Oct. 28, 1930. W. R. MAGEE 1,779,974

SHEET METAL EDGING MACHINE

Filed Aug. 2, 1927 3 Sheets-Sheet 1

Fig. 1.

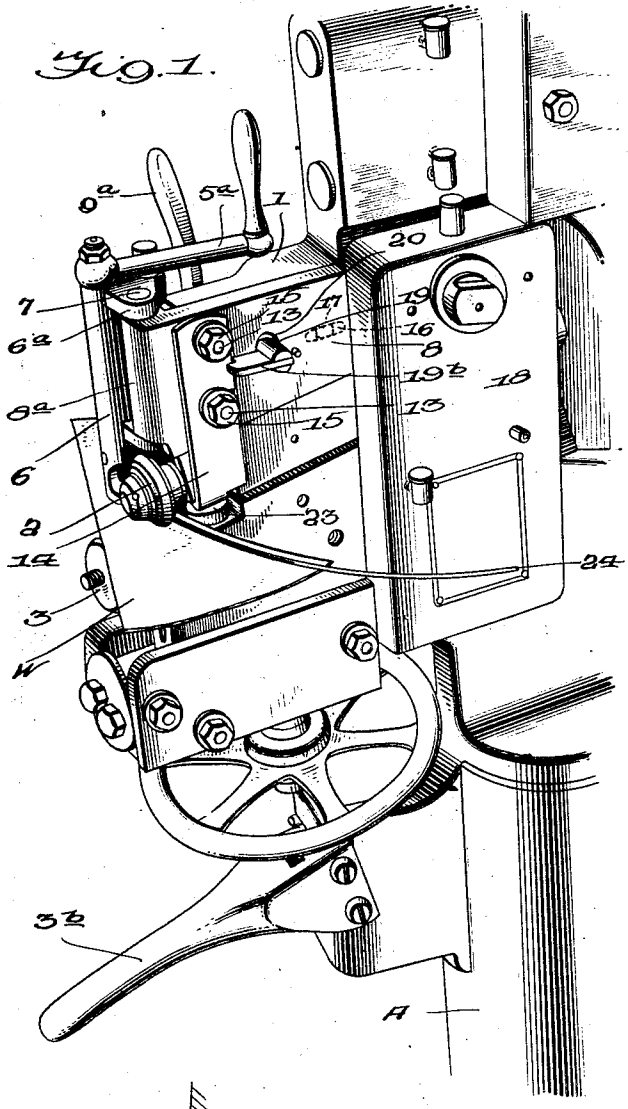


Fig. 6

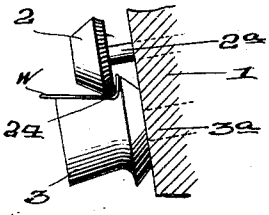
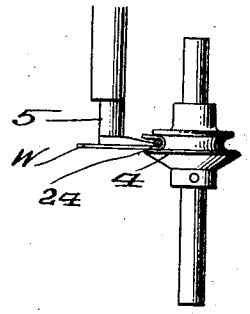


Fig. 7.



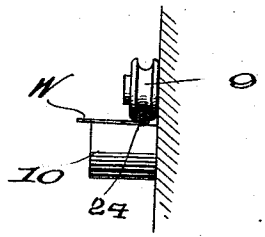


Fig. 8.

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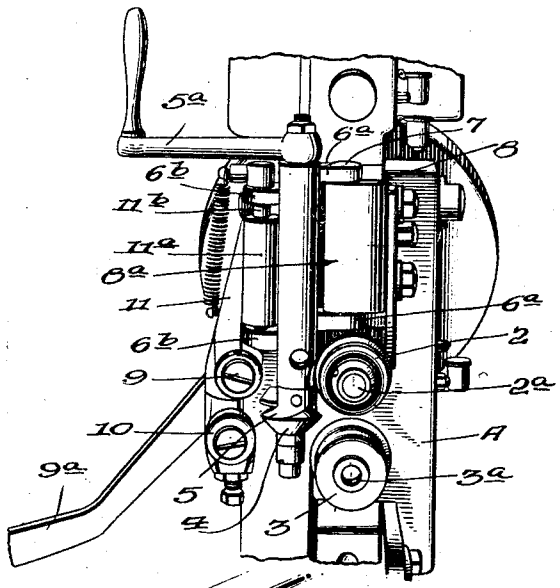
Attorneys

Oct. 28, 1930. W. R. MAGEE 1,779,974

SHEET METAL EDGING MACHINE

Filed Aug. 2, 1927 3 Sheets-Sheet 2

Fig. 2.



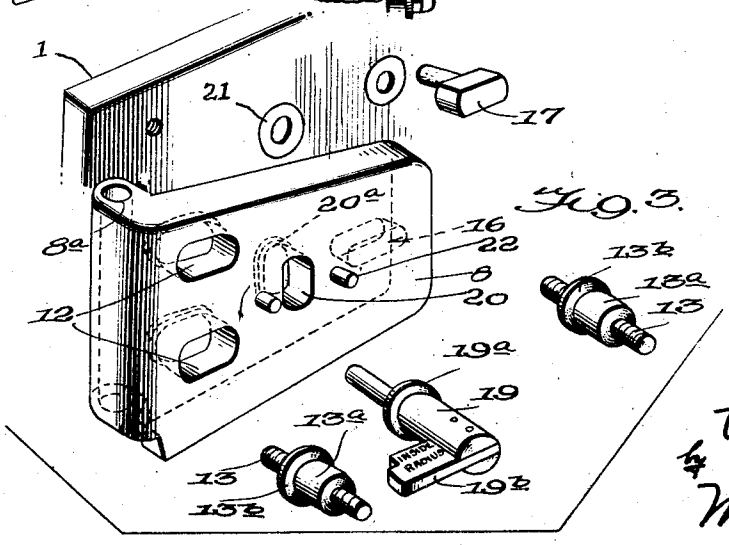


Fig. 3.

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Oct. 28, 1930. W. R. MAGEE 1,779,974

SHEET METAL EDGING MACHINE

Filed Aug. 2, 1927 3 Sheets-Sheet 3

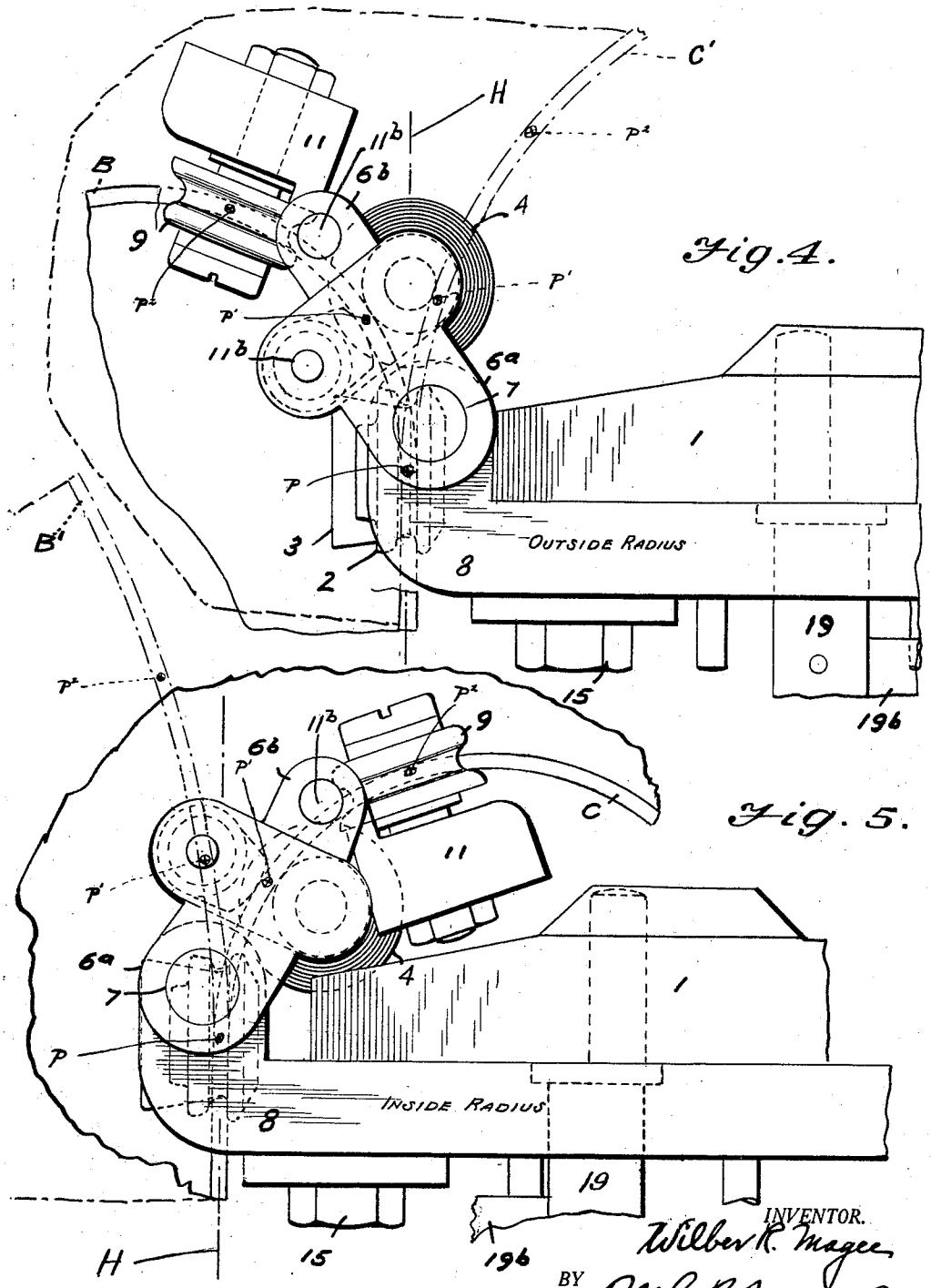


Fig. 4.

Fig. 5.

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Patented Oct. 28, 1930 1,779,974

UNITED STATES PATENT OFFICE

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SHEET-METAL-EDGING MACHINE

Application filed August 2, 1927. Serial No. 210,167.

My invention relates to improvements in sheet metal machines,—for instance, such as are designed for wiring, hemming, or otherwise turning or operating upon the edges of sheet metal,—and is more especially an improvement over the structure shown in my Patent No. 1,048,984, dated December 31st, 1912.

In my prior patent, referred to, the edge of the work was given a predetermined form in a single pass through the machine. There, the initially acting dies for effecting the preliminary bend of the work or stock were fixedly journalled in the machine frame. The secondary set of dies were carried by a major sub-frame swingable in a horizontal plane, while the finishing dies were carried by a minor horizontally swingable sub-frame carried by the major sub-frame. By mounting the dies in this fashion it was possible to operate upon work having a straight, curved, or compound curved edge. In other words, the horizontally swingable mounting of the secondary and finishing dies enabled them within certain limits to follow the curve of the work edge.

The main difficulty with the patented structure manifested itself when the edge of the work defined short radii compound or opposite curves. By this I mean a work edge including first, an arc of a circle having an outside radius,—that is to say where the center of the circle is located outwardly of the path of the work through the initial dies; and secondly the work edge having an oppositely curved or inside radiused arc where the center of the circle lies on the same side of the path of the work as does the main part of the machine,—or to put it differently,—where the center of the circle lies inwardly or outwardly of the edge of the work. Present day sheet metal work, particularly in the automotive branch (i. e. fenders, fender aprons, etc.), abounds in compound or oppositely directed edge curves of short radii in the same piece of work. The horizontally swingable major and minor sub-frame dies of the patented machine can and do follow work edge curves of inside and outside radii in the same piece of metal, and the machine can be built to turn either a very short inside radiused curve or a very short outside radiused curve,—but not both. Hence, two machines are necessary,—one for short inside radiused curves, and one for short outside radiused curves. Furthermore, the necessary shifting of the work from one machine to another slows down production and this, of course, is even more objectional than the cost of the extra machine.

It is therefore the primary object of my present invention to provide a sheet metal edging machine, which will overcome the objections noted, in that it is adapted to turn short radii curves of both the inside and outside variety in the same piece of metal.

Another object of the invention resides in the provision of a sheet metal edging machine, having means whereby the work engaging elements may be readily adjusted for turning curves of short inside or short outside radii without the necessity of removing the work from the machine, thus effecting a great saving of time and enabling a job to be finished in a single pass through the machine.

The invention has for a still further and more specific object to furnish in a machine of this kind having two sets of co-acting dies, one swingable and the other fixed,—a novel demountable carrier upon which the swingable support for the first named die-set is pivoted, the carrier having means whereby it may be readily adjusted so as to shift the pivot point of the swingable die-set support with respect to fixed die-set so that both sets of dies may be included in either an arc of very short inside radius or one of very short outside radius, depending on the particular extreme position at which the swingable die support carrier is set.

The foregoing, and other features of novelty which characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this specification. However, in order that the invention may be better understood and its advantages appreciated, reference should be had to the accompanying drawings and descrip-

tive matter which disclose in concrete form a preferred embodiment of my improvement. Since it will be manifest to those skilled in the art that the invention is capable of other mechanical expressions, I specifically reserve the right to make such changes and modifications in the structure shown as fairly fall within the spirit and scope of the appended claims.

In the drawings, wherein the same reference characters designate the same parts in all views,

Figure 1 is a perspective view of a portion of the frame of a metal edge finishing machine and illustrating the application of my invention;

Figure 2 is a side elevation;

Figure 3 is a group perspective view of the adjustable carrier plate for the major sub-frame and the securing and adjusting elements associated therewith;

Figure 4 is a somewhat diagrammatic top plan view, omitting non-essential details and illustrating the device set for a work edge curve of the minimum outside radius that it is adapted to handle, and showing in dotted lines the minimum inside radiused arc that the dies can follow at this adjustment;

Figure 5 is a view similar to Figure 4 but showing the device set for an arc of minimum inside radius;

Figures 6, 7 and 8 are detail views illustrating, respectively, the initial, secondary and finishing dies and their action on the work in the edge wiring thereof.

Referring specifically to the drawings, A indicates a fragment of the main frame or standard of a sheet metal edging machine, the standard having a lateral horizontal projection 1 in which are journalled the superposed oppositely driven shafts 2^a, 3^a upon the outer ends of which are keyed the co-acting initial dies 2, 3 respectively. The dies, 2, 3 are of a form for wiring the edge of the work as shown in Fig. 6, but it is to be understood that other kinds of dies may be used according to character of work to be done.

The shafts 2^a, 3^a, may be driven in any suitable manner, as shown in my prior patent, to draw the work between the dies 2, 3. Shaft 3^a is capable of vertical adjustment as in the patent.

The secondary dies 4, 5 are of the form shown in my prior patent, their shanks being vertically journalled in a horizontally swingable major sub-frame 6 attached by a pintle or hinge pin 7 which extends through the laterally projecting frame ears 6^a and the interposed integral sleeve bearing 8^a of the carrier plate 8 which is adjustably carried by the standard projection 1 above the shafts 2^a, 3^a. The nature and action of dies 4, 5 is shown in Fig. 7.

The finishing dies 9, 10 (Fig. 8) as in the patented structure, are horizontally journalled in a minor sub-frame 11 whose sleeve bearing 11^a is interposed between spaced ears 6^b of major sub-frame 6. A pivot pin 11^b extending through said ears 6^b and sleeve bearing 11^a swingably attaches the two sub-frames.

Levers 3^b, 5^a, and 9^a are adapted to actuate the respective dies 3, 5 and 9 to and from co-acting relationship with their mates and since they form no part of this invention they are only casually mentioned herein.

Referring to Fig. 3, the carrier plate 8 is shown as having a pair of vertically spaced transverse holes 12 which are somewhat elongated in the direction of the length of plate 8 and receive the intermediate cylindrical enlargements 13^a of bolts 13. One end of each bolt 13 is adapted to be threaded into a hole in the smooth outer face of standard projection 1. Since the standard portion 1 is of relatively soft cast metal, each bolt has a wide lateral circumferential flange 13^b provided adjacent one side of enlargement 13^a to bear against the face of said projection 1 to prevent the wearing of a groove therein and to give the bolts a tighter binding fit. Holes 12 have countersunk shoulders at the inner surface of the carrier plate 8 to receive flanges 13^b. The other ends of the bolts 13 extend through holes in a bracket plate 14 to receive nuts 15 whereby the carrier plate 8 will be slidingly secured to the standard projection 1 for lengthwise movement. The rear end of the plate 8 may have an inner surface groove 16 to receive the head of a T-headed stud 17 which extends into a drilled hole in the surface of projection 1 and acts to further guide the plate in its movement. Fig. 1 illustrates that the rear end of plate 8 extends between a removable casting 18 and frame projection 1. Thus, the necessity for employing shoulder bolts 13 at this point is obviated. Frame casting 18 also holds T-stud 17 in its operative engagement with the plate 8 and standard projection 1, as suggested in Fig. 1.

The means for shifting carrier plate 8 to its extreme position comprehends a cam member 19 working in a hole 20 in the plate 8 and having its reduced inner shank portion received in a bronze bushing 21 embedded in the smooth face of projection 1. Plate hole 20 has a countersunk shoulder 20^a to receive the flange enlargement 19^a of the cam,—the object of which flange enlargement is to prevent withdrawal of the cam except upon removal of plate 8. The projecting end of cam 19 has a lateral finger piece 19^b upon one face of which is printed the words "inside radius" while upon the other face is printed the words "outside radius". Pins 22 at either side of hole 20 limit the throw of finger piece 19^b to 180 degrees. Thus, when finger piece 19^b is turned in a counter-clockwise direction the plate 8 will be shifted outwardly and the "inside radius" inscription will be exposed

to indicate that the device is set for work of short inside radius. Conversely, when the finger piece 19b is swung in a clockwise direction the "outside radius" inscription will be visible to indicate that the plate 8 has been drawn inwardly so that the dies will be permitted to follow work edge curves of short outside radius.

As will be gathered from the preceding description, adjustment of the machine for either inside or outside curves of short radii is effected by shifting the pivot point 7 of the major sub-frame 6 so as to change the relative position of the arc in which dies 4, 5 swing with respect to the fixedly journalled dies 2, 3. By moving plate 8 inwardly it is possible as shown in Fig. 4, to locate the dies 4, 5 of the major sub-frame 6 and the dies 9, 10 of the minor sub-frame 11 in an arc of short outside radius which will also include the effective work engaging points P of the fixedly journalled initial dies 2, 3. In Figure 4 the short outside radiused work-edge arc referred to is indicated by full line B upon which the work engaging points of the primary, secondary and final dies are diagrammatically indicated by P, P^1 and P^2 respectively. In order that a contrast may be gotten I have indicated in Figure 4 by dotted line C′ the shortest inside radiused arc which the major and minor sub-frame dies can follow when the machine is at the outside radius adjustment, the relative positions of the work engaging die portions P, P^1 and P^2 being shown upon said dotted line C′. As clearly indicated, the radius of arc C′ is commensurately greater than the radius of arc B.

By comparison of Figure 5 wherein the plate 8 carrying the pivot point 7 is shown shifted to the "inside radii position" (namely, to its outermost limit);—with the showing in Figure 4 it will be noted that it is possible to include all three sets of dies 2, 3; 9, 10 and 4, 5 in an arc C of very short inside radius. Figure 5 also indicates by dotted line B′ the shortest outside radiused arc in which dies 2, 3; 9, 10 and 4, 5 can be located at this setting of this machine, the exact location of the work engaging points P, P^1 and P^2 of the dies indicated in each instance.

Of course straight edged work can be operated upon at either setting of plate 8 and it is also clear that the finishing dies 9, 10 of the minor sub-frame will readily follow either a short radius inside or outside arc at either setting of plate 8 inasmuch as the pivot point 11^b thereof is fixed with respect to major sub-frame 6.

The actual shift of the carrier plate 8 from one extreme position to the other is about three eighths of an inch. Since the machine will turn out a thousand pieces of work a day, it is possible that two thousand or more shifts of the plate 8 may be necessary. Hence I provide, and prefer the cam element 19 as the shifting means because of its simplicity and ease of operation. Furthermore, the finger piece 19^b of the cam element serves as an indicator to denote the position at which the plate 8 is located. Other plate actuating means might be availed of within the scope of my invention. Here, it might be observed that the proper time for shifting the plate 8 is just at the beginning of the curve in the work edge,—although of course where the piece of work involves but one short radius edge curve the setting of plate 8 will be made beforehand.

In Figure 1, numeral 23 designates a gauge roll, while the wire stock is indicated at 24. As previously mentioned, the drawings show the machine equipped with edge wiring dies, but it must be borne in mind that they are merely illustrative and that any variety of dies may be used depending on the job to be done.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A machine of the class described having two work-engaging instrumentalities relatively movable in predetermined paths with respect to each other, and positionable in inside and outside radiused arcs, mounting means for one of said instrumentalities and bodily movable to a position wherein the relative paths of movement of the said instrumentalities will be so changed that the same may be located in predetermined short radiused arcs of inside or outside radii.

2. A machine of the class described having two work-engaging instrumentalities relatively movable in predetermined paths with respect to each other, and positionable in inside and outside equally short radiused arcs and adjustable mounting means for one of said instrumentalities whereby said paths of movement may be relatively changed so that said instrumentalities may be positioned in oppositely curved arcs of short radii.

3. A machine of the class described having two work-engaging instrumentalities relatively movable in predetermined paths with respect to each other, and positionable in inside and outside equally short radiused arcs, a carrier upon which one of said instrumentalities is swingably mounted, and means for shifting the position of said carrier to relatively change the paths of movement of said instrumentalities whereby the same may be positioned in oppositely curved arcs of short radii.

4. The combination with a machine of the class described having two work-engaging instrumentalities, one of which is fixed and the other swingably mounted; said instrumentalities being positionable in inside and outside radiused arcs of a carrier for the swingably mounted instrumentality, and means for adjustably securing said carrier to

said machine whereby the path of swing of said last-mentioned instrumentality may be changed with respect to the other instrumentality and both instrumentalities included in the opposite short radiused arcs of a compound curve.

5. The combination defined in claim 4,— and means for adjusting said carrier relatively of the machine.

6. The combination defined in claim 4, and including, means for adjusting said carrier relatively of the machine, and means for limiting the movement of said adjusting means.

7. A machine of the class described having two work-engaging instrumentalities relatively movable in predetermined paths with respect to each other and positionable in inside and outside equally short radiused arcs, a carrier for one of said instrumentalities, and means for adjustably securing said carrier to the machine whereby the same may be moved to a position to change the relative paths of said instrumentalities whereby the same may be selectively located in oppositely curved arcs of short radii.

8. The combination defined in claim 7,— and means for adjusting said carrier relatively of the machine.

9. The combination defined in claim 7,— means for adjusting said carrier relatively of said machine, and means for limiting the movement of said adjusting means.

10. A machine of the class described having a frame and two work-engaging instrumentalities one fixedly journalled in said frame and the other swingably mounted, a carrier plate having a bearing to which said swingable instrumentality is secured, guide studs carried by said frame, said carrier plate having slots through which said studs extend, nuts on the ends of said studs for securing said carrier plate against said frame, a cam projecting through said carrier plate and having a shank extending into said frame, said shank having a flange engaging the inner face of said carrier plate whereby the shank will be held against outward movement, a finger piece projecting laterally from the outer end of said cam and playing over the outer face of said carrier plate, studs projecting from the outer face of said carrier plate for engaging said finger piece to limit the throw of said cam, and said finger piece having inscriptions on opposite sides thereof to indicate the relative position of said plate.

11. The combination defined in claim 10,— said plate having a longitudinal groove in its inner surface remotely located from said slots, a T-headed stud, the frame having a hole for receiving the shank of said stud, the head of the stud engaging in said groove whereby to assist in guiding said plate, and said aforementioned studs and nuts which hold the plate against said frame also serving to hold the head of said T-headed stud in said groove and its shank in the hole in said frame.

12. A machine of the class described having two major sets of work-engaging instrumentalities relatively movable in predetermined paths with respect to each other, a minor set of work-engaging instrumentalities movably carried by one of said aforementioned sets and movable in a predetermined path with respect thereto and with respect to said other set, mounting means for one of said major sets of work-engaging instrumentalities and adjustable bodily to a position wherein the relative paths of movement of said major and minor instrumentalities will be so changed that the same may be located in predetermined short radiused arcs of inside or outside radii.

13. A machine of the class described having two working engaging instrumentalities relatively movable in predetermined paths with respect to each other, a carrier for one of said instrumentalities, means for adjustably securing said carrier to the machine whereby the same may be moved to a position to change the relative paths of said instrumentalities whereby the same may be located in oppositely curved arcs of short radii, means for adjusting said carrier relatively of said machine, and means for limiting the movement of said adjusting means, and said adjusting means having an indicator portion to denote the relative position of said carrier.

14. A machine of the class described having two work engaging instrumentalities relatively movable in predetermined paths with respect to each other, a carrier for one of said instrumentalities, means for adjustably securing said carrier to the machine whereby the same may be moved to a position to change the relative paths of said instrumentalities whereby the same may be located in oppositely curved arcs of short radii, and cam means in part carried by said machine and in part carried by said carrier for adjusting the latter.

15. A machine of the class described having two work engaging instrumentalities relatively movable in predetermined paths with respect to each other, a carrier for one of said instrumentalities, means for adjustably securing said carrier to the machine whereby the same may be moved to a position to change the relative paths of said instrumentalities whereby the same may be located in oppositely curved arcs of short radii, cam means in part carried by said machine and in part carried by said carrier for adjusting the latter, and a laterally projecting finger piece for actuating said cam means.

16. A machine of the class described having two work engaging instrumentalities relatively movable in predetermined paths with respect to each other, a carrier for one

of said instrumentalities, means for adjustably securing said carrier to the machine whereby the same may be located in oppositely curved arcs of short radii, cam means in part carried by said machine and in part carried by said carrier for adjusting the latter, a laterally projecting finger piece for actuating said cam means, and stop elements carried by said carrier for engaging said finger piece to limit the movement of said cam.

17. A machine of the class described having two work engaging instrumentalities relatively movable in predetermined paths with respect to each other, a carrier for one of said instrumentalities, means for adjustably securing said carrier to the machine whereby the same may be moved to a position to change the relative paths of said instrumentalities whereby the same may be located in oppositely curved arcs of short radii, cam means in part carried by said machine and in part carried by said carrier for adjusting the latter, a laterally projecting finger piece for actuating said cam means, and a shoulder on said cam means and engaged by said carrier whereby said carrier securing means serves to hold said cam means in operative position.

18. A machine of the class described having two work engaging instrumentalities relatively movable in predetermined paths with respect to each other, a carrier for one of said instrumentalities, means for adjustably securing said carrier to the machine whereby the same may be moved to a position to change the relative paths of said instrumentalities whereby the same may be located in oppositely curved arcs of short radii, cam means in part carried by said machine and in part carried by said carrier for adjusting the latter, a laterally projecting finger piece for actuating said cam means, said finger piece having inscriptions on opposite sides thereof to indicate the position of said carrier, and stop elements projecting from said carrier and engaging said finger piece to limit the throw of said cam.

19. The combination with a machine of the class described having two work-engaging instrumentalities, one of which is fixed and the other swingably mounted; of a carrier for the swingably mounted instrumentality, means for adjustably securing said carrier to the machine whereby the path of swing of said last mentioned instrumentality may be changed with respect to the other instrumentality, means for adjusting said carrier relatively of the machine, means for limiting the movement of said adjusting means, and said adjusting means having an indicator portion to denote the relative position of said carrier.

20. In a machine of the class described having a work-engaging instrumentality, a carrier for said work-engaging instrumentality, adjusting means for said carrier, said adjusting means having an indicator portion to denote the relative position of said carrier, and means engaging said indicator portion for limiting the movement of said adjusting means.

In testimony whereof I affix my signature.

WILBER R. MAGEE.