(No Model.) 4 Sheets—Sheet 1.

E. JORDAN.

AUTOMATIC FOLDER OR HOOK MACHINE FOR SHEET METAL.

No. 307,198. Patented Oct. 28, 1884.

Fig. 1.

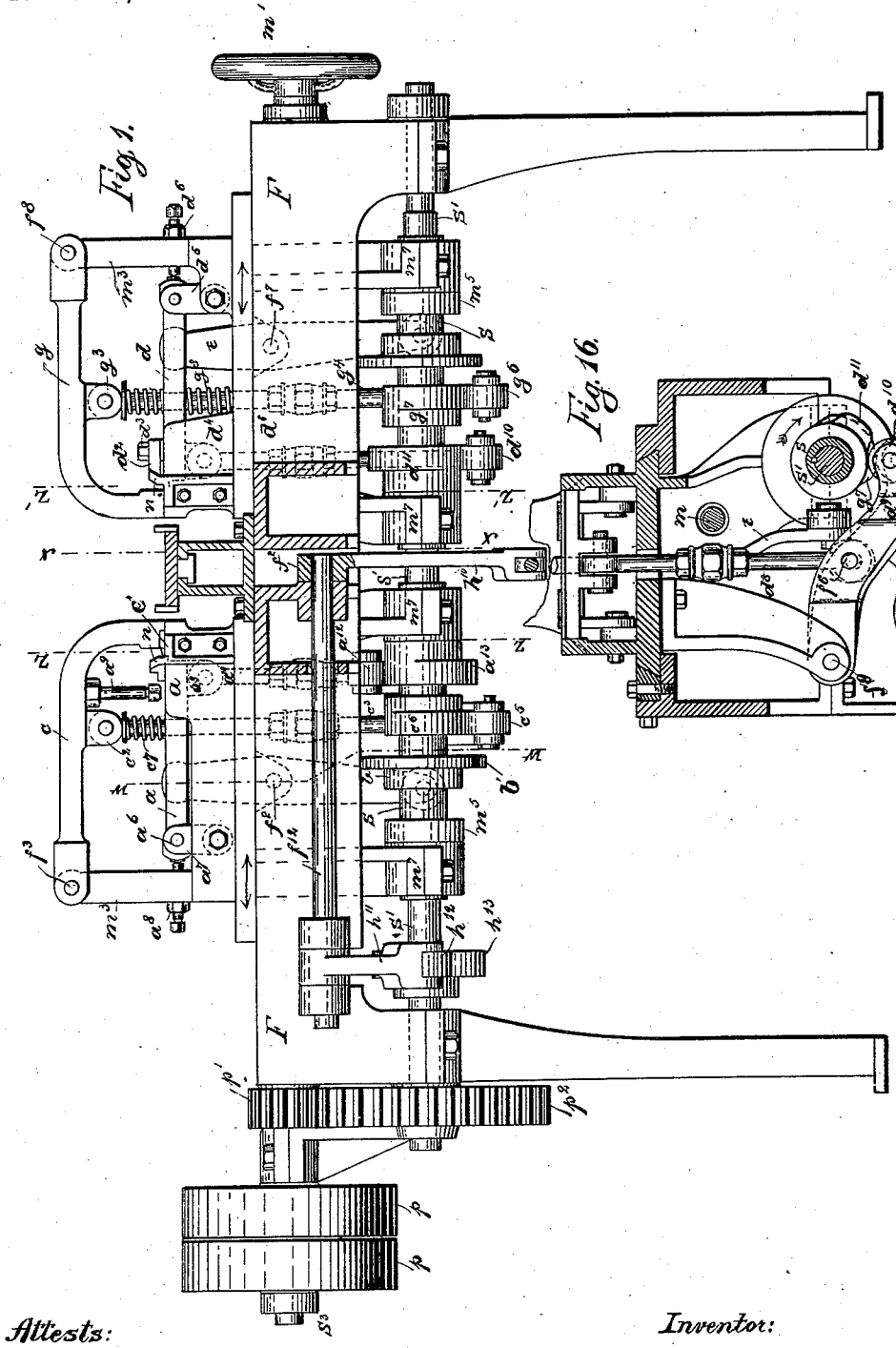

Fig. 1b.

Attests:

F. Rudolph.

J. H. Templin.

Inventor:

Edmund Jordan

(No Model.) 4 Sheets—Sheet 2.

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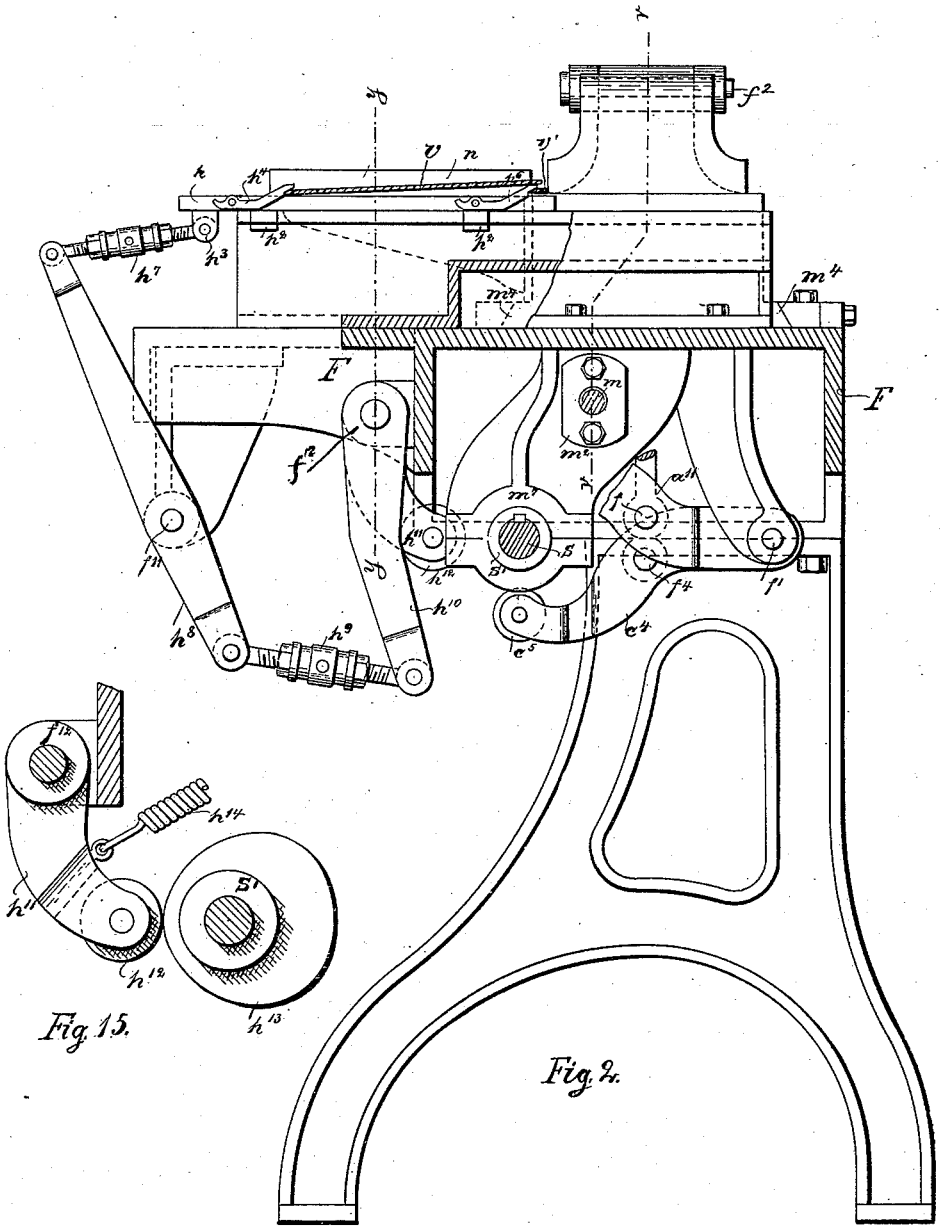

Fig. 2.

Fig. 15.

Attests:

F. Rudolph.

J. H. Templin.

Inventor:

Edmund Jordan

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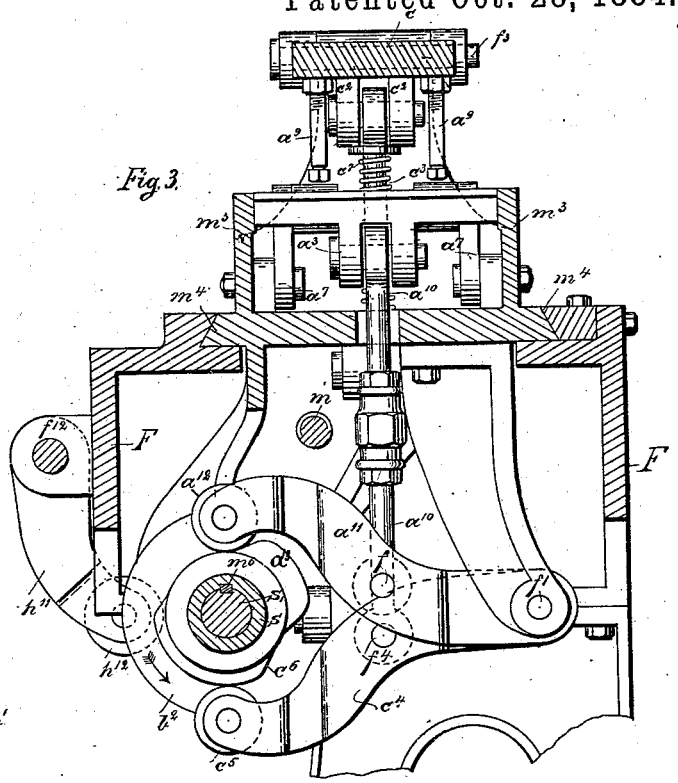
Fig. 3.



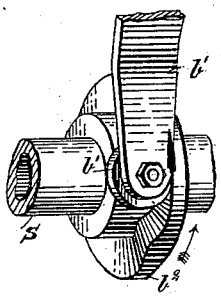
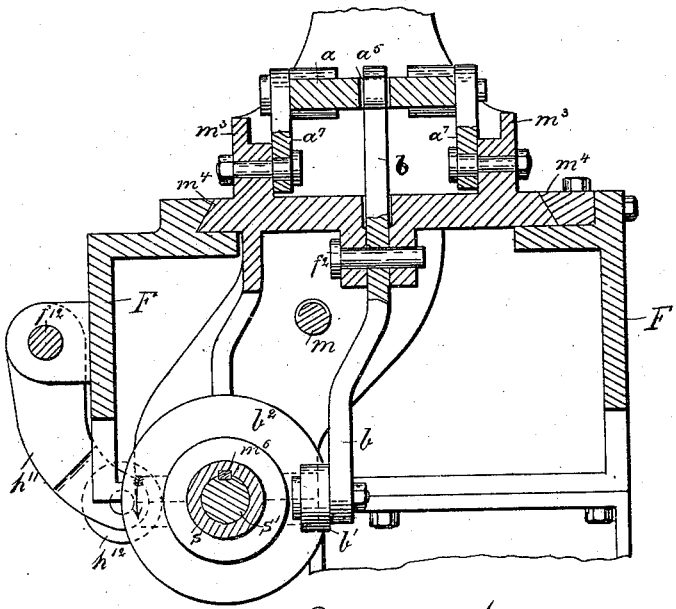


Fig. 5.

Fig. 4.



Attests:

F. Rudolph.

J. H. Templin.

Inventor: Edmund Jordan

(No Model.) 4 Sheets—Sheet 4.

E. JORDAN.

AUTOMATIC FOLDER OR HOOK MACHINE FOR SHEET METAL.

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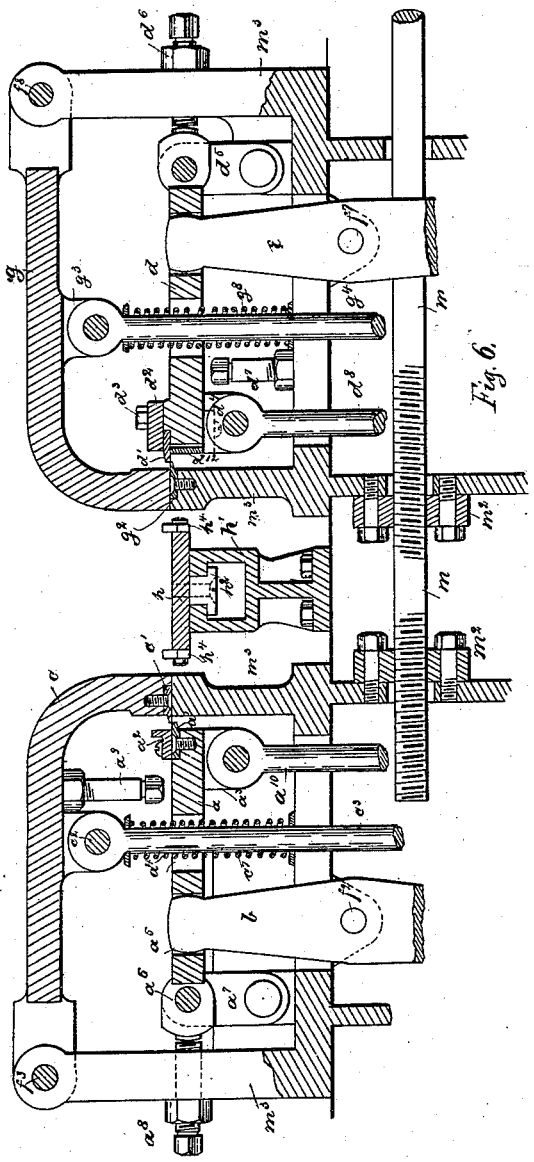

Fig. 6.

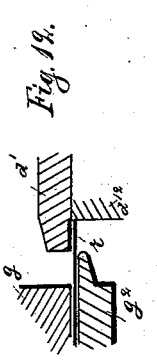

Fig. 12.

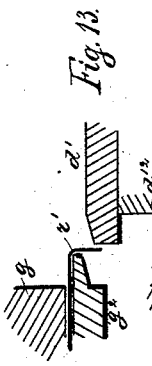

Fig. 13.

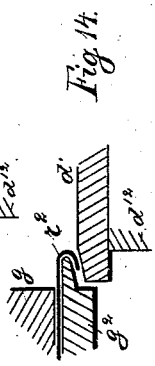

Fig. 14.

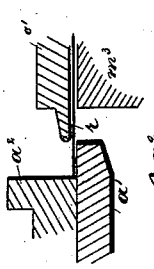

Fig. 9

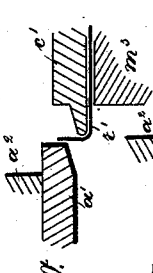

Fig. 10.

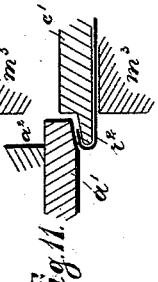

Fig. 11.

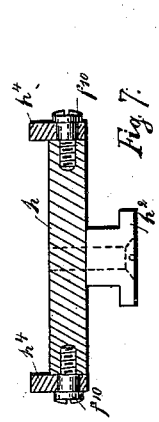

Fig. 7.

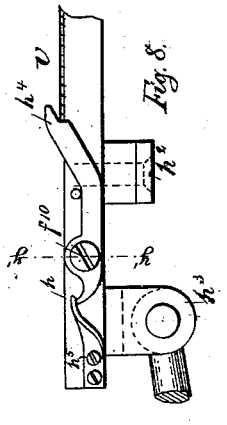

Fig. 8.

Attests:
F. Rudolph.
J. H. Templin.

Inventor:
Edmund Jordan

UNITED STATES PATENT OFFICE.

EDMUND JORDAN, OF BROOKLYN, NEW YORK, ASSIGNOR TO E. W. BLISS, OF SAME PLACE.

AUTOMATIC FOLDER OR HOOK-MACHINE FOR SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 307,198, dated October 28, 1884.

Application filed May 22, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDMUND JORDAN, a citizen of the United States, residing at Brooklyn, in the State of New York, have invented certain new and useful Improvements in Automatic Folders or Hook-Machines for Working Sheet Metal, of which the following is a specification.

My invention relates to a machine for forming hooks on the edges of sheet metal preparatory to making a locked seam, as hereinafter fully described.

In the accompanying drawings, Figure 1 is a front elevation of my improved machine, showing a section of the frame carrying the feed device, taken at line *y y*, Fig. 2. Fig. 2 is a cross-section of my machine, taken at line *x x*, Fig. 1. Fig. 3 is a cross-section of my machine, taken at line *z z*, Fig. 1. Fig. 4 is a cross-section of my machine, taken at line *w w*, Fig. 1. Fig. 5 represents one of the cams and an end of one of the levers which actuate the formers for finishing the hooks. Fig. 6 is a longitudinal section of the machine, taken at line *v v*, Fig. 2. Fig. 7 is a section taken through Fig. 8 at line *y' y'*. Fig. 8 shows a partial side view of the feed-slide. Figs. 9, 10, 11, 12, 13, and 14 represent cross-sections showing the working-points of the different formers at the various points during the process of forming the hooks. Fig. 15 shows a side view of the cam-lever which works the feed-slide; and Fig. 16 is a cross-section taken at line *z' z'*, Fig. 1, showing the levers and other parts.

Similar letters of reference indicate corresponding parts throughout the several views.

F represents the cast-iron frame of proper size and strength, with suitable legs or supports.

a is a cast-iron former of the required width, about one inch and one-eighth in thickness and eight inches long, with slots to accommodate a connecting-rod, and a lever, hereinafter described.

a' represents a steel bar or forming-edge, fitted to the upper surface of the former, of the required length and size, attached to the frame and projecting over the edge of the former about a quarter of an inch, over which the hook on the sheet metal is formed. This may be enlarged or diminished without interfering with the usefulness of my invention.

a^2 is an adjustable gage attached to the upper surface of the former, to lengthen or shorten the hook to be formed on the sheet metal. This is constructed of steel, and is attached to the frame by screws.

a^3 is a projecting ear on the under side of the former, to which a connecting-rod is attached, and a^4 is a slot in the former, in which the connecting-rod works.

a^5 is another slot in the former, in which the lever works, imparting a horizontal circular motion to the former.

a^6 represents the moving fulcrum, supporting the end of the former and imparting the circular motion.

a^7 a^7 represent two flat links, one end of each attached to the adjustable frame and the other end to the former, supporting the same. The upper ends of these links follow the horizontal motion of the former, thereby imparting a circular motion to the same.

a^8 is a screw to receive the thrust of the former when in use, and a^9 represents a similar screw, to take the upward thrust of the former when in use. These screws keep the former in place when the machine is performing its work.

a^{10} represents an adjustable connecting-rod, one end pivoted to the projecting ear on the former at a^3, and the opposite end fits loosely into a pocket in lever a^{11}, to which lever the connecting-rod is loosely fitted to allow the connecting-rod to follow the upward motion of the former *a*. One end of the lever a^{11} is pivoted to the frame at *f'*, and the opposite end is provided with a roller, a^{12}, which works on the face of the cam a^{13}, attached to the adjustable sleeve S, fitted on the shaft S'.

By the mechanism described a vertical swinging motion is imparted to the end of the former provided with the projecting former *a'*.

b represents a lever, the upper end working in slot a^5, pivoted in the adjustable frame at

f^2, the opposite end being provided with a roller, b', working on the side of cam b^2, attached to the sleeve S, fitting over the shaft S'.

By the mechanism here described a horizontal circular motion is imparted to the former.

c represents a blank-holder pivoted to the adjustable frame at f^3.

c' represents a steel bar or projecting former attached to the opposite end of the blank-holder, provided with a projecting edge of about one-quarter of an inch, and so shaped as to turn the hook of the required width and shape over the same.

c^2 represents an ear or lug on the under side of the blank-holder, and a screw, a^9, is also attached to the blank-holder.

c^3 represents an adjustable connecting-rod, one end attached to the ear c^2 on the blank-holder and the opposite end pivoted to a lug at f^4.

c^4 represents the lever, one end pivoted to the frame at f', and the opposite end working on the face of cam c^6, rigidly attached to the sleeve S on the shaft S', by means of a cam-roll, c^5.

c^7 represents a spring which raises the blank-holder.

d represents a former similar to the former marked a.

d' represents a steel bar or projecting former, clamped to the former by a plate, d^2, and bolts d^3.

d^4 is an ear on the under side of the former, which is pivoted to links d^5, attached to the frame, in all respects similar to those already described, and by these links a horizontal carrying motion is imparted to the former.

d^6 and d^7 represent screws to keep the former to its work.

d^8 represents an adjustable connecting-rod, one end attached to the ear d^4 on the former, and the opposite end to a lever, d^9, pivoted to the frame at f^6, and carrying a roll, d^{10}, on the opposite end, which works on the face of a cam, d^{11}, fitted and rigidly held to sleeve S, which fits over a shaft, S'.

By the mechanism described a vertical circular motion is imparted to the former d.

e represents a lever, one end of which fits and works in the slot in the former pivoted in the frame at f^7, the lower end being provided with a roll in all respects similar to b', which works on the side face of a cam similar to b^2. By this mechanism a horizontal circular motion is imparted to the former d.

d^{12} represents an adjustable gage, consisting of an angle-bar adjusted, by means of screws on the former, to regulate the width of the hook.

g represents a blank-holder, pivoted to the adjustable former at f^8. The opposite end of this blank-holder clamps the sheet metal between it and the adjustable frame. The upper surface of the adjustable frame, where the former rests, is provided with a steel former, g^2, projecting sufficiently to form the hooks in the sheet metal over the projecting edge, as before stated.

g^3 represents an ear on the under side of the blank-holder.

g^4 represents an adjustable connecting-rod, one end pivoted to ear g^3 and the opposite end to a lever, g^5, pivoted at f^9, and the opposite end carrying a roll, g^6, which works on the face of a cam, g^7.

By the mechanism described a vertical swinging motion is imparted to the blank-holder.

g^8 represents a spring to raise the blank-holder.

h is a feed-slide of the required length, and about four inches wide, working in guides h' h' in the frame.

h^2 h^2, Fig. 2, are lugs on the under side of the feed-slide, and h^3 is an ear on the under side of the same.

h^4 h^4 represent two carriers, attached to the outer surface of the feed-slide at f^{10}, actuated by springs h^5 h^5. The weight of the sheet metal depresses the upward projecting ends of the carriers. When the sheet metal is carried forward, the springs raise the carriers, the projecting ends of which strike against the edge of the sheet metal, carrying it under the blank-holder.

h^6 h^6 represent similar carriers operated in the same manner, provided to move the sheet metal from the machine after the hooks have been formed on the edges.

h^7 is an adjustable connecting-rod, one end attached to ear h^3 on the feed-slide.

h^8 is a lever to which the connecting-rod is attached. This lever is pivoted at f^{11}, and the opposite end connected with an adjustable connecting-rod, h^9, the opposite end of which is attached to a lever, h^{10}. The opposite end of this lever is attached to a rock-shaft, f^{12}, Fig. 1, and the opposite end of the rock-shaft carries a lever, h^{11}, Figs. 1 and 15, rigidly fastened to the same.

h^{12} represents a roll carried on the lever h^{11} and working on the face of a cam, h^{13}, rigidly attached to shaft S'.

h^{14} represents a spring operating the lever and all parts connected therewith, imparting a backward motion.

By the mechanism described a horizontal motion is imparted to the feed-slide which carries the sheet metal.

m represents an adjusting-screw with a right and left hand thread cut in the same.

m' represents a wheel rigidly attached to the projecting end of the screw.

m^2 m^2 represent two nuts rigidly attached to the adjustable frame, with a right and left hand thread provided to fit the thread on the screw.

m^3 m^3 represent the adjustable frames, each carrying a former and a blank-holder adapted to move in guides m^4 in the frame.

By the mechanism described the adjustable frames with formers and blank-holders can be

adjusted to different lengths of sheet metal by turning the screw.

To accommodate the change here described an adjustment is provided on the main shaft as follows:

Two hollow sleeves, S S′, are fitted over the main shaft and held in place by collars m^5 m^5 and cams a^{13} and d^{11}, acting as collars on the shaft.

m^6 represents a feather in the sleeve working in a spline on the main shaft S′.

m^7 represent bearings on the adjustable frames, in which the sleeve revolves.

By the adjusting-screw m the adjustable frames m^3 m^3 and the sleeves and cams attached thereto and the operating mechanism are all adjusted to different lengths of sheet metal.

n n represent guides attached rigidly to the adjustable frames to guide the sheet metal under the blank-holders, and consist of two triangular-shaped guides provided to receive and guide the sheet metal under the blank-holders.

p p represent a fast and a loose pulley attached to a short shaft, S^3. On the opposite end of this shaft is a pinion, p', meshed with a gear-wheel, p^2, rigidly attached to the end of main shaft S′.

r r, Figs. 9 and 12, represent a sheet of metal under the blank-holders, ready to have hooks turned on the edges of the same.

r' r', Figs. 10 and 13, represent the sheet of metal after the first operation, one edge of the metal being turned up and the other down.

r^2 r^2, Figs. 11 and 14, represent a sheet of metal after the hooks are formed by the horizontal motion of the former, as before described.

Operation: The sheet metal is placed on the guides n n and held in place by the operator until the feed-slide h, with carriers h^4 and h^4, is moved backward sufficiently to allow the carriers to be raised by springs h^5 h^5, to embrace the edges of the sheet metal when the travel-slide is reversed. The sheet is guided under the blank-holders c and g, which clamp the sheet on the projecting surface of the formers and hold it firmly. The travel of the feed is then reversed, the carriers being depressed while receding, the next blank laid on the guides n n, and held there by the operator or suitable mechanism. The springs h^5 h^5, being very light, afford but little resistance to the depression of the carriers. The former a moves upward and the former b moves downward simultaneously, and immediately succeeding this operation both formers move inward, completing the hooks when they recede, and the blank-holders are raised by the springs c' and g^8. The movable carriers h^6 and h^7 on the feed-slide embrace the edge of the sheet metal on which the hooks have been formed and carry the same out of the machine, and at the same time another sheet is brought under the blank-holders, as already described. The carriers h^6 h^6, while the feed-slide is receding, are depressed by the sheet held by the blank-holder. In this way the feeding mechanism is greatly simplified.

It is obvious that each hook on the edges of the sheet metal could be formed separately without interfering with the usefulness of my invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A machine for forming hooks turned in opposite directions on opposite edges of sheet metal, having two movable blank-holders to hold the sheet when the hooks are formed, in combination with suitable formers, one having an upward succeeded by an inward circular motion, and the other having a downward succeeded by an inward circular motion, for forming the hooks over projecting surfaces, as described.

2. A machine for forming hooks on sheet metal, having, first, one or more movable blank-holders for automatically holding the sheet when the hooks are being formed, and to release the same when completed; second, one or more formers having an upward or downward motion, succeeded by an inward circular motion, as described, for turning the hook or hooks over projecting surfaces, as described; third, a reciprocating feed-slide provided with suitable means for carrying the sheet metal under the blank-holders, combined and arranged as described.

3. A machine for forming hooks on sheet metal, having, first, two movable blank-holders for automatically holding the sheets while the hooks are being formed and then release the same; second, two movable formers, one having an upward and the other a downward motion, succeeded by an inward circular motion for forming the hooks over projecting surfaces provided therefor; third, a reciprocating feed-slide provided with suitable means for carrying the sheet metal under the blank-holder, and provided with suitable carriers to move the sheets from the machine; fourth, two or more stationary guides to conduct the sheet metal under the blank-holders, all combined and arranged as described.

4. The combination, in a machine for forming hooks on sheet metal, of a reciprocating feed-slide provided with one or more projecting moving carriers pivoted to the feed-slide, and raised by springs or other suitable means during the inward motion of the slide, adapted to embrace the edge of the sheet metal, and depressed during the backward motion of the slide by the sheet metal laid on the guides, the slide and carriers adapted to feed the sheet metal under the blank-holders and carry the same out of the machine after the hooks have been formed, with suitable means for imparting a reciprocating motion to the slide.

5. In a machine for forming hooks on sheet metal, first, one or more adjustable frames moving in guides in the main frame; second, one or more sleeves movable on the shaft, provided with a movable feather in a spline

in the shaft, provided with suitable means for adjusting the frames, sleeve, and connecting mechanism to different lengths of sheet metal, as described.

6. In a machine for forming hooks on sheet metal, a projecting bar, c', rigidly attached to the lower inner surface of the blank-holder, over which the hooks are formed, in combination with projecting bar a', rigidly attached to the inner surface of the former, having an upward succeeded by an inward motion to form the hooks, as described.

7. In a machine for forming hooks on sheet metal, projecting bar g, rigidly attached to the projecting surface of the frame over which the hooks in the sheet are formed, in combination with projecting bar d', rigidly held to the inner surface of the movable former, having a downward succeeded by an inward motion to form the hooks, as described.

8. In a machine for forming hooks on sheet metal, adjustable frames m^3 m^3, moving in guides on the main frame, adjustable sleeves S S, provided with a feather moving in a spline in shaft S′, in combination with rod m, having a right and left hand screw-thread working in nuts m^2 m^2, adapted to adjust the movable frames, sleeves, and connecting mechanism toward or from the center of the feed-slide to accommodate different lengths of sheet metal, as described.

EDMUND JORDAN.

Witnesses:
C. WILLIAMS,
F. RUDOLPH.