W. R. MAGIE.

MACHINE FOR WIRING SHEET METAL.

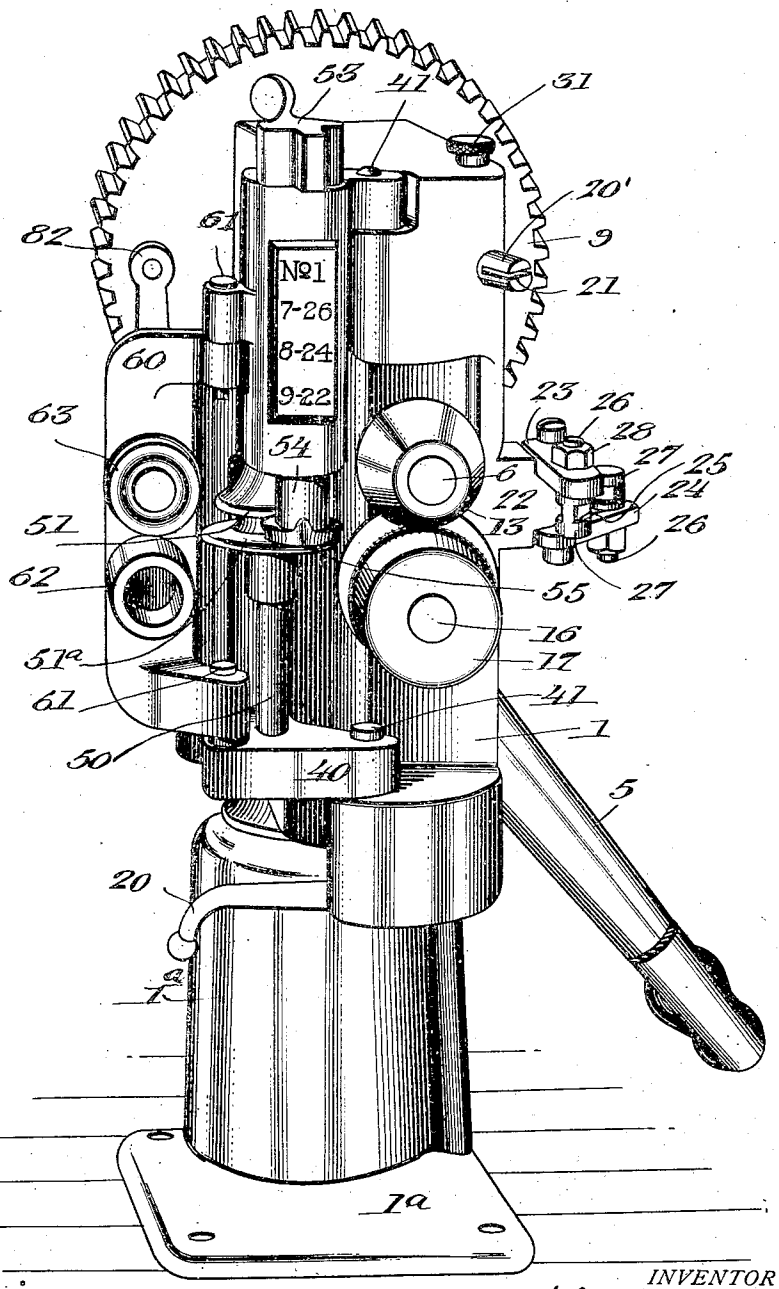
APPLICATION FILED DEC. 26, 1911.

1,048,984.

Patented Dec. 31, 1912.

3 SHEETS—SHEET 1.

Fig. 1



WITNESSES

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3 SHEETS—SHEET 2.

Fig. 2.

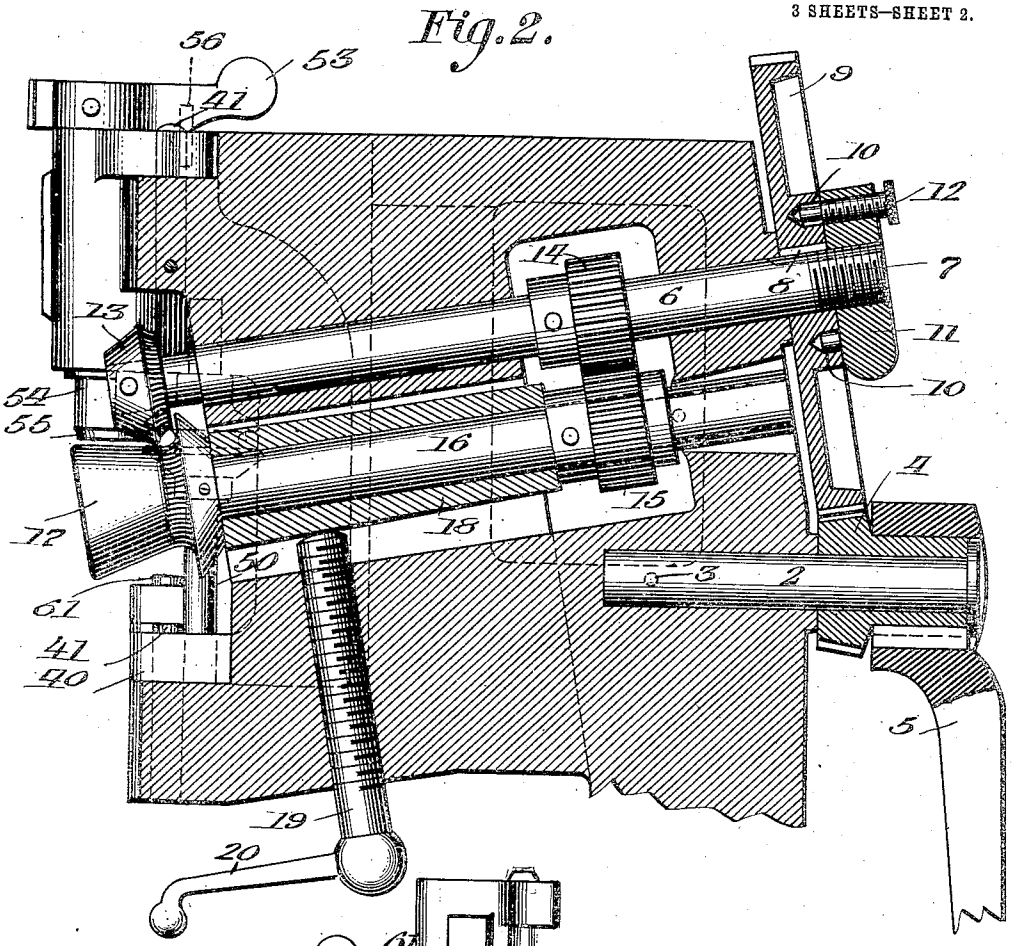
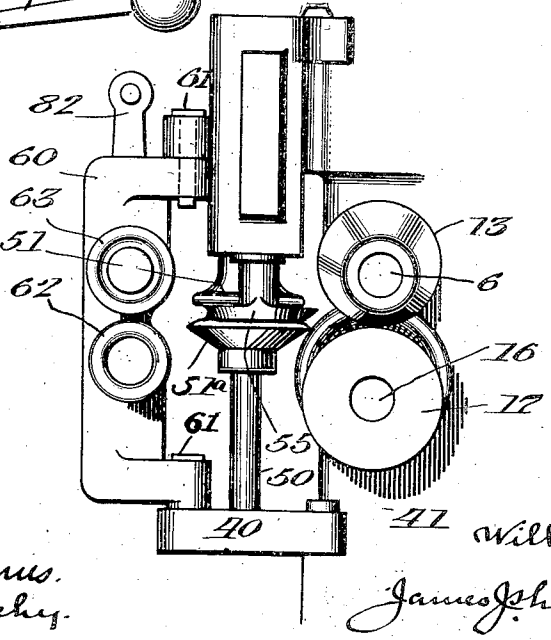


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

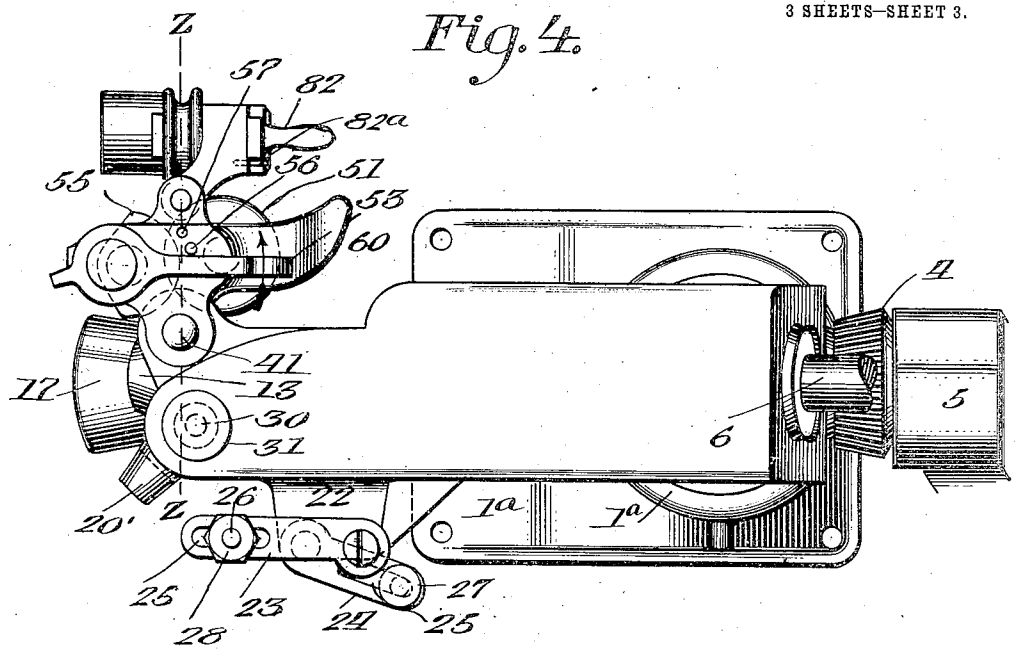


Fig. 5.

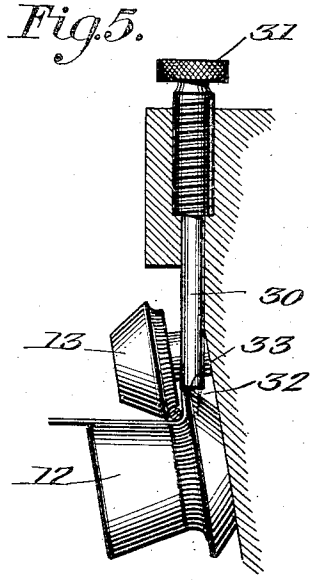


Fig. 6.

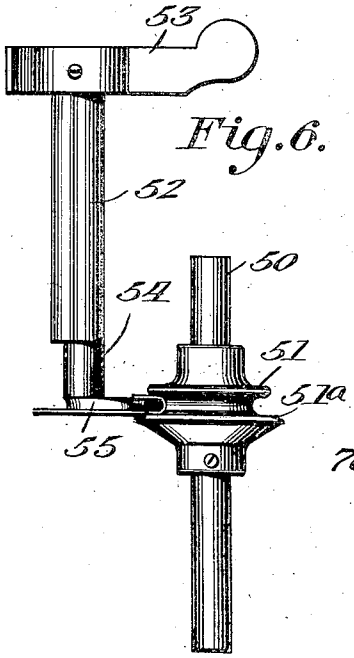


Fig. 7.

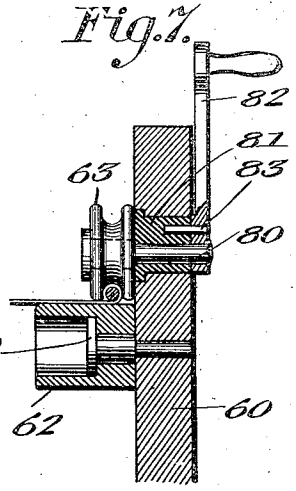
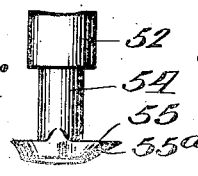


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILBER R. MAGIE, OF INDIANAPOLIS, INDIANA.

MACHINE FOR WIRING SHEET METAL.

1,048,984. Specification of Letters Patent. Patented Dec. 31, 1912.

Application filed December 26, 1911. Serial No. 667,723.

To all whom it may concern:

Be it known that I, WILBER R. MAGIE, citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Machines for Wiring Sheet Metal, of which the following is a specification.

My present invention relates to machines for wiring sheet-metal, and is designed more particularly as an improvement upon the machine constituting the subject matter of my Letters-Patent No. 943,118, dated December 14, 1909.

The object of my present invention is the provision of a machine for the purpose stated that is a material simplification of those extant, and is easy of operation and possessed of large capacity in the accomplishment of a wide variety of work.

The invention in all of its details will be fully understood from the following description and claims when the same are read in connection with the drawings, accompanying and forming part of this specification, in which:

Figure 1 is a perspective of my improved machine. Fig. 2 is a detail, longitudinal vertical section with some of the parts in elevation. Fig. 3 is a detail view hereinafter specifically referred to. Fig. 4 is a plan view of the machine. Figs. 5, 6, 7 and 8 are detail views illustrative of features peculiar to the improved machine.

Similar numerals of reference designate corresponding parts in all of the views of the drawings.

The main frame 1 of the machine is suitably mounted upon a base 1^a and is equipped with a stud 2 that is fixed at 3 in said frame, and on the said stud is loosely mounted a pinion 4. To the said pinion 4 is keyed a crank 5 for manual rotation of the same, though it is obvious that the pinion may be rotated through the medium of any other suitable means without involving departure from the scope of my invention.

In the main frame is journaled a longitudinal inclined shaft 6 that is threaded at its rear end 7, and keyed at 8 on the rear portion of the shaft 6 is a gear 9 that bears against the rear end of the main frame and is intermeshed with the pinion 4. This gear 9 is provided in its rear side with a circular series of sockets 10, and mounted on and revoluble about the threaded portion 7 of the shaft 6 is a correspondingly threaded wing or other suitable nut 11. The said nut 11 carries a set screw 12 the inner end of which is reduced and adapted to be moved into and out of the sockets 10 of gear 9. By reason of this construction it will be manifest that when the screw 12 is out of engagement with the gear 9, the nut 11 can be turned to adjust the shaft 6 in the direction of its length through the main frame and the said gear 9, and then the shaft can be adjustably fixed to the gear 9 by moving the screw 12 into one of the sockets 10 of the said gear. In this manner the driving rolling die 13 on the forward end of the shaft 6 can be expeditiously and correctly positioned and then adjustably fixed as occasion demands, without the use of any tool whatever. The shaft 6 is further equipped with a spur gear 14, and this latter is intermeshed with a spur gear 15 on an inclined shaft 16 that is equipped at its forward end with a driving rolling die 17. The forward portion of the shaft 16 is journaled in a vertically movable box 18, and under the said box is disposed a screw 19 that bears in the frame 1 and has a handle 20 at its lower end.

The rolling dies 13 and 17 are preferably roughened as shown, and serve to bring or bend the edge portion of the sheet-metal to be wired up more than square to the major portion of the sheet—*i. e.*, beyond the perpendicular as shown in Fig. 5. The said dies are enabled to so bend the sheet-metal because of the shafts 6 and 16 being set or arranged obliquely, say at an angle of about ten degrees from the horizontal, and the provision of the said peculiar bend is materially advantageous because it leaves less work for the sub-frames, hereinafter described, to perform, and enables them to get around short curves. It will also be appreciated that by performing the amount described of the operation in the dies 13 and 17, which are powerful and driven, the said dies are enabled to push the work through the remainder of the machine. Hence I am enabled to dispense with the gears of my cited prior patent for driving the materials through the sub-frames; the said gears being expensive and also objectionable because their action rendered the operation of the

machine jerky. By adjusting the rolling die 13 through the medium of the wing nut 11, and the rolling die 17 through the medium of the screw 19, the said dies may be nicely located relative to each other for work of different sizes.

At 20′ (see Figs. 1 and 4), the main frame 1 is provided with a projection having a slot 21. In the said slot the sheet of metal to be wired is "tipped" on its corner—*i. e.*, its corner is bent upward, this being advantageous in that it facilitates the entrance of the sheet into the machine and below the wire; the wire having been first passed by the operator through the three pairs of dies, as indicated by the dotted line *z*—*z* in Fig. 4. In using the slotted projection 20′ the proper portion of the sheet of metal is inserted in the slot 21 and the remainder of the sheet is then simply lifted to bend the said portion to the extent desired. Were the slotted projection 20′ not provided, the operator would have to pick up and use a tool such as a pair of pliers to perform the function ascribed to the projection 20′ and hence it will be manifest that said projection is materially advantageous.

I would here invite attention to the fact that the shaft 6 is not located in the same vertical plane as the shaft 16, but on the other hand the upper shaft 6 is placed slightly, about one sixteenth of an inch, farther from the discharge end of the machine than the lower shaft 16. This relative arrangement is materially advantageous because it places the lifting force of the die 17, as it bends the edge of the sheet upward, more nearly under the resistance provided by the upper die 13, thereby preventing tipping of the sheet and assuring a clean bend.

The main frame 1 is provided at 22 with a bracket, and at the upper side and the lower side of said bracket are pivoted horizontally-swinging gage arms numbered 23 and 24, respectively, each of the said gage arms having a longitudinal slot 25 to receive the threaded shank 26 of a gage button 27, which shank 26 is adjustably fixed to the gage arm by a nut 28. It will also be clearly understood from the drawings, particularly Fig. 1, that the button 27 on the gage arm 23 is disposed below said gage arm while the button 27 on the gage arm 24 is disposed above the latter. By reference to Fig. 1 it will be further understood that each button 27 of the two gages is preferably grooved at its opposite sides; the button on the upper arm 23 being shown as so grooved. The gages thus far described are the best to use for wiring sheets each of which has a straight edge or a curved edge into which the straight edge merges. In the last named case one of the gages would be set and used for the straight portion of the edge, and the other gage set for the curved portion of the edge, each gage being used alone and being swung out of the way of the other when such other is to be used. From this it follows that no changing of the gages is necessary until a particular job,—*i. e.*, a job involving sheets having uniformly shaped edges, is done. For a great variety of work, however, such as sheets having edges that describe short or irregular curves or when a job is a small one the above described gages are unsuited. I therefore provide the auxiliary gage 30 shown in Figs. 1, 4 and 5. This gage 30 is threaded into the main frame 1, and is provided at its upper end with a roughened head 31, so that by turning it between the thumb and finger the necessary adjustment is provided. The edge of a sheet after it is turned is fed against the end of the gage, Fig. 5. It will also be noted here that the gage 30 being set well up in the dies 13 and 17 is not affected by the edge of the sheet being curved or straight; also, that by merely raising or lowering gage 30 the operator provides more or less sheet-metal to cover the wire. After the wire and sheet-metal have been introduced, the crank 5 being turned, the operator has but to gage the materials.

The operation of the driving rolling dies 13 and 17 has been explained, and after said operation the action in the major sub-frame is designed to bend the edge portion of the sheet over the wire until said edge portion lies approximately parallel to the major portion of the sheet, as shown in Fig. 6, while the following action in the minor sub-frame is designed to continue the bending of the edge portion of the sheet until the edge of said portion is adjacent the major portion of the sheet and the wire is fully inclosed, as shown in Fig. 7.

The major sub-frame and the minor sub-frame will be described in the order stated. The major sub-frame 40 is pivoted on and detachable from posts 41 on the main frame 1. Hence said frame is adapted to be lifted off and replaced on said posts, and is also adapted to be swung horizontally. In this connection I would say that I contemplate furnishing with each machine two major sub-frames each equipped with a minor sub-frame; the sub-frames so equipped being adapted to be used interchangeably on the posts 41; the major sub-frame and the minor sub-frame shown being adapted to take No. 7 wire with No. 26 gage of iron, No. 8 wire with No. 24 gage of iron, and No. 9 wire with No. 22 gage of iron, as indicated on the major sub-frame, and the other major sub-frame and minor sub-frame that are not shown being adapted to take No. 9 wire and 26 gage iron, No. 10 wire and 24 gage iron, and No. 11 wire and 22 gage

iron. Thus with the employment of the two sets or pairs of sub-frames, the machine is adapted for handling five sizes of wires and three gages of sheets. I would further have it here understood that any desired number of pairs of major and minor sub-frames may be used interchangeably on the machine to accommodate a wide variety of different gages of sheets and wires, and hence the operator is enabled with the machine to perform a wide range of work without loss of time in changing.

Revoluble about a spindle 50 fastened to the major sub-frame 40 is a horizontally-disposed and circumferentially grooved die 51, and journaled in the upper portion of the major sub-frame 40 is a shaft 52 having at its upper end a crank 53, and at its lower end a reduced portion or shank 54; the latter being arranged eccentrically to or off the center of the shaft as shown in Fig. 6. The said shank 54 carries the die 55 that coöperates with the revoluble die 51 in bending the sheet-metal as shown in Fig. 6. The crank or lever 53 enables the operator to conveniently swing or move the die 55 outward to admit of work being taken away, and as conveniently swing said die back to its working position; the stop pin 56 at the top of the major sub-frame 40, Fig. 4, serving to prevent movement of the crank 53 and die 55 forward—*i. e.*, in the direction indicated by arrow while said die 55 is at work. By reason of the eccentric connection of the die 55 to its shaft 52, the operator can, by disposing the stop pin 56 in the socket 57 in the upper end of the sub-frame 40, adjust the space between the dies 55 and 51 within small limits.

The lower part 51ª of the die 51, Figs. 1, 3 and 6, is extended and curved downward, the downward curve being from the upper side of the part 51ª, and the table so formed being designed to effectually prevent the sheet from passing below or against the lower part 51ª of the die 51 in the same manner that the bevel or "sled runner" shape 55ª, Fig. 8, at the underside of the die 55 prevents the sheet from passing above or against the edge of said die 55. These features are of importance, inasmuch as they obviate the necessity of the operator concerning himself regarding the entrance of the sheet between the die 55 and the lower part or table 51ª of the die 51.

By referring to Fig. 4, it will be observed that the center of the shaft 52 of die 55 is a short distance, about one-eighth of an inch in practice, farther from the discharge end of the machine than the center of the spindle 50 and die 51, this being of material advantage in that it prevents the bending of the wire when the die 51 begins to act on the metal. In other words, the point of resistance is brought a slight distance, say one-eighth of an inch nearer the sheet than if the said centers were opposite. It is this that prevents bending of the wire, particularly when the wire is small and the sheet-metal heavy.

The minor sub-frame 60 is hinged at 61 and 61 and is adapted to be swung horizontally on the major sub-frame 40, and the rolling dies 62 and 63, which the said sub-frame 60 carries, Figs. 1, 3, 4 and 7, are adapted of themselves and without assistance to take care of the entrance of the sheet and complete the bending of the edge portion of the same about the wire as shown in Fig. 7. The rolling die 62 is loosely mounted on a stud 70 connected to the sub-frame 60, and this die 62 and the die 17 are made long as shown, to prevent the ends of said dies from marking the sheet-metal as the same passes over them.

The upper of the dies carried by the minor sub-frames 60 is loosely mounted on a stud 80, and the said stud is tightly fitted in or otherwise secured to a rolling member 81 and this eccentrically or off the center of said rolling member, Fig. 7. It will also be seen by reference to Fig. 7 that the stud 80 extends through and is riveted back of a lever 82, and that the said lever 82 is made fast to the rolling member 81 by a stud 83. The mounting of the stud 80 of the die 63 in the manner described permits of the die 63 being moved through the medium of the lever 82 to increase or diminish the size of the space between dies 63 and 62.

It will be gathered from the foregoing that the levers 53 and 82 may be opened and the work removed from the major and minor sub-frames at any time, as when the sheet tears or if the curves in the sheet should be too short to complete the operation. In such cases the lever 82 is opened first thereby stopping the action of the rolling and finishing dies 62 and 63. If this operation is not sufficient to enable the driving or feed dies 13 and 17 to push the work through, then the lever 53 is opened in which event only the dies 13 and 17 act until the difficult place is passed. Then the levers 53 and 82 are again turned in, the unfinished portion of the work being afterward completed with a hammer in the ordinary well known manner. It will further be gathered from the foregoing that the major sub-frame 40 is free to swing as the sheet and wire are fed, and that the capacity of the minor sub-frame 60 to swing on the major sub-frame 40 renders the dies 62 and 63 free to accommodate themselves to the curvature of the edge portion of the sheet-iron.

While my novel machine is primarily a machine for wiring sheet-metal, and I prefer to employ the exact shapes of dies illustrated and described for that purpose, I

would have it distinctly understood that certain of the parts and certain combinations of parts may be used for other purposes not involving the use of wire to which said parts and combinations are applicable. For instance by providing suitably-shaped rolls in the machine the machine can be used to advantage in preparing the edge portion of a sheet of metal without covering a wire in a portion of the metal. In this way what is known as a "sham wire" sheet can be prepared—*i. e.*, a sheet having its edge portion merely curled to a greater or less extent or else bent down flat on the major portion of the sheet. With my novel machine the operation mentioned not involving the use of wire may be carried out around curves which is novel and eminently useful. I therefore do not desire to be understood as confining myself to a machine for wiring sheet-metal.

At 82ª is a stop pin for the lever 82.

Having described my invention, what I claim and desire to secure by Letters-Patent, is:

1. A machine for the purpose described, comprising a main frame, a sub-frame pivotally connected with the main frame to swing thereon and accommodate itself to curves in the edge of a piece of sheet-metal; the pivotal connection being constructed to permit of the sub-frame being readily detached from and replaced on the main frame, pairs of opposed dies adapted to receive and guide the sheet-metal between them and to bend the metal; one of the said pairs of dies being rolling dies carried by the main frame and constructed and arranged to bend the edge portion of a piece of sheet-metal beyond the perpendicular with reference to the major portion of the piece of sheet-metal, and the other pair of dies being carried by the sub-frame and constructed to bend the sheet-metal, a second sub-frame connected and movable with the first-named sub-frame and adapted to swing independently thereof, and a pair of dies carried by the second-named sub-frame and constructed to complete the bending of the metal.

2. In a machine for the purposes described, the combination of a main frame, shafts mounted in said frame and inclined from the horizontal, means for transmitting rotary motion to said shafts, rolling dies carried by the said shafts and constructed and arranged to feed sheet-metal; one of the said dies having a portion constructed and arranged to bend the edge portion of a piece of sheet-metal beyond the perpendicular with reference to the major portion of the piece, a sub-frame pivotally connected with the main frame to swing thereon and accommodate itself to curves in the edge of a piece of sheet-metal; the pivotal connection being constructed to permit of the sub-frame being readily detached from and replaced on the main frame, a pair of opposed dies carried by the sub-frame and adapted to receive and guide the sheet-metal between them and to bend the metal, a second sub-frame connected and movable with the first-named sub-frame and adapted to swing independently thereof, and a pair of dies carried by the second-named sub-frame and constructed to complete the bending of the metal.

3. In a machine for the purposes described, the combination of a main frame, shafts mounted in said frame and inclined from the horizontal, means for transmitting rotary motion to said shafts, rolling dies carried by the said shafts and constructed and arranged to feed the sheet-metal; one of the said dies having a portion constructed and arranged to bend the edge portion of a piece of sheet-metal beyond the perpendicular with reference to the major portion of the piece, a sub-frame pivotally connected with the main frame to swing thereon and accommodate itself to curves in the edge of a piece of sheet-metal; a pair of opposed dies carried by the sub-frame and adapted to receive and guide the sheet-metal between them and to bend the metal, a second sub-frame connected and movable with the first-named sub-frame and adapted to swing independently thereof, and a pair of dies carried by the second-named sub-frame and constructed to complete the bending of the metal.

4. In a machine for the purposes described, the combination of a main frame, shafts mounted in the main frame and inclined from the horizontal; one of said shafts being arranged above the other and slightly farther from the discharge end of the machine than such other, means for transmitting rotary motion to said shafts, rolling dies carried by the said shafts and constructed and arranged to feed the sheet-metal; one of the said dies having a portion constructed and arranged to bend the edge portion of a piece of sheet-metal beyond the perpendicular with reference to the major portion of the piece, a sub-frame pivotally connected with the main frame to swing thereon and accommodate itself to curves in the edge of a piece of sheet-metal; the pivotal connection being constructed to permit of the sub-frame being readily detached from and replaced on the main frame, a pair of opposed idler or undriven dies carried by the sub-frame and adapted to receive and guide the sheet-metal between them and to bend the metal, a second sub-frame connected and movable with the first-named sub-frame and adapted to swing independently thereof, and a pair of opposed and idler or undriven dies carried

by the second named sub-frame and constructed to complete the bending of the metal.

5. In a machine for the purposes described, the combination of a main frame, a shaft adjustable endwise in the frame and having a threaded rear portion, a die on said shaft, a gear bearing against the frame and mounted to rotate with and move on the shaft, the latter in the direction of the length of the shaft; said gear having sockets, a nut adjustable on the threaded portion of the shaft, and a pin adjustable in the nut and into and out of the sockets in the gear, for the purpose set forth.

6. In a machine for the purposes described, the combination of a frame having a lateral bracket, rolling dies connected with the frame and disposed at the forward end of the frame, and a gage comprising a swinging arm pivoted to the bracket in position to swing toward and from the dies, and a button that is adjustable lengthwise of the arm and is adjustably fixed thereto.

7. In a machine for the purposes described, the combination of a frame having a lateral bracket, rolling dies connected with the frame and disposed at the forward end of the frame, gages comprising swinging arms arranged above and below and pivoted to the bracket and positioned to swing toward and from the dies, and buttons that are adjustable lengthwise of the arms and are adjustably fixed thereto.

8. In a machine for the purposes described, the combination of a main frame, rolling dies carried thereby and arranged one above the other, and a gage adjustable vertically in the main frame and set well up in the dies and having its lower end disposed above and movable toward and from the plane of the meeting points of the dies.

9. In a machine for the purposes described, the combination of a major sub-frame, a rolling die carried thereby, an upright shaft journaled in the sub-frame and having a lever and also having a reduced shank portion or eccentric arranged off its center, and a die carried by said shank portion or eccentric and opposed to the rolling die.

10. In a machine for the purposes set forth, the combination of a minor sub-frame, a rolling die carried thereby, a rolling part journaled in the sub-frame and provided with a lever, and a rolling die connected to said rolling part off the center thereof and movable toward and from the first-named rolling die.

11. In a machine for the purposes set forth, the combination of a frame, a rolling die carried thereby and having a circumferential groove and a table below said groove, and a die arranged opposite the groove of the rolling die and corresponding in thickness to the width of said groove and having a beveled underside.

12. In a machine for the purpose set forth, the combination of a major sub-frame, a rolling die carried thereby, and a shaft having an eccentrically arranged die opposed to the rolling die; the center of the rolling die being arranged slightly nearer the discharge end of the machine than the center of said shaft, for the purpose set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILBER R. MAGIE.

Witnesses:
HENRY M. DOWLING,
ANNA HOSEA.