No. 757,870. PATENTED APR. 19, 1904.

S. Y. HIGH.

BOX FORMING MACHINE.

APPLICATION FILED JULY 19, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

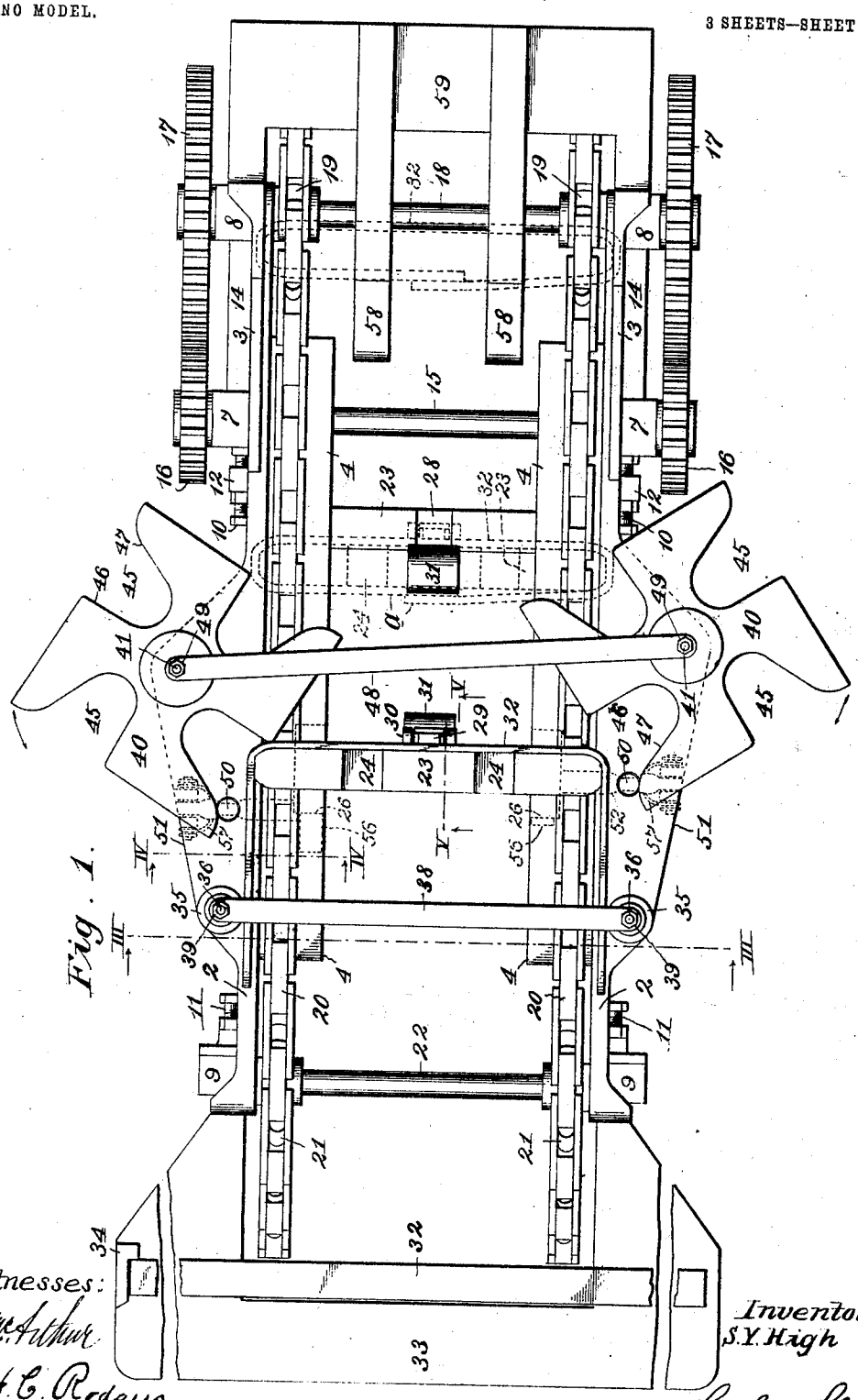


Fig. 1.

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3 SHEETS—SHEET 2.

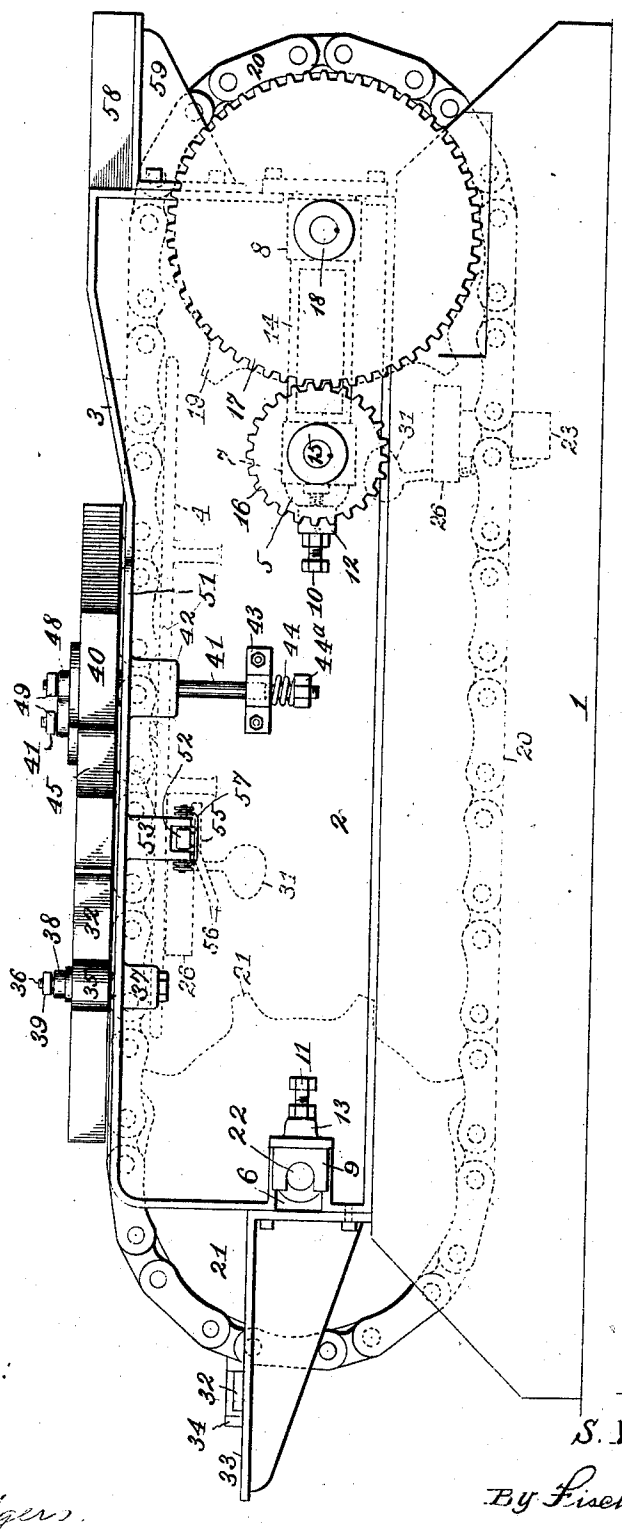


Fig. 2.

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.

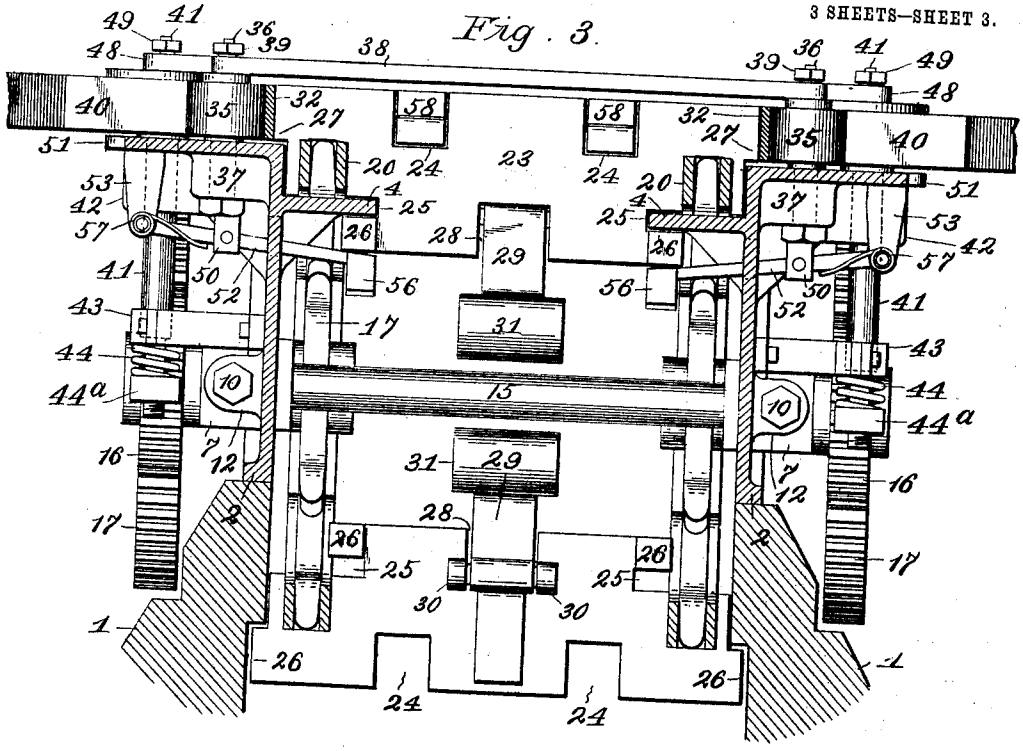


Fig. 4.

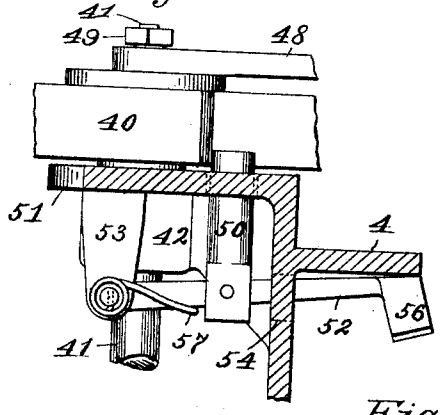


Fig. 5.

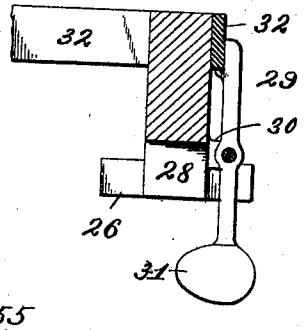
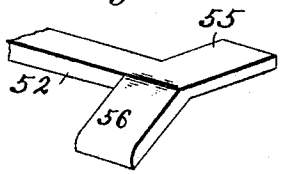


Fig. 6.



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No. 757,870. Patented April 19, 1904.

UNITED STATES PATENT OFFICE.

SAMUEL Y. HIGH, OF KANSAS CITY, MISSOURI.

BOX-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 757,870, dated April 19, 1904.

Application filed July 19, 1902. Serial No. 116,300. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL Y. HIGH, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Box-Forming Machines, of which the following is a specification.

My invention relates to box-forming machines, and more especially to that class of machines whereby metal strips of sufficient but variable length may be bent to form the sides of boxes; and my object is to produce a machine which will perform such function efficiently and expeditiously.

To this end the invention consists in certain novel and peculiar features of construction and organization, as hereinafter described and claimed.

In this connection it may be well to state that a great many clippings and small pieces of metal accumulate in rolling-mills and like places, which for purposes of economy are bent to form box sides, these sides being secured upon suitable bottoms and filled with clippings and particles which would otherwise be wasted. Wire is then employed to bind the sides and bottom together, and the box and its contents are placed in a furnace to be fused together and rolled into convenient form for future use. At present it is customary for a workman to shape these box sides with a hand forming-machine, and as a large number of boxes are required in a shop of ordinary size a great deal of valuable time is consumed in preparing them. It will thus be seen that a machine fed by a boy or other unskilled operator, which will form these box sides automatically, quickly, and efficiently, will permit the skilled workman to be otherwise employed, and therefore save the plant a great deal of money in the course of a year.

Referring to the accompanying drawings, which illustrate the invention, Figure 1 represents a plan view of the machine. Fig. 2 is a side elevation of the same. Fig. 3 is a cross-sectional view taken on line III III of Fig. 1. Fig. 4 is a detail cross-section taken on line IV IV of Fig. 1, showing one of the stop-pins for the finishing-rollers. Fig. 5 is a detail cross-section taken on line V V of Fig. 1, showing how the traveling form carries the metal strip. Fig. 6 is a detail perspective of the T-shaped end of the stop-pin lever.

In constructing my machine I provide a suitable foundation 1 to support the side plates 2, which carry the operating mechanism of the machine. The side plates have inclined surfaces 3 at their upper front portions, and they are also provided with inwardly-disposed rails 4, which extend from a point near the front ends to a point near the rear ends of said side plates. The side plates also have rectangular recesses 5 and 6 located at their opposite ends to receive bearings 7, 8, and 9, adapted to be adjusted with adjusting-screws 10 11, extending through bosses 12 13, formed integral with and projecting outwardly from the side plates. Bearings 7 8 are separated by spacing-blocks 14, which maintain the same relative distance between said bearings when the machine is in operation.

Journaled in bearings 7 is a drive-shaft 15, which may derive its power from any suitable source and is provided with rigidly-mounted pinions 16, which intermesh with cog-wheels 17, keyed on the opposite terminals of a shaft 18, journaled in bearings 8. Shaft 18 is provided with a pair of rigidly-mounted sprocket-wheels 19, which transmit power through sprocket-chains 20 to a similar pair of sprocket-wheels 21, keyed upon a shaft 22, journaled in bearings 9. Sprocket-chains 20 carry two equally-spaced forms 23, approximately rectangular in shape and provided with recesses 24 at their upper portions to prevent their interfering with finger-bars, hereinafter described. Their lower side portions have recesses 25 to permit the passage of rails 4, and they are prevented from tipping by horizontal extensions 26 underlying the rails. The upper portions 27 of the forms project above the side plates, and their lower portions have central recesses 28 to permit the operation of gravity-clamps 29, pivotally secured to lugs 30 on opposite sides of the recesses. The upper portions of the gravity-clamps are normally held in contact with the front surfaces of the forms or the metal strips by their enlarged weighted lower portions 31.

Sections of metal strips 32 are fed to the machine from a table 33, secured to the rear ends of the side plates and provided at one side with a gage 34 for centering each section thereon. The sections are laid down flat upon the table and pushed against the gage one at a time, as shown in Figs. 1 and 2, and picked up by the forms as the latter are carried around by the sprocket-chains. As each form passes around the lower quarter of the rear set of sprocket-wheels the clamp thereon turns a half-revolution on its pivot, bringing its upper portion in position to grip the metal strip on the form when the latter assumes a vertical position after passing over the upper quarter of the sprocket-wheels. As the form with the metal strip continues to move forward the latter is brought in contact with bending-rollers 35, journaled on vertical shafts 36, extending up through bosses 37 on the side plates and also through the opposite ends of a tie-bar 38, secured thereon by nuts 39 to prevent the rollers from spreading apart while bending the metal strip, which leaves the strips in the form of the letter **U**, as shown by Fig. 1. The metal strip in **U** shape is next brought into contact with the finishing-rollers 40, keyed upon vertical shafts 41, journaled in bearings 42 43 on the side plates and provided at their lower portions with expansion-springs 44, which bear at their opposite ends against bearings 43, and adjusting-nuts 44^a to retard the movement of the rollers. The finishing-rollers have a plurality of cavities 45, against the forward walls 46 of one set of which the metal strip contacts and revolves the rollers, bringing the rear walls 47 of the cavities in contact with the bent ends of the metal strip, which bend said ends back against the rear side of the form, as shown by the dotted lines *a* in Fig. 1, thus completing the operation of forming the metal strip into the box sides above mentioned. To avoid conflict between the opposite ends of the metal strips while bending them back against the form, I set one of the finishing-rollers slightly to the rear of its companion, so it will bend the adjacent end of the metal strip back against the form ahead of the opposite end. I prevent the finishing-rollers from spreading apart when performing their work by securing the upper terminals of shafts 41 together with a tie-bar 48, held in position thereon by nuts 49. I also provide positive stop-pins 50, against which the rear walls of cavities 45 contact to insure the stoppage of the finishing-rollers in proper position to receive the succeeding form after the preceding one has passed by. Said stop-pins project downwardly through ribs 51 on the outer sides of side plates 2 and are pivotally secured at their lower bifurcated ends to levers 52, fulcrumed at their outer ends to depending lugs 53, and passing through slots 54 in the side plates terminate in the path of horizontal extensions 26 with **T**-shaped ends 55. The rear portions 56 of said **T**-shaped ends incline downwardly below extensions 26, so when the latter advance and contact therewith they will be depressed against the action of springs 57 and withdraw the stop-pins below the finishing-rollers, leaving the latter free to move with the advancing form. As the form continues to move forward it passes between the inclined portions 3 of the side plates, while the end walls of the box sides overlap said incline portions and are gradually raised thereby until they clear the top of the form. They are then pushed forward by the following box sides upon a pair of finger-bars 58, secured at their rear portions upon a table 59, secured to the forward ends of the side plates 2, while the form passes around beneath the forward pair of sprocket-wheels and back to table 33 for another metal strip. Thus the forms are continually traveling while the machine is in operation.

While I have shown but two traveling forms in the drawings, it is of course obvious that a greater number may be employed, if found desirable. I also claim the right to make such changes and substitutions as will properly fall within the scope of my invention.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine of the character described, a traveling form adapted to engage and carry therewith a metal strip, a gravity-clamp pivoted to the form, rollers adapted to bend the strip around the form in the shape of box sides, and means for automatically disengaging the box sides from the form, substantially as described.

2. In a machine of the character described, a suitable frame, a table secured to the rear end thereof to receive sections of metal strips, a traveling form to engage and carry therewith one of said metal strips at a time, rollers for bending the strip around the form, and incline portions on the frame for automatically disengaging the strip from the form, substantially as described.

3. In a machine of the character described, a suitable frame, a table secured to the rear end thereof to receive sections of metal strips, a gage on the table to insure the proper placing of the metal strip, a traveling form adapted to engage and carry therewith, one piece at a time, said metal strips, rollers for bending the strip around the form, means for automatically delivering it from the form, and a table to receive it after said delivery, substantially as described.

4. In a machine of the character described, a frame consisting of side plates, rails formed thereon, horizontal shafts journaled in said plates in a lower plane than said rails, sprocket-wheels on said shafts in the same vertical planes as the rails, sprocket-chains connecting

the longitudinally-alined wheels, and having their upper strands above said rails, one or more forms connecting the sprocket-chains and provided with recesses to receive the inner edges of the rails and with horizontal extensions underlying the rails to prevent the form or forms from tilting while passing over the rails.

5. In a machine of the character described, a traveling form adapted to engage and carry at its front side a metal strip, means for bending the metal strip in approximately U-shape form around the ends of the traveling form, finishing-rollers adapted to bend the ends of the metal strip back against the rear surface of the form, stop-pins for arresting the motion of the finishing-rollers, levers to which the stop-pins are pivotally secured, lugs to which said levers are fulcrumed, and T-shaped ends on said levers arranged in the path of the traveling forms, substantially as described.

6. In a machine of the character described, a frame, consisting of side plates having inwardly-projecting longitudinal rails, traveling forms arranged to move forward upon the rails and to move rearward below and out of contact with the rails, and adapted when moving forward to carry metal strips, means for bending the strips around the forms in such forward passage, in the shape of box sides, means for delivering the box sides from the forms at or near the front ends of said rails, and a table provided with finger-bars to underlie and receive the box sides.

7. In a machine of the character described, a traveling form which moves in an endless or annular path and carries part way with it a metal strip, and rollers for bending said strip around the form.

8. In a machine of the character described, a traveling form which moves in an endless or annular path and carries part way with it a metal strip, and rollers adapted to be turned by said strip and in turning to bend the latter around the form.

9. In a machine of the character described, a traveling form which moves in an endless or annular path and carries part way with it a metal strip, two sets of rollers actuated successively by the strip to bend it around the form, and means to check the movement of the last set of rollers as the bent strip leaves them.

10. In a machine of the character described, a traveling form which moves in an endless or annular path, and carries part way with it a metal strip, means to partially bend said strip around the form, rollers to complete such bending operation and actuated by the strip and having a plurality of cavities, one set of which receives and bends the ends of the strip against the back of the form, and means to arrest said rollers with their following set of cavities arranged to receive and complete the bending of the ends of the next strip presented.

11. In a machine of the character described, a form traveling forward, downward, rearward, and upward in an endless path, and carrying a metal strip with it while traversing the upper portion of the path, means for bending such strip around the form, and an inclined way in the path of and adapted to lift the bent strip vertically from the form.

12. In a machine of the character described, an endless traveling conveyer, a metal-strip-carrying form secured thereto, means to bend the strip around the form, and side plates having upwardly-inclined ways between which the form passes; said inclined ways being adapted to engage the ends of the strip and lift it off the moving form.

13. In a machine of the character described, an endless traveling conveyer having a substantially horizontal axis, a metal-strip-carrying form secured to the conveyer, means to bend said strip around the form when the latter is above its conveyer-axis, and an inclined way intersecting the path of the form adapted to lift the bent strip vertically therefrom.

14. In a machine of the character described, a suitable frame having an inclined upper face, an endless conveyer having its axis substantially horizontal, a metal-strip-carrying form secured to the conveyer and adapted when above its conveyer-axis to occupy a substantially horizontal plane intersecting the plane of said inclined face, means to bend the strip around the form, and means to operate the conveyer and cause the strip to be lifted by said inclined face off the moving form.

15. In a machine of the character described, a form traveling in an endless path which has a substantially horizontal axis, and carrying part way with it, while above such axis a metal strip, a gravity-clamp for clamping the strip to the form while above such axis, and means to bend the strip around the ends of the form while the latter is above such axis.

16. In a machine of the character described, a form traveling in an endless path which has a substantially horizontal axis, and carrying part way with it, while above such axis a metal strip, a gravity-clamp for clamping the strip to the form while above such axis, a means to bend the strip around the ends of the form while the latter is above such axis, and means for withdrawing the strip from the form.

17. In a machine of the character described, a framework, substantially horizontal shafts journaled therein and suitably driven, wheels on said shafts, a conveyer on said wheels, a transversely-extending form on the conveyer, means to support a metal strip in position to be picked up by the advancing form, and a clamp carried by the form and adapted as the latter moves upward to move from in front of it and then to reverse such action and clamp

the strip against the front side of the form as the latter about completes its upward movement.

18. In a machine of the character described, a framework, substantially horizontal shafts journaled therein and suitably driven, wheels on said shafts, a conveyer on said wheels, a transversely-extending form on the conveyer, means to support a metal strip in position to be picked up by the advancing form, a clamp carried by the form and adapted as the latter moves upward to move from in front of it and then to reverse such action and clamp the strip against the front side of the form as the latter about completes its upward movement, and means whereby a relative vertical movement shall take place between the conveyer and strip to withdraw the latter from between the form and clamp.

19. In a machine of the character described, a frame having inwardly-projecting and substantially horizontal rails, a traveling conveyer mounted in the frame and having a substantially horizontal axis and having its upper strand or portion upon the rails and its lower strand or portion below and out of contact with said rails, and a transversely-extending form, carried by the conveyer and adapted at times to travel upon said rails and provided with extensions to underlie said rails at such times to prevent the form from tilting.

20. In a machine of the character described, a traveling form to engage and carry therewith a metal strip, means to bend said strip to approximately U form, a pair of rollers to bend the arms of the U-strip against the back of the form, spring-actuated pins to check the movement of said rollers as the strip passes from engagement therewith, and levers carrying said pins and adapted to be operated to withdraw the pins from the path of said rollers, by the form as it presents another strip to said rollers.

21. In a machine of the character described, a form having inwardly-projecting rails, rollers suitably journaled, spring-elevated levers suitably mounted and provided with pins to intercept said rollers, and having their outer ends underlying said rails and provided with downwardly-inclined rear portions, a traveling conveyer, and a form carried thereby to successively present metal strips to said rollers and adapted preliminary thereto to engage the inclined portions of said levers to withdraw the pins from the path of the rollers.

22. In a machine of the character described, a suitable frame having substantially horizontal rails, a traveling conveyer therein with its axis substantially horizontal and below the plane of the rails, a form carried by the conveyer to take up and carry a metal strip forwardly of said rails, a gravity-clamp pivotally carried by such form and adapted to be held by gravity substantially parallel with the front ends of the form and against said strip when the form is above such rails and to assume an angle thereto, when such face of the form is disposed at a substantial angle to the vertical.

23. In a machine of the character described, a traveling conveyer, a form carried thereby and adapted to carry part way with it a metal strip, means for bending said strip to approximately U form, rollers suitably journaled at opposite sides of the conveyer having a plurality of cavities to receive successive strips and be actuated thereby and bend their arms against the back of the form, and means to render such roller movement intermittent by arresting the rollers with their succeeding set of cavities in position to receive the arms of the next strip presented.

24. In a machine of the character described, a table to hold a metal strip, a conveyer contiguous thereto and having its axis substantially horizontal, a form carried by the conveyer and adapted to take the strip from the table, a clamp for automatically engaging and holding the strip against the form for at least a part of the travel of the latter, means to bend the ends of the strip around the form, and an inclined way intersecting the path of the form and adapted to lift the bent strip from between the latter and the clamp.

In testimony whereof I affix my signature in the presence of two witnesses.

SAMUEL Y. HIGH.

Witnesses:
F. G. FISCHER,
G. Y. THORPE.