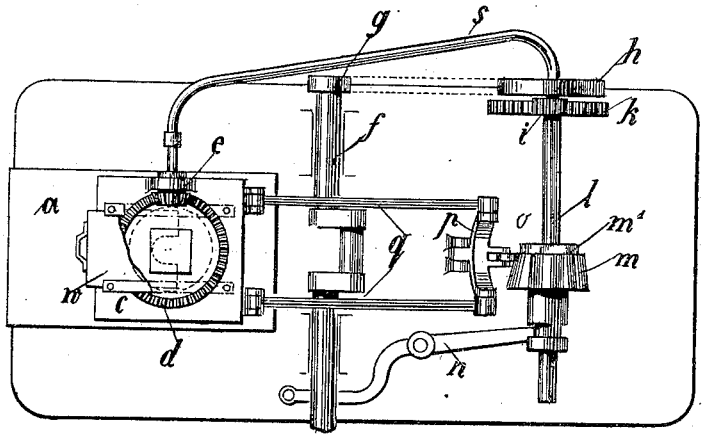


Fig. 2.



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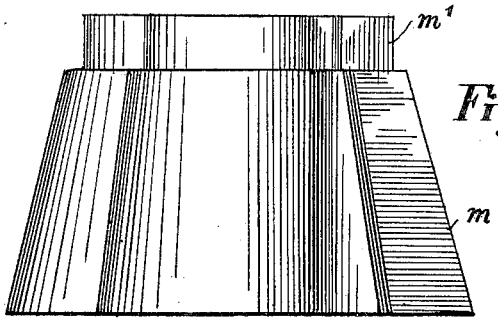

Fig 3

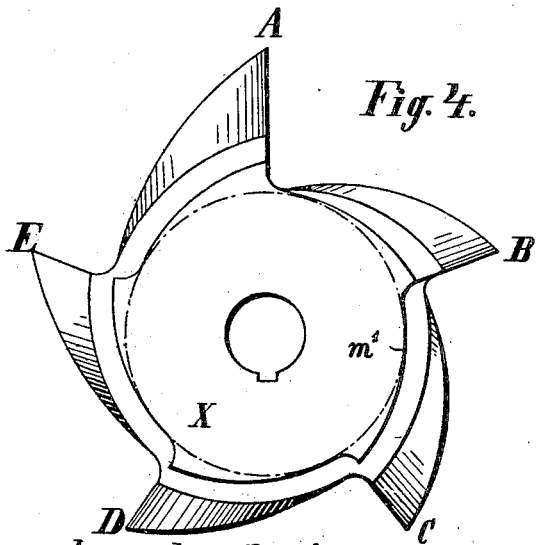

Fig. 4.

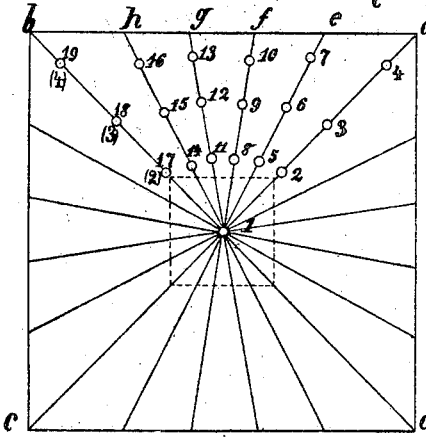

Fig. 5

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UNITED STATES PATENT OFFICE.

JACOB HEINRICH AND HEINRICH DORSCH, OF FÜRTH, GERMANY.

APPARATUS FOR THE MANUFACTURE OF SHEET METAL, METAL FOIL, &c.

SPECIFICATION forming part of Letters Patent No. 676,818, dated June 18, 1901.

Application filed August 17, 1899. Serial No. 727,577. (No model.)

To all whom it may concern:

Be it known that we, JACOB HEINRICH and HEINRICH DORSCH, subjects of the King of Bavaria, and residents of Fürth, in the Kingdom of Bavaria, Germany, have invented certain new and useful Improvements in Apparatus for the Manufacture of Sheet Metal, Metal Foil, and the Like, (for which we have applied for patents in Germany, dated July 8, 1899, and in France, No. 278,895, dated July 17, 1889,) of which the following is a specification.

This invention relates to metal-beating machines; and it consists of the improvements which are fully set forth in the following specification, and are shown in the accompanying drawings.

It is of the greatest importance in beating metal squares into sheets or leaves that the thin metal pieces between the beater's skins should be caused to expand quickly and evenly. Experience has shown that this result is most successfully attained when the blows take place successively at varying distances from the center, and it is the object of our invention to enable such blows to be struck by mechanical devices of simple and improved construction.

In the drawings, Figure 1 is a side elevation of a machine embodying our invention. Fig. 2 is a plan view of the same. Fig. 3 is a side elevation, enlarged, of the cam for reciprocating the leaf-carrier. Fig. 4 is a plan view of the same, and Fig. 5 is a diagrammatic view illustrating the action of the beater.

a is an anvil upon which the carriage *c* is supported and over which it may be reciprocated.

b is the beater, which may be of any suitable form and operated in any convenient manner. We have shown the well-known spring-hammer, which may be operated in any suitable manner, as from the crank *f*.

Reciprocations are imparted to the carriage *c* from a cam *m* on a shaft *l* through a rocking lever *p*, connected with the carriage *c* by links *g* and making contact with the cam by a roller-finger *o*. A spring *r* maintains the roller-finger *o* in contact with the cam and returns the lever *p* and carriage *c*. Carried by the carriage *c* is the pack-holder, which is free to rotate therein and is provided with a cogged rim *d*, which engages and is operated by a gear *e* on the end of a flexible shaft *s*.

The shafts *l* and *s* are driven in any suitable manner. As shown, the shaft *s* is driven from the crank-shaft *f* by a belt and pulleys *g h*, and the shaft *l* is driven from the shaft *s* by gears *i k*.

To enable successive series of blows to be struck at varying distances from the center, the cam *m* is constructed, as shown in Figs. 3 and 4, with a series of cam projections A B C D E, the effect of which is to move the carriage *c* forward to the extent of each cam projection and to return it quickly (under the action of the spring *r*) when the end of each cam projection is reached, while meanwhile the work-holder is being turned under the action of the gears *d e*. The effect of these movements is illustrated in the diagram shown in Fig. 5. Supposing the roller-finger *o* to be in contact with the lowest portion of the cam-face A, with the pack-holder in substantially a central position under the beater *b*, now as the cam-face A moves under the finger *o* the carriage *c* and the pack will be moved forward and successive blows will be struck at the points 2 3 4 at varying distances from the center. When the end of the cam A is reached, the finger *o* is drawn by a quick movement to the lowermost portion of the cam B and the carriage *c* is returned, so that approximately the central portion of the pack is again under the beater, and as the cam B moves under the finger *o* the carriage and work will be moved as before and successive blows will be struck at varying distances from the center; but as the work-holder has meanwhile been turned under the action of the gears *e d* these blows will occur in a different radial direction, as 5 6 7, and so on successively, and the action of the cams A B C D, &c., will cause a series of successive blows to be given on varying radial lines. If the work-holder is under constant rotation by the action of the gears *d e*, the successive blows imparted during the operation of each cam-face will not take place in straight radial lines, as shown in the diagram, but in spiral lines radiating from the center.

Owing to the fact that with a square or rectangular sheet some radial distances will be longer than others, as illustrated in the dia-

gram, and to avoid having the beater *b* impart some blows beyond the edge of the sheet we prefer to form the cam projections A B C, &c., of varying lengths, so as to vary the extent of movement imparted to the carriage *c* to suit the direction of movement relative to the radial length of the sheet, as shown in Fig. 4.

To avoid having too many blows imparted at the center, we do not form all of the cams A B C, &c., so as to return the carriage and holder to an exact central position. In the construction shown in Fig. 4 only one cam-face, C, is shown formed sufficiently low to bring the work exactly to a central position under the beater.

As the metal square becomes beaten out and expanded it is desirable that the blows shall be struck at proportionately greater distances from the center. For this purpose the cam *m* is made conical and is supported with provision for longitudinal movement, as by a shifting lever *n*, on its shaft *l*, so that it may be moved to increase the diameter of the cam-face acting on the finger *o*, and thus increase the extent of movement imparted to the carriage *c* and the work proportional to the increase of the metal sheet in diameter.

It is desirable that the fresh pack should be beaten to straighten and flatten it out before the regular beating operation takes place. For this purpose we provide an additional cam *m'* adjacent to the cam *m*, which may be used in connection with the lever *p* and its finger *o* for this preliminary work. This cam *m'* need not be conical and may be provided with smaller cam projections.

The details of construction shown may be varied without departing from the invention.

What we claim as new, and desire to secure by Letters Patent, is as follows:

1. In a metal-beating machine, the combination of a reciprocating pack-carrying carriage, with a pack-holder carried thereby and having an independent movement with reference thereto, and means to shift said pack-holder in its carriage and during its reciprocations.

2. In a metal-beating machine, the combination of a reciprocating pack-carrying carriage, with a pack-holder carried thereby and having an independent rotary movement with reference thereto, and means to rotate said pack-holder in its carriage and during its reciprocation.

3. In a metal-beating machine, the combination of a reciprocating pack-carrying carriage, a pack-holder carried thereby, and rotatable therein and gearing *d e* for rotating said pack-holder in its carriage, substantially as and for the purposes described.

4. In a metal-beating machine, the combination of a pack-carrying carriage, a pack-holder carried thereby and having an independent movement with reference thereto, means to shift said pack-holder in its carriage, a cam *m* having a series of operative cam projections of varying length, and power-transmitting connections between said cam *m* and the carriage whereby reciprocations of successively-varying length are imparted to said carriage.

5. In a metal-beating machine, the combination of a pack-carrying carriage, a conical cam *m* having a series of cam projections of varying length, power-transmitting connections between said cam *m* and the carriage, and means to shift the conical cam *m* to increase or decrease the diameter of the projections acting on said power-transmitting connections and the extent of reciprocations imparted to said pack-carrying carriage, and the auxiliary cam *m'* adjacent to the cam *m* provided with smaller cam projections substantially as and for the purpose described.

In testimony whereof we have hereunto set our hands in the presence of two witnesses.

JACOB HEINRICH.
HEINRICH DORSCH.

Witnesses:
SIGMUND DÜNKELSHÜBLE,
H. ENGELHARD.