March 31, 1942. C. M. YODER 2,277,740

MACHINE FOR OPERATING ON SHEET METAL

Filed Jan. 31, 1939 3 Sheets-Sheet 1

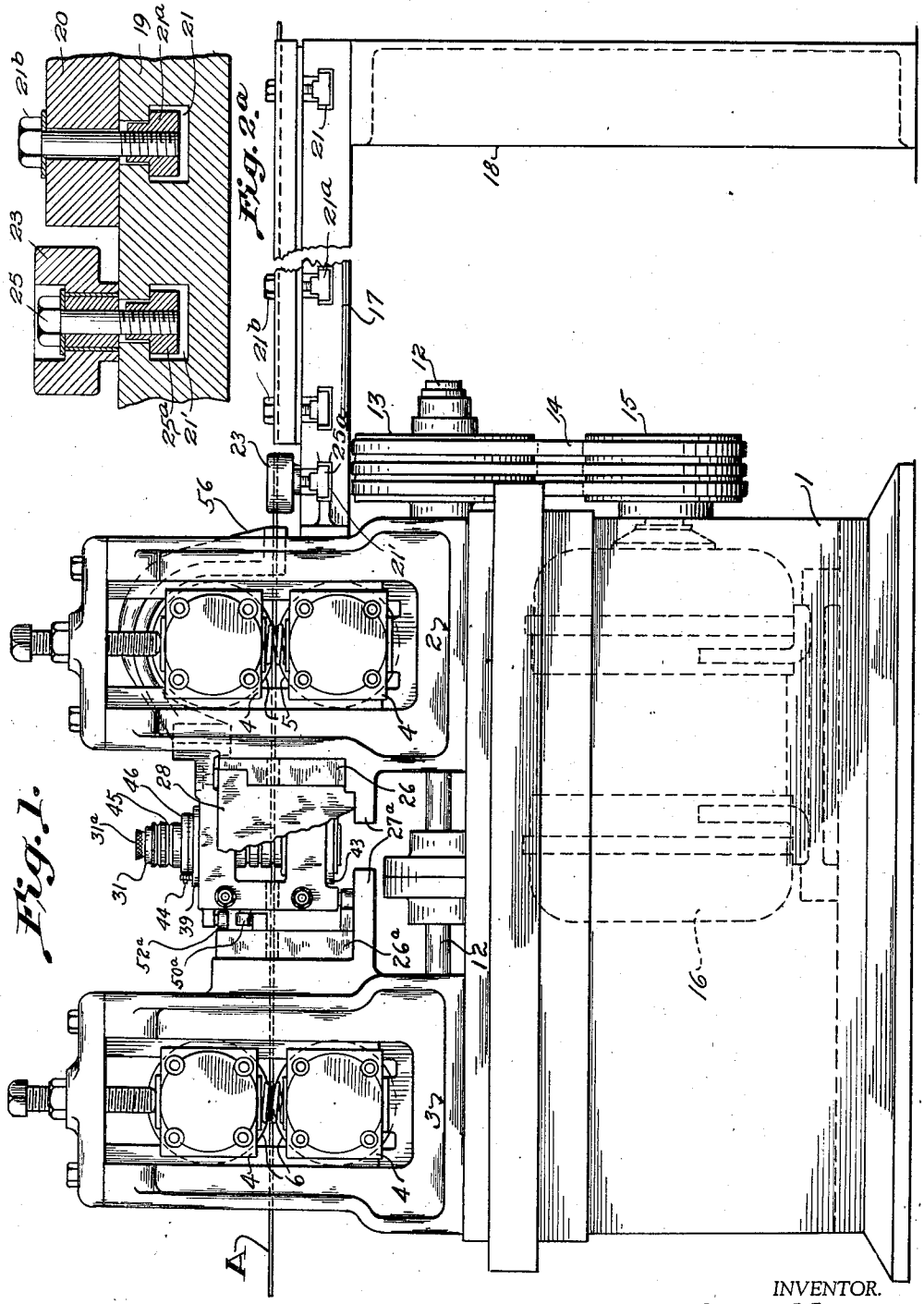


Fig. 1.

Fig. 2a.

INVENTOR.
Carl M. Yoder.

BY Geo. B. Pitts

ATTORNEY.

March 31, 1942. C. M. YODER 2,277,740

MACHINE FOR OPERATING ON SHEET METAL

Filed Jan. 31, 1939 3 Sheets-Sheet 2

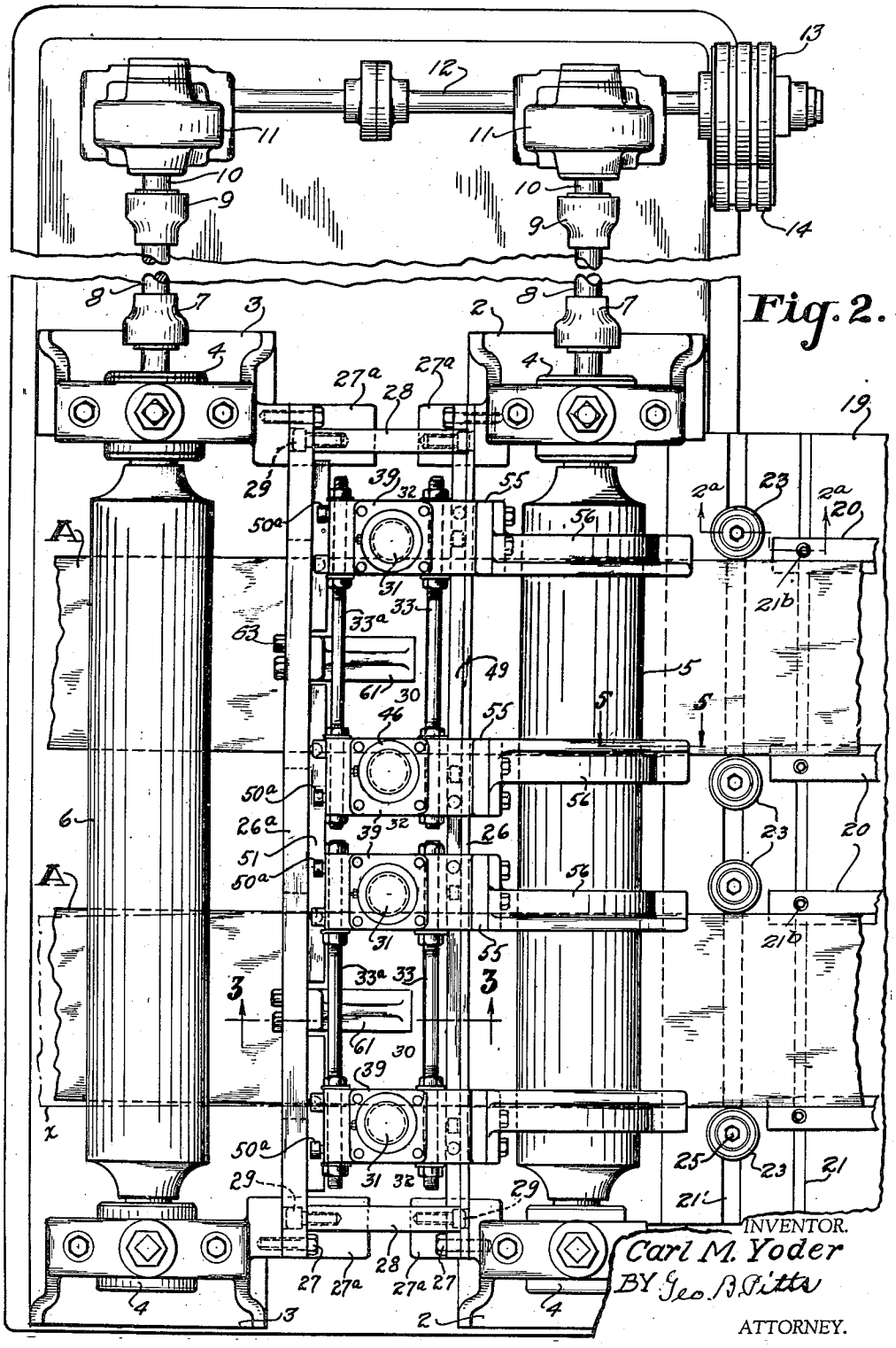


Fig. 2.

INVENTOR.
Carl M. Yoder
BY Geo. B. Fitts
ATTORNEY.

March 31, 1942. C. M. YODER 2,277,740

MACHINE FOR OPERATING ON SHEET METAL

Filed Jan. 31, 1939 3 Sheets-Sheet 3

Fig. 4.

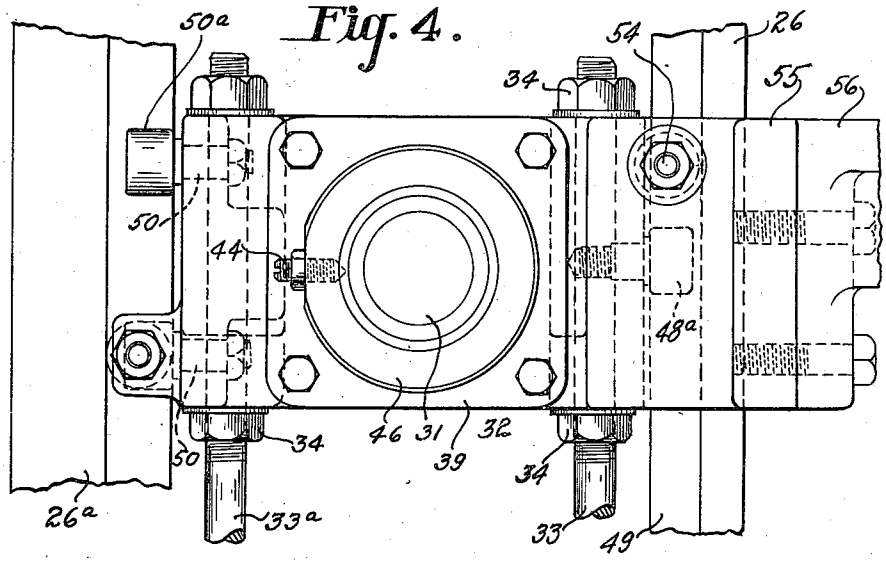


Fig. 5.

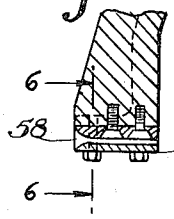


Fig. 3.

Fig. 6.

INVENTOR.
Carl M. Yoder.
BY
Geo. B. Pitts
ATTORNEY.

Patented Mar. 31, 1942

2,277,740

UNITED STATES PATENT OFFICE

2,277,740

MACHINE FOR OPERATING ON SHEET METAL

Carl M. Yoder, Lakewood, Ohio

Application January 31, 1939, Serial No. 253,756

7 Claims. (Cl. 80—31.1)

This invention relates to a machine for treating either or both edges of sheet metal, which may be supplied from a coil or otherwise. Such material as produced very often varies in width and ordinarily is cambered at different portions throughout its length. It has also been found in many instances that when the sheet metal is first passed through a trimming or slitting mechanism, camber at different portions of the stock will still be found to exist therein.

One object of my invention is to provide an improved machine for finishing or up-setting the edges of sheet metal, having a pair of edging members movably mounted to compensate for any camber existing in the material as it passes into engagement with and between the edging members.

Another object of the invention is to construct an improved machine for finishing the edges of sheet metal, wherein is provided a carrier having a pair of edging members disposed in fixed spaced relation and freely movable in either direction laterally as a unit relative to the direction of feed of the material, whereby the edging members through their engagement with the material automatically accommodate themselves to any camber in the sheet metal.

Another object of the invention is to construct a machine for finishing the edges of sheet material embodying certain improvements in the mechanism forming the subject-matter of my co-pending application Serial No. 136,176, filed April 10, 1937.

Other objects of the invention will be apparent to those skilled in the art to which my invention relates from the following description taken in connection with the accompanying drawings, wherein

Fig. 1 is a side elevation of a machine embodying my invention, parts being broken away.

Fig. 2 is a fragmentary plan view.

Fig. 2*a* is a fragmentary section on the line 2*a*—2*a* of Fig. 2.

Fig. 3 is a fragmentary section on the line 3—3 of Fig. 2, somewhat enlarged.

Fig. 4 is a plan view of the parts shown in Fig. 3.

Fig. 5 is a section on the line 5—5 of Fig. 2.

Fig. 6 is a section on the line 6—6 of Fig. 5.

In the drawings, 1 indicates a base frame supporting spaced pairs of standards 2, 3, in each of which are mounted suitable bearing boxes 4. The boxes 4 support front and rear pairs of feed rolls 5, 6, for feeding a plurality of sheet metal strips or webs A; the apparatus herein shown being adapted to operate on two strips or webs. Corresponding ends of the feed roll shafts are connected through universal joints 7 to the adjacent ends of shafts 8, the opposite ends of which are connected through universal joints 9 to shafts 10. The shafts 10 are drivingly connected to suitable gearing in casings 11. The gearing in turn is driven by a main shaft 12 having a sprocket 13, driven by chains 14 engaging a sprocket 15, the latter being fixed to the shaft of a motor 16.

17 indicates a feed table disposed at the front end of the base frame 1, the table being connected thereto at its inner end and supported at its outer end of a leg 18. The table comprises a plate 19 on which are bolted pairs of parallel guides 20 extending longitudinally of the plate 19 and arranged to engage the opposite edges of the webs A. The plate 19 is formed with transverse T-slots 21 to receive nuts 21*a* into which suitable bolts 21*b* are threaded, the slots 21 and nuts and the bolts therefor permitting transverse and relative adjustment of the guides 20 for guiding webs of different widths. By preference, I provide pairs of guide rolls 23 on the plate 19 at the inner ends of the guides 20, each roll 23 being loosely mounted on a bushing fixed to the plate 19 by a bolt 25. The bolt 25 engages a nut 25*a* which fits into the adjacent slot 21′ (see Fig. 2), to provide for the adjustment of the roll transversely of the plate 19.

26, 26*a*, indicate a pair of front and rear supporting members supported on and suitably secured at their opposite ends by bolts 27 to brackets 27*a* provided on the opposed walls of the standards 2, 3, and preferably formed integrally therewith. 28 indicates plates disposed adjacent to and between the inner ends and the outer ends of the supporting members 26, 26*a*, each plate being connected to the members by countersunk bolts 29. The purpose of the plates 28 will later appear.

30, 30, indicate carriers movably mounted on the supporting members 26, 26*a*, and each provided with two edging members 31 disposed in spaced relation and arranged to engage the opposite edges of a web A. In the machine herein illustrated, I provide for the delivery thereto simultaneously, of two webs A of sheet metal and a carrier having edging members to engage with each thereof, but it will be understood that the machine may be constructed to operate on one web or more than two webs. As the carriers 30, 30, are similar in construction and mounted similarly on the members 26, 26*a*, only one thereof need be described as follows (like parts on both carriers being designated by the same reference

characters): 32, 32, indicate housings connected together in spaced relation by one or more rods, for example, a rod 33 connecting the front sides of the housings and upper and lower rods 33a, 33b, connecting the rear sides of the housings. The rods 33, 33a, 33b, extend through alined openings formed in the walls of the housings and each end portion of each rod is threaded to take suitable nuts 34, between which the adjacent housing is clamped and secured to the rod, so that both housings and the rods may be connected in rigid relation for movement as a unitary structure with the edging members 31 predeterminately spaced according to the width of the web A to be engaged thereby. In the arrangement shown the nuts 34 at either side of each housing serve as stops or abutments against which the housing is clamped by the nuts 34 on the other side thereof, but since I provide nuts on both sides of each housing, the latter may be adjusted longitudinally of the rods to provide any desired spaced relation between the edging members 31.

The carriers 30, 30, are movably mounted on the supporting members 26, 26a, in the manner later set forth. As the housings 32 of each carrier 30 are similar in construction and mounted in the same way, it will only be necessary to refer to one housing, as follows:

35 indicates a front wall and 36 indicates a rear wall connected by upper and lower walls 37, 37a, which are provided with bearings to removably and rotatably support an edging member 31, the front, rear, upper and lower walls forming an opening, whereby the edging member 31 may engage the edge of the web A as the latter is fed forwardly by the pairs of feed rolls 5, 6. Each bearing is preferably of the anti-friction type. The upper bearing consists of an outer race 38 seated in the upper wall of the housing and held in place by a plate 39 suitably bolted thereto and an inner race 40 suitably keyed to the edge engaging member 31 and having at its upper end a collar 40' which seats on the plate 39, anti-friction rollers being mounted between the races. The lower bearing consists of an inner race 41 suitably keyed to the edge engaging member 31 and having at its upper end a collar seated in a rabbeted portion formed in the bottom wall 37a and an outer race 42 seated in the wall 37a and held in position by a plate 43 suitably bolted thereto. The edge engaging member 31 is supported at its upper end on the upper side of the wall 37 and is removable endwise upwardly and also adjustable endwise vertically for a purpose later set forth. The supporting means for each edging member consists of a screw 44, the inner end of which projects into a groove 45 formed in the extended end of the edge engaging member 31 to engage the walls of the groove. The screw 44 is mounted in a ring 46 which rests on the collar 40' of the inner race 40. The screw 44 may be locked in set position by a nut 44a. Each edging member consists of a round section of material having bearing portions at its opposite ends and therebetween the section is formed with a plurality of spaced grooves 47, the walls of each of which have a predetermined cross section and constitute an edging element to engage the adjacent side edge of the web A and up-set, roll it down or re-shape it, dependent upon the use of the sheet metal and the manner in which it is to be fabricated. The walls of each groove 47 may be similar in cross section or each may have a cross section different from that of the other grooves and by adjustment of the edge engaging member endwise, any one of the grooves 47 may be positioned in the plane in which the web A feeds. To provide for such adjustment the upper end of the edge engaging member 31 is provided with a plurality of grooves 45 equal in number to that of the edging elements 47 and correspondingly spaced, so that by loosening the screw 44 and adjusting the edge engaging member to aline the selected groove 47 with the web and resetting the screw 44, in the correspondingly related groove 45, the edge engaging member may be rotatably mounted in the selected position. As will be understood from Fig. 2, the opposite edges of each web A are simultaneously engaged by two edge engaging members 31 which are adjustably mounted in the housings in fixed spaced relation so that the edging elements thereof will co-act to up-set, roll down or re-shape the metal edges on an imaginary line transverse to the direction of feed of the web. The upper end of each edging member 31 is provided with an extension 31a which permits it to be grasped and moved vertically or removed. Each carrier 30, 30, is movably mounted on and between the supporting members 26, 26a, by means of rollers engaging run-ways or tracks, the rollers being preferably mounted on the housings 32, as follows: the front wall 35 of each housing 32 is provided centrally with a forwardly projecting stud shaft 48 loosely mounting a roller 48a which rolls on a run-way or track 49 provided on the inner side of the member 26 and the rear wall 36 of each housing 32 is provided at spaced points with rearwardly projecting stud shafts 50 loosely mounting rollers 50a which roll on a run-way or track 51. To resist the pressure transmitted rearwardly by reason of the engagement of the edging members 31 with the webs A, the rear wall of each housing is provided at its upper and lower ends with vertically disposed stud shafts 52 loosely mounting rollers 52a, one thereof engaging the inner face of the member 26a and the other engaging a run-way or track 53 provided thereon. By preference, the front wall 35 of each housing is provided with a vertically disposed shaft 54 loosely mounting a roller 54a, which rolls on the inner surface of the member 26.

Each housing 32 is provided on its front side with a bracket 55 to which is removably bolted an arm 56, the latter being shaped to extend over the upper feed roll 5, and forward thereof, as shown in Fig. 1. At its forward end each arm 56 is provided with a plate 57, removably secured thereto by bolts, such end of the arm and plate being recessed to form a throat and guide 58 for the adjacent marginal edge of the web A between the guide rolls 23 and feed rolls 5. The side wall of each throat 58 is related to the edging elements 47 of the adjacent edge engaging member 31; that is, the side walls of the guides 56 are spaced from each other a distance slightly greater than that of the edging elements 47, to permit the web to freely slide therethrough. The recessed portion of each arm 56 is provided with a wear plate 59 fixed thereto by counter-sunk screws.

As shown in Fig. 3, the members 26, 26a, are formed with alined slots 60 through which the material passes. Each slot may have a length to accommodate the widest web A and camber occurring therein. 61 indicates upper and lower brackets removably mounted on the inner side of the member 26a between each pair of hous-

ings 32 and arranged to support in spaced relation shoes 62 between which the adjacent web feeds. The shoes 62 extend from a point forward of the edging members 31 to a point rearward thereof to support the web intermediate its edges to prevent buckling thereof due to pressure of the edging members upon the web edges. The shoes 62 are removable so that shoes may be substituted dependent upon the thickness of the webs.

The brackets 61 are adjustably and removably secured to the members 26a by bolts 63, which extend through the openings therein (see Fig. 3). By providing in front of the forward feeding rolls 5 web guides in a predetermined relation to the edging elements and supported by and movable with the housings 32 when the latter are adjusted, the guides may be utilized by the operative to accurately determine the amount of adjustment required and proper position of each housing for any width of web, thereby permitting positioning of the edging members in a ready manner.

It will be noted that in my construction the edging members 31 may be (a) adjusted endwise in their supporting devices to aline one edging element of one member with any one of the edging elements of the opposed edging member or (b) entirely removed in a ready manner without disassembly of any part of the apparatus. By reason of this fact, the machine may be quickly adapted to different widths of webs.

Each web A is fed through the guides 58 and between and past the adjacent pair of edging members 31, which being mounted in fixed relation, cause their related edging elements to up-set or treat the edges of the web in the desired manner. As the carrier for the edging members 31 for each web is mounted to freely move laterally in either direction, any camber in the material, as indicated at x in dotted lines, will act through the edging members to move the carrier and thus permit the edging members to operate effectively and uniformly upon the edges of the material irrespective of the camber therein without damaging it as would be the result if the edging members were fixedly mounted or engaging one edge only of the material. Accordingly, both edges of the webs throughout their lengths will be uniformly engaged and treated by the edging members. The plates 28 serve to prevent undue lateral movement outwardly of each carrier 30, while each carrier prevents the movement in the opposite direction of the other carrier.

To those skilled in the art to which my invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope thereof. My disclosures and the description herein are purely illustrative and not intended to be in any sense limiting.

What I claim is:

1. In apparatus of the class described, the combination with a support relative to which a web of sheet metal feeds and provided with transversely arranged guide-ways, of a carrier provided with rollers in engagement with said guide-ways and comprising a pair of housings and a device extending between and adjustably connected at its opposite ends to said housings to secure them in fixed spaced relation, and an edging member rotatably mounted in each housing and arranged to engage one edge of the web, said rollers permitting the carrier to move laterally in either direction, whereby said members follow the edges of the web due to camber therein.

2. In apparatus of the class described, the combination with a support relative to which a web of sheet metal feeds and provided with transversely arranged guide-ways, of a carrier provided with rollers in engagement with said guide-ways and comprising a pair of housings and a connection extending between and adjustably connected at its opposite ends to said housings for securing the housings in fixed spaced relation, said connection comprising a rod the opposite end portions of which are threaded and extend through openings formed in said housings and nuts threaded on each said end portion in engagement with the opposite sides of the adjacent housing, and an edging member rotatably mounted in each housing and arranged to engage one edge of the web, said rollers permitting the carrier to move laterally in either direction, whereby said members follow the edges of the web due to the camber therein.

3. In apparatus of the class described, the combination with a support relative to which a web of sheet metal feeds, of transversely arranged front and rear runways on said support, a carrier comprising housings and a connection between and connected at its opposite ends to said housings for securing them together in fixed relation, said housings being provided with edging members arranged to engage the opposite edges of the web, and sets of rollers on said carrier, one of said sets of rollers engaging said runways to support said carrier thereon to permit it to move relative to said support laterally in either direction, whereby said edging members follow the edges of the web due to camber therein, and the other set of rollers engaging portions of said support and co-acting therewith to resist pressure in the direction of feed of the web due to engagement of said edging members with the web.

4. An apparatus as claimed in claim 1 wherein each edging member is adjustable in and removable endwise from the adjacent housing.

5. In apparatus of the class described, the combination with a support relative to which a web of sheet material feeds and provided with transversely arranged runways, of a carrier comprising connected together housings each having upper and lower bearings, an edging member mounted in said bearings in each housing and arranged to engage one edge of the web, a set of rolls engaging certain of said runways and mounted on horizontally arranged shafts supported on said carrier to permit the latter to move laterally in either direction, and a separate set of rolls engaging other of said runways and mounted on vertically arranged shafts supported by said carrier to resist pressure on said edging members in the direction of feed of the web.

6. In apparatus of the class described, the combination with a support relative to which a web of sheet metal feeds, of a carrier comprising connected together housings each having upper and lower bearings, an edging member mounted in said bearings in each of said housings and arranged to engage one edge of the web, a set of rolls mounted on horizontally disposed shafts and runways for the rolls interposed between said support and said carrier to support the latter on said support and to permit it to move laterally in either direction, and separate rolls mounted on vertically disposed shafts and runways for said

separate rolls interposed between said support and said carrier, said last mentioned rolls being disposed rearward of and substantially in the plane of said bearings, respectively, and arranged to resist pressure in the direction of feed of the web due to its engagement with said edging members.

7. In apparatus of the class described, the combination with a frame relative to which a web of sheet metal feeds, of a carrier comprising spaced connected together housings each provided with upper and lower bearings, an edging member rotatably mounted in the bearings in each housing, means for supporting said carrier on said frame for free lateral movement in either direction, said means consisting of a set of rolls mounted on horizontally disposed shafts and runways for the rolls interposed between said frame and said carrier, vertically disposed runways on said frame rearward of and substantially in the respective planes of said bearings, and rolls mounted on vertically disposed shafts carried by said carrier for engaging said vertically disposed runways.

CARL M. YODER.