A. G. KLING.

SHEET METAL EDGE ROLLING MACHINE.

APPLICATION FILED NOV. 9, 1914.

1,166,994. Patented Jan. 4, 1916.

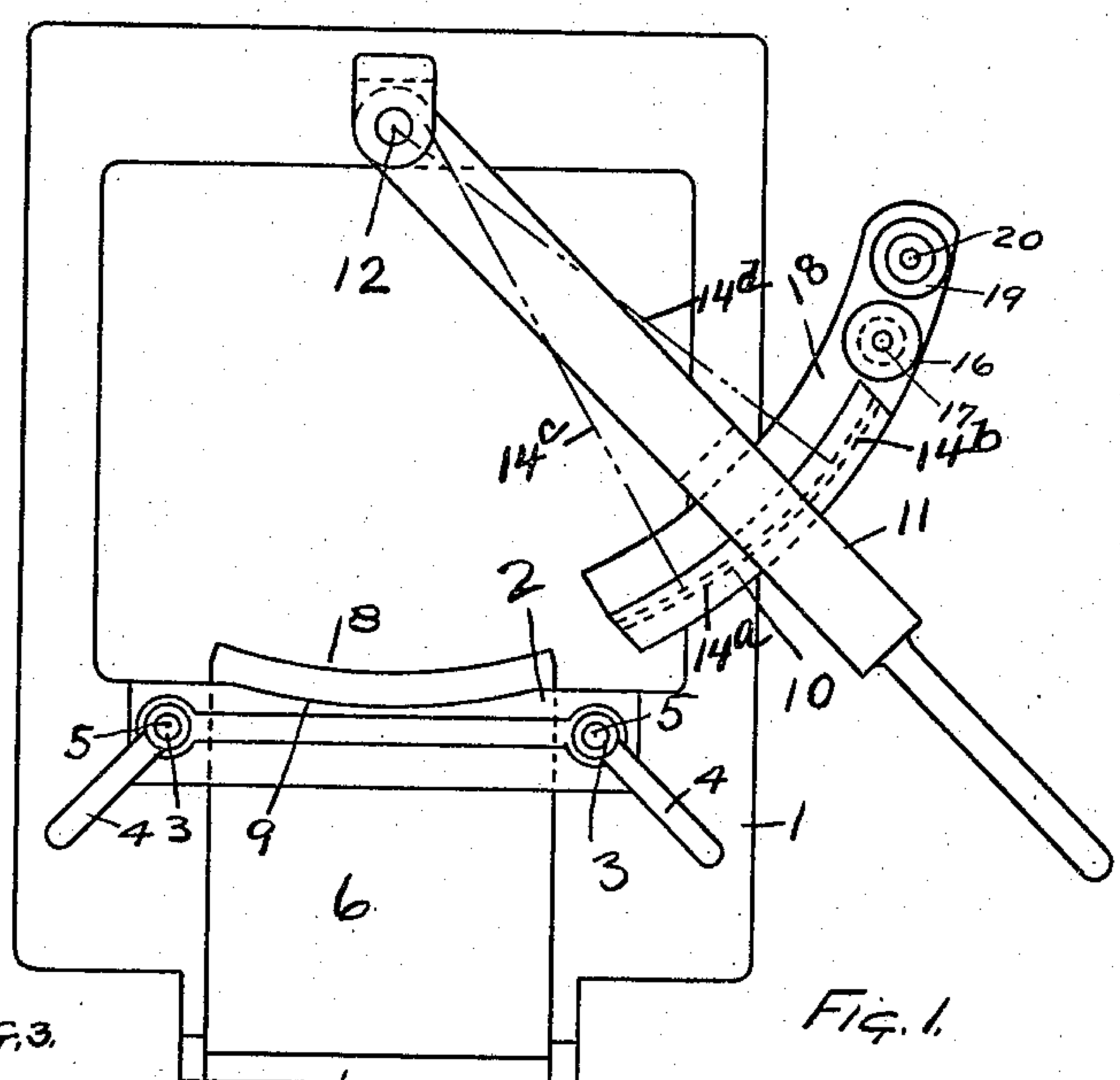

Fig. 1.

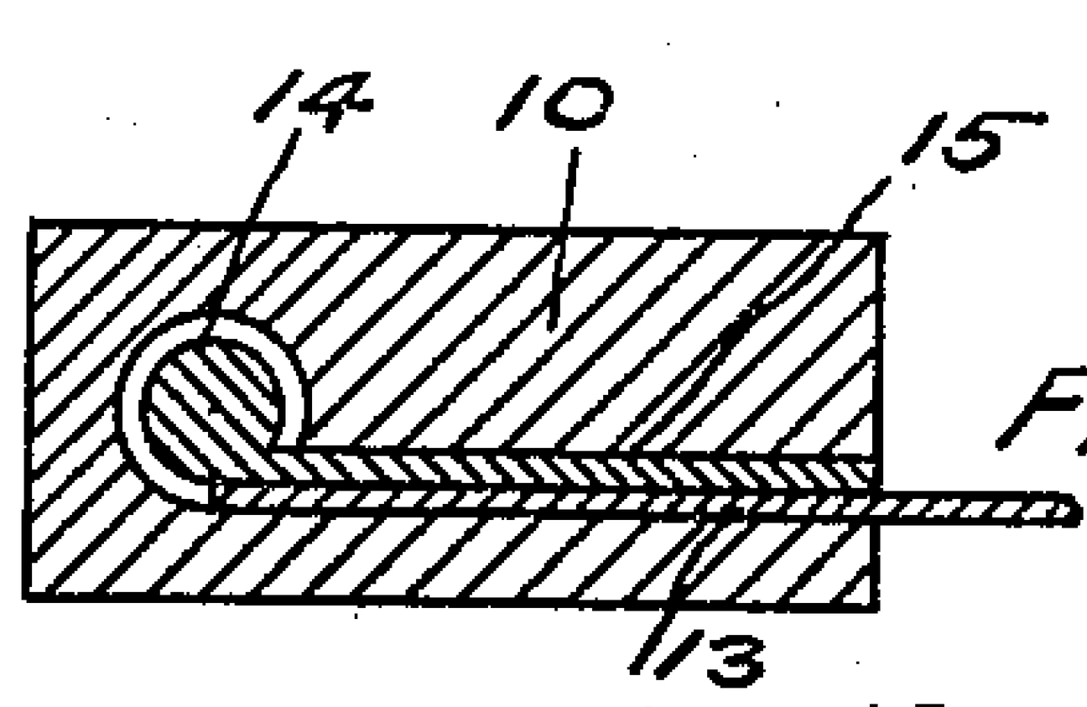

Fig. 3.

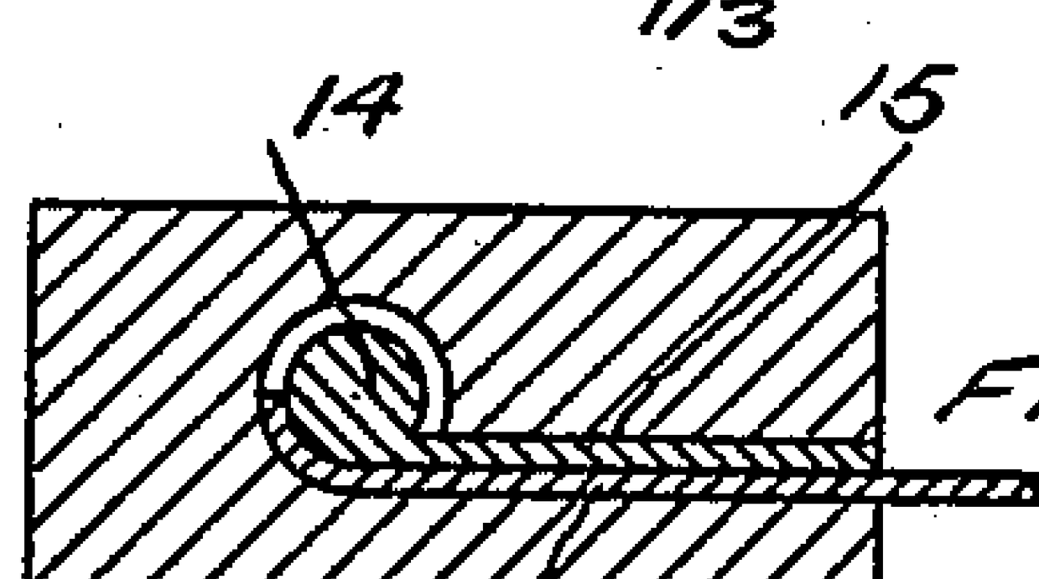

Fig. 4.

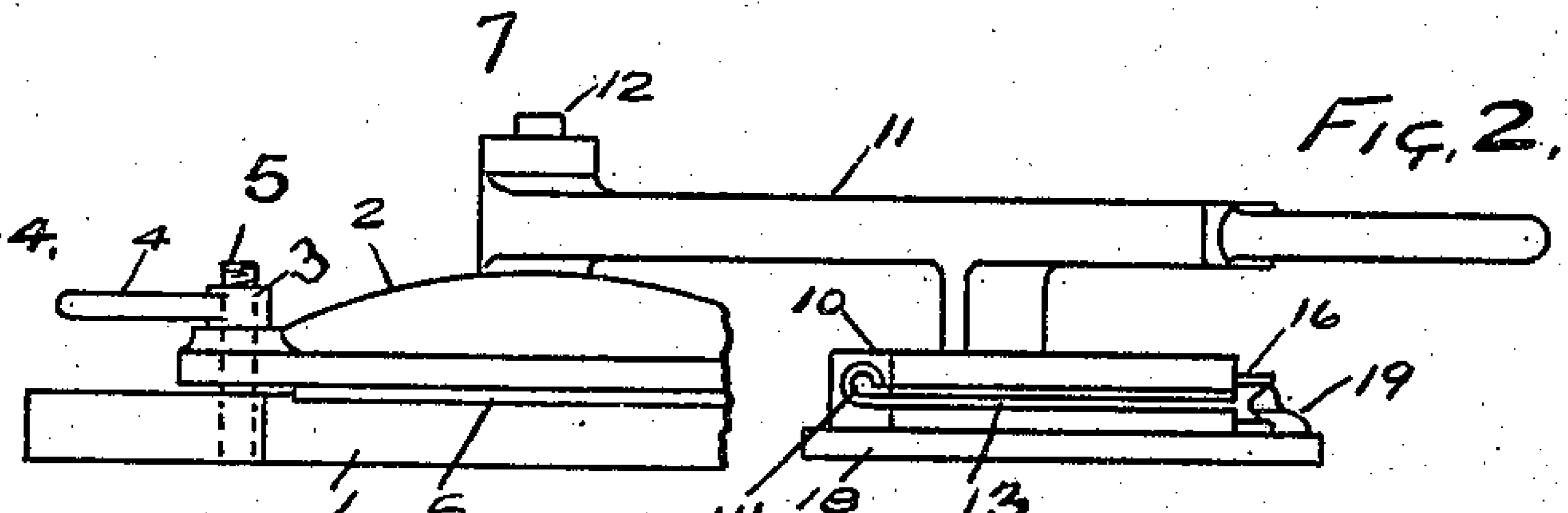

Fig. 2.

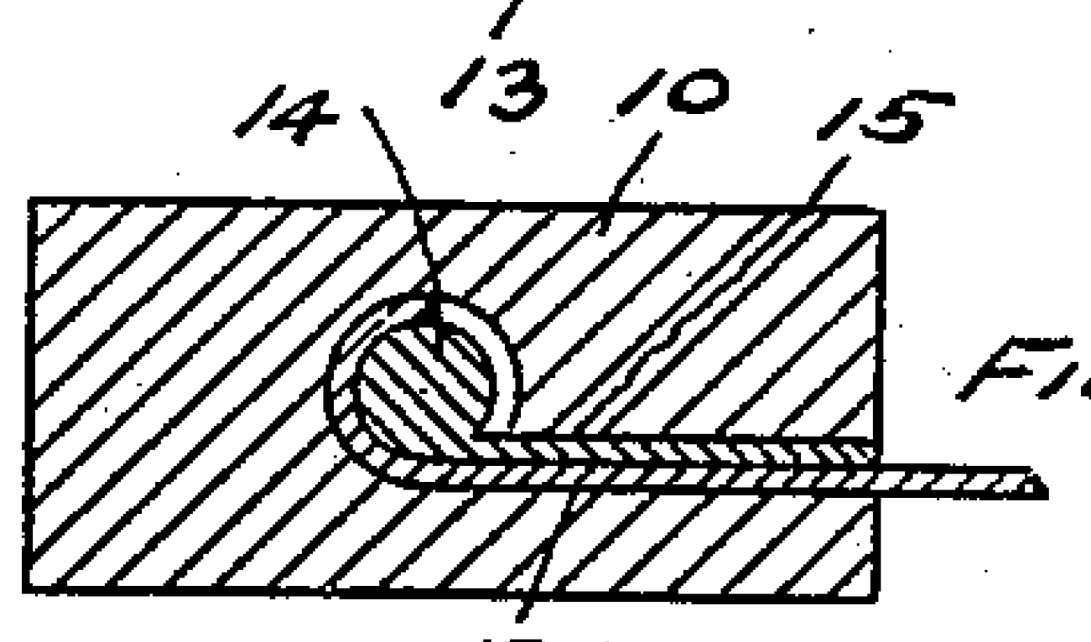

Fig. 5.

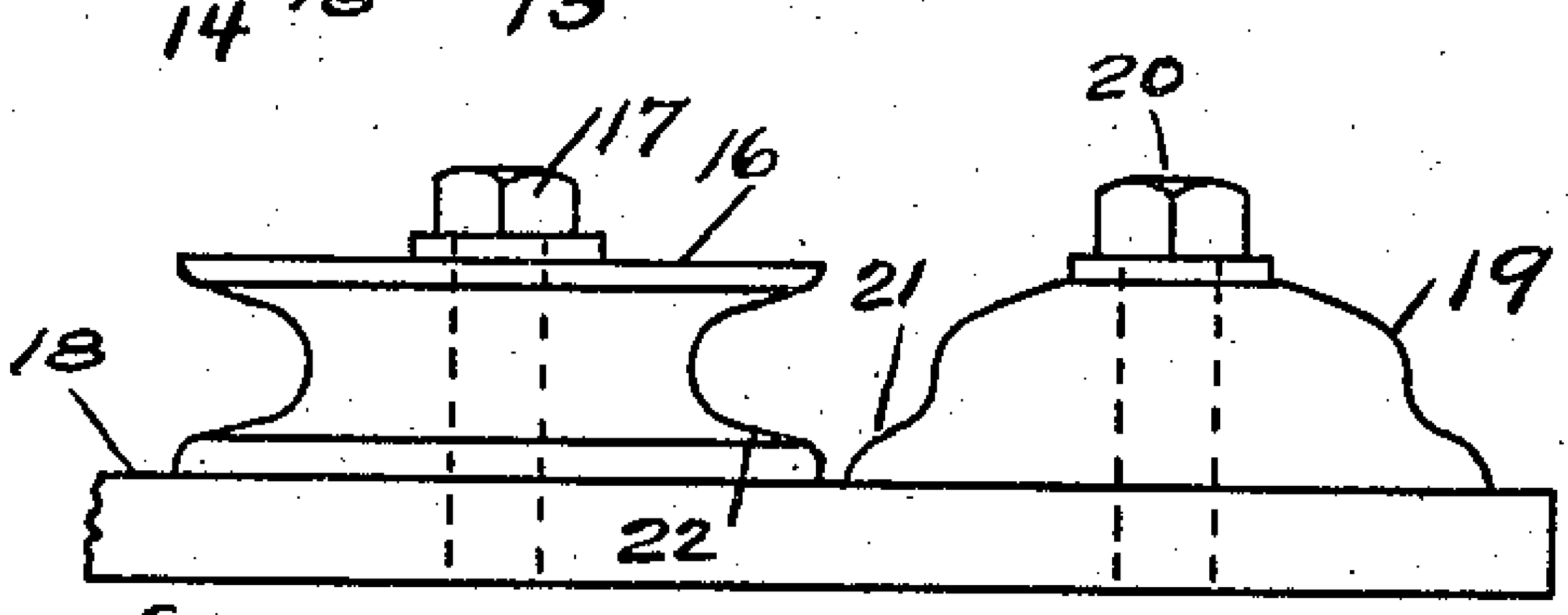

Fig. 11.

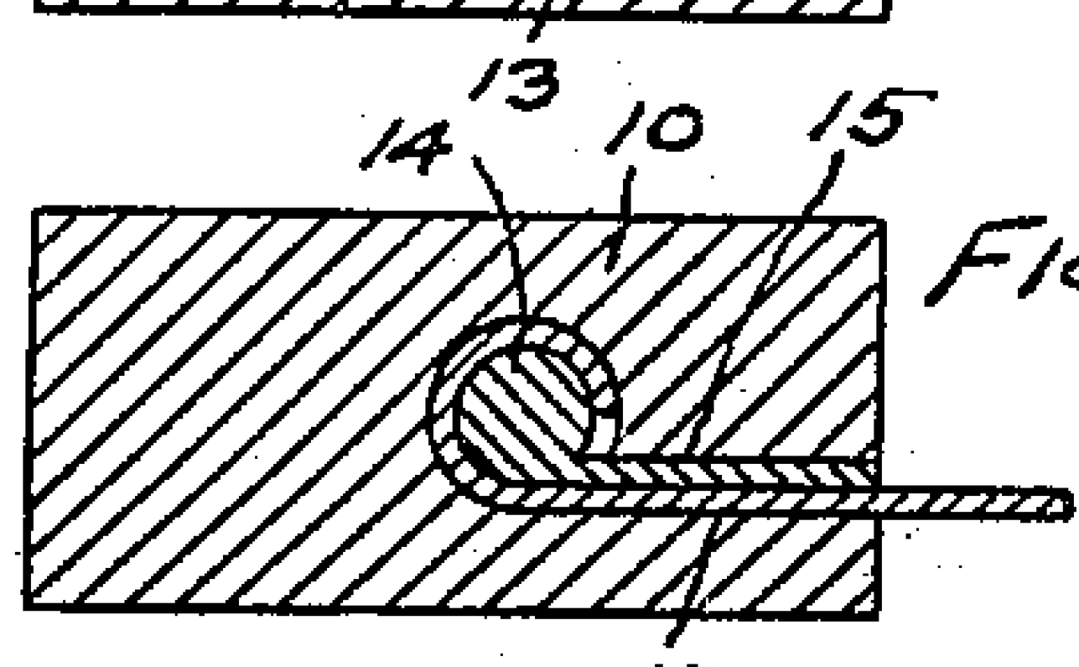

Fig. 6.

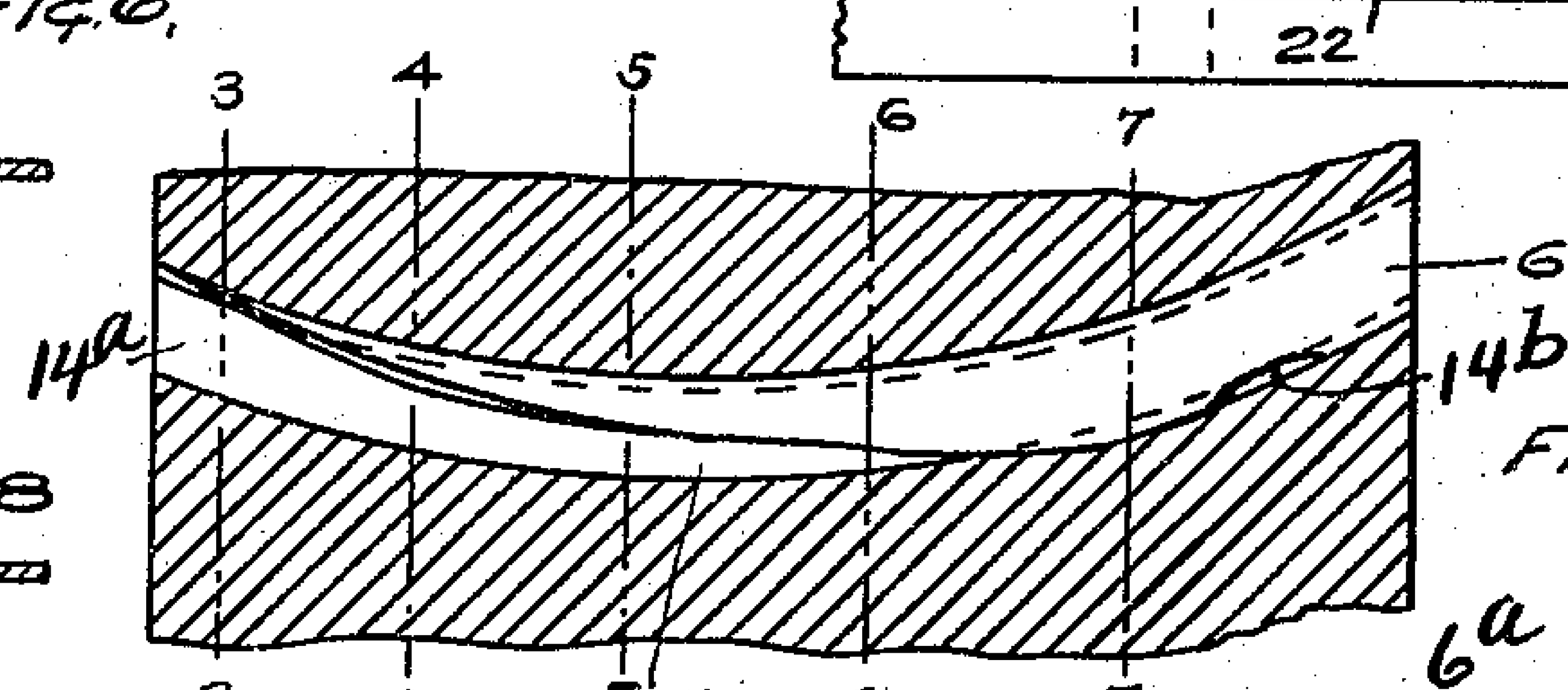

Fig. 8.

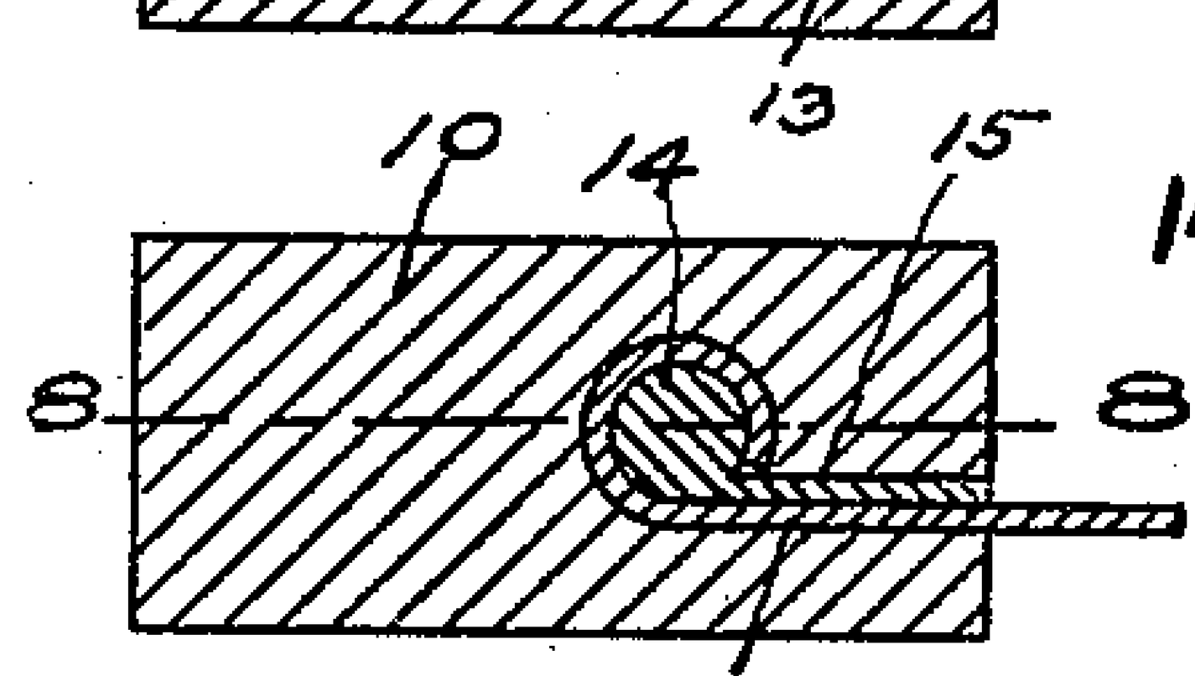

Fig. 7.

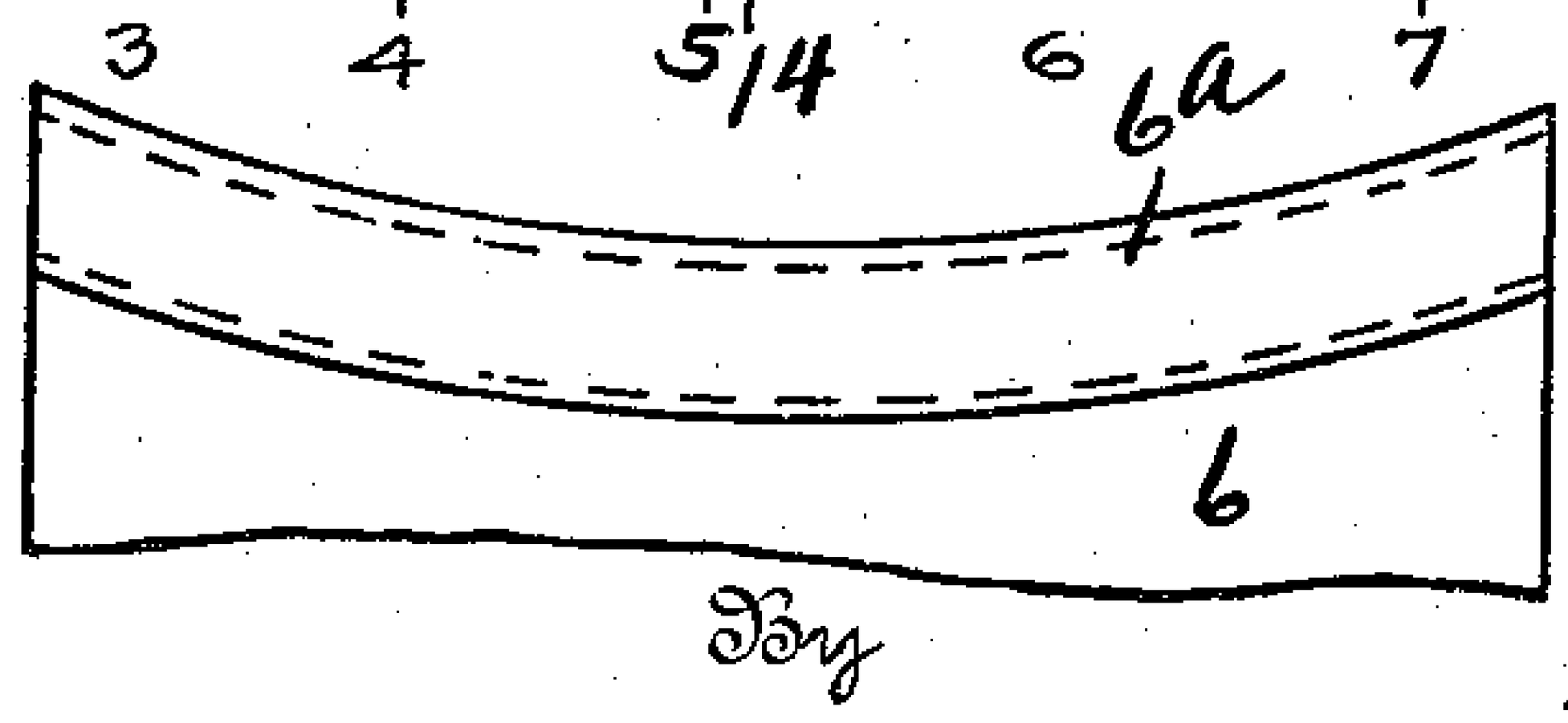

Fig. 9.

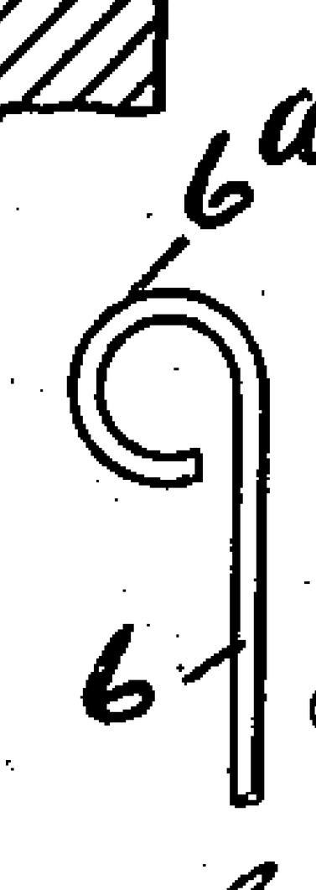

Fig. 10.

Witnesses

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SHEET-METAL-EDGE-ROLLING MACHINE.

1,166,994. Specification of Letters Patent. **Patented Jan. 4, 1916.**

Application filed November 9, 1914. Serial No. 870,996.

To all whom it may concern:

Be it known that I, ADOLPH G. KLING, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Sheet-Metal-Edge-Rolling Machines, of which the following is a specification.

This invention relates to sheet metal edge rolling machines and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

It is often desirable to roll the edge of sheet metal plates, for instance in stove manufacture both for finishing the edge of the plate and for stiffening the edge of the plate.

The object of the present invention is to provide a machine capable of rolling edges of various forms and particularly a form where the edge forms a concave surface.

The invention is illustrated in the accompanying drawings as follows:—

Figure 1 shows a plan view of the machine. Fig. 2 a front elevation of the machine, a part being broken away to better show construction. Figs. 3, 4, 5, 6 and 7 show sections on lines 3, 4, 5, 6 and 7 respectively in Fig. 8 of the roll forming die with a sheet therein, the sections showing the progressive rolling of the sheet. Fig. 8 shows a section on the line 8—8 in Fig. 7. Fig. 9 a plan view of a rolled edge. Fig. 10 an end view of a rolled edge. Fig. 11 a side elevation of straightening rolls.

1 marks the frame of the machine, 2 a clamping bar on the frame, 3 clamping nuts, 4 handles extending from the clamping nuts, 5 bolts on which the nuts operate, the bolts extending from the frame through the clamping bar, and 6 a sheet metal plate in place in the clamp formed by the clamping bar.

The rear end of the sheet metal plate is held in position by a guide lip 7. The front edge 8 of the unformed plate when against the guide is just in front of the clamp. As shown the edge 8 forms a concave surface and the clamp bar has its edge 9 parallel with the edge 8 so as to support the plate adjacent to the edge.

A roll forming die 10 is carried by a handle 11. The handle 11 is pivotally mounted on the frame by means of a pin 12. The edge 8 of the plate forms an arc of a circle with the axis of the pivot 12 as a center.

The roll forming die has a slot 13 extending inwardly from its periphery. The inner end of this slot extends partially around the roll forming rib or mandrel 14, the roll forming rib or mandrel 14 being carried by a plate 15 secured in the die and forming one wall of the slot 13. As shown the body of the die is formed in one piece but this may be made in parts if desired to facilitate the assembling of the parts or the machining of the walls of the slot. The slot 13 terminating in the rib or mandrel 14 varies in depth, the part 14^a of the rib or mandrel 14 being placed at a slight angle to an arc of a circle having the pivot as a center. The extent of this angularity or variation from a circular relation depends on the size of the roll to be formed in the edge because this angularity must be sufficiently great to supply the metal for the roll. The rib or mandrel, therefore, at the rear end of the part 14^a of the die is enough nearer the edge of the die away from the pivot to approximately equal the circumference of the roll.

As shown in Fig. 3 the plate enters the slot 13 with the edge 8 directly below the axis of the rib 14, while at the rear end of the portion 14^a as shown in Fig. 7, the rib is sufficiently near the edge of the die to allow the metal of the plate to have rolled around the rib filling the slot 13. In practice the part 14^a of the rib or mandrel would be formed substantially in a circle having a center off the pivot center 12, the radius of this curve being indicated in Fig. 1 by a dash line 14^c. In order to fully shape the edge it is desirable to continue the rib or mandrel 14 beyond the point where the roll is completed so as to shape the roll to an arc of a circle having the pivot 12 as a center and to crimp the roll sufficiently to make it retain its closed shape. The rib 14, therefore has an extension 14^b which is formed on an arc of a circle with the axis of the pivot 12 as a center being indicated by a dash line 14^d in Fig. 1.

In the operation of the device, the plate 6 is placed under the clamp and clamped on the bed. The rear of the plate will rest against the guide 7 and the front edge will preferably be parallel to the edge of the clamp. This edge will have a configuration

approximating the general configuration of the finished plate. As shown this forms an arc of a circle with the axis of the pivot 12 as a center. The die 10 is swung forward by pressure on the handle and the die passes over the plate, the plate entering the slot 13. As the die progresses the metal at the edge of the plate is gradually forced around the rib or mandrel 14 by reason of the fact that the part 14ª of the rib or mandrel 14 varies from a true circle, the rear end being swung outwardly and consequently nearer the clamp 9. As the die progresses, therefore, the edge of the plate is forced around the rib or mandrel 14 progressively as shown in Figs. 3 to 7 inclusive, the edge forming a spiral as shown in Fig. 8 around the rib or mandrel 14. The rear end of the part 14ª is so placed relatively to the unformed edge of the plate 6 as to effect a complete rolling of the edge and the part 14ᵇ sets the roll 6ª, the roll 6ª as it leaves the die forming a rolled edge as shown in Figs. 9 and 10. If desired the rolled edge may be closed by any convenient mechanism but it is often desirable to have it left open as it then forms a means for securing other plates to the plate having the rolled edge. The width of this opening at the edge of the roll may be determined by the thickness of the plate 15.

The rolling of the edge tends ordinarily to give to the finished sheet a slight bend. To correct this I provide the straightening rolls as follows: A grooved roll 16 is pivoted on a pin 17 on an extension 18 on the die. A second roll 19 is journaled on the pin 20. It has a straightening surface 21 slightly above the bottom 22 of the grooved roll. The rolled edge as it passes from the die goes into the grooved roll and then passes onto the surface 21 which forces the edge upwardly slightly, the rolled edge being held in the grooved roll 16. This bends the edge in a reverse direction from that which it receives as the roll is formed and thus straightens the edge.

What I claim as new is:—

1. In a sheet metal edge rolling machine, the combination of means for securing the sheet; a roll forming die comprising a body having a roll forming bore curved axially and forming a mandrel in said bore curved axially and forming with the die a forming slot around the mandrel, the slot extending to the edge of the die; and devices for moving the die and edge of the sheet relatively to each other and endwise of the die, the path of movement having the same general curve as the mandrel, the mandrel of the die being arranged at an angle to the unformed edge of the sheet.

2. In a sheet metal edge rolling machine, the combination of means for securing the sheet; a roll forming die comprising a roll forming mandrel having its axis convex in the direction of the sheet, said mandrel forming with the die a forming slot around the mandrel, the slot extending to the edge of the die; and devices for moving the die and edge of the sheet relatively to each other, the path of movement approximating the curve of the die and having a direction endwise of the die with the die at an angle to the unformed edge of the sheet.

3. In a sheet metal edge rolling machine, the combination of means for securing the sheet; a roll forming die comprising a roll forming mandrel, said mandrel being curved axially and convex in the direction of the sheet, said mandrel forming with the walls of the die a forming slot around the mandrel, the slot extending to the edge of the die; and a pivotal mounting for the die, the mandrel approximating an arc of a circle with the axis of the mounting as a center, the mandrel of the die being set at an angle to the unformed edge of the sheet, the angularity of the mandrel varying the location of the axis of the mandrel at the front and rear of the mandrel relatively to the axis of the mounting a distance approximating the circumference of the roll to be formed.

4. In a sheet metal edge rolling machine, the combination of a clamp for securing the sheet, said clamp paralleling the edge of the sheet; a roll forming die comprising a roll forming mandrel forming with the walls of the die a forming slot around the mandrel; and devices for moving the die and the edge of the sheet relatively to each other and endwise of the die parallel to the edge of the clamp with the mandrel at an angle to the unformed edge of the sheet.

5. In a sheet metal edge rolling machine, a roll forming die comprising a body of a die having a slot extending to the edge and an opening extending therethrough approximating the outer surface of the roll to be formed; a roll forming mandrel arranged in said opening and leaving a surrounding slot approximating in cross dimension the cross dimension of the sheet to be formed; and a plate on which said mandrel is mounted secured to the body of the die along the slot, said plate forming one wall of the slot in the assembled die.

6. In a sheet metal edge rolling machine, the combination of means for securing the sheet; a roll forming die comprising a roll forming mandrel, said mandrel forming with the walls of the die a forming slot around the mandrel, the slot extending to the edge of the die; devices for moving the die and edge of the sheet relatively to each other and endwise of the die with the die at an angle to the unformed edge of the sheet; and means for straightening the rolled edge of the sheet as it leaves the die.

7. In a sheet metal edge rolling machine,

the combination of means for securing the sheet; a roll forming die comprising a roll forming mandrel, said mandrel being curved axially and convex in the direction of the sheet, said mandrel forming with the walls of the die a forming slot around the mandrel, the slot extending to the edge of the die; a pivotal mounting for the die, the mandrel approximating an arc of a circle with the axis of the mounting as a center, the mandrel of the die being set at an angle to the unformed edge of the sheet, the angularity of the mandrel varying the location of the axis of the mandrel at the front and rear of the mandrel relatively to the axis of the mounting a distance approximating the circumference of the roll to be formed; and straightening rolls arranged on the mounting and adapted to engage the formed roll as it leaves the die for straightening the roll.

8. In a sheet metal edge rolling machine, the combination of means for securing the sheet; a roll forming die comprising a roll forming mandrel forming with the walls of the die a forming slot around the mandrel, the slot extending to the edge of the die; and devices for moving the die and edge of the sheet relatively to each other and endwise of the die with the die at an angle to the unformed edge of the sheet, said roll forming mandrel having an extension parallel to the unformed edge of the sheet.

9. In a sheet metal edge rolling machine, the combination of means for securing the sheet; a roll forming die comprising a roll forming mandrel curved axially, said mandrel forming with the walls of the die a forming slot around the mandrel, the slot extending to the edge of the die; and devices for moving the die and edge of the sheet relatively to each other and endwise of the die, the path of movement having the same general curve as the mandrel, the mandrel of the die being arranged at an angle to the unformed edge of the sheet, said roll forming mandrel having an extension parallel to the unformed edge of the sheet.

10. In a sheet metal edge rolling machine, the combination of means for securing the sheet; a roll forming die comprising a roll forming mandrel having its axis convex in the direction of the sheet, said die having a slot around the mandrel, the slot extending to the edge of the die; and devices for moving the die and edge of the sheet relatively to each other, the path of movement approximating the curve of the die and having a direction endwise of the die with the die at an angle to the unformed edge of the sheet, said roll forming mandrel having an extension parallel to the unformed edge of the sheet.

11. In a sheet metal edge rolling machine, the combination of means for securing the sheet; a roll forming die comprising a roll forming mandrel, said mandrel being curved axially and convex in the direction of the sheet and forming with the walls of the die a forming slot around the mandrel, the slot extending to the edge of the die; and a pivotal mounting for the die, the mandrel approximating an arc of a circle with the axis of the mounting as a center, the mandrel of the die being set at an angle to the unformed edge of the sheet, the angularity of the mandrel varying the location of the axis of the mandrel at the front and rear of the mandrel relatively to the axis of the mounting a distance approximating the circumference of the roll to be formed, the roll forming mandrel having an extension with its axis forming an arc of a circle with the axis of the pivotal mounting as a center.

12. In a sheet metal edge rolling machine, the combination of a roll forming die comprising a die body having a slot extending to the edge and a curved bore extending therethrough approximating the outer surface of the roll to be formed, said opening having its axis convex in the direction of the sheet; a roll forming rib arranged in said opening, said rib being curved axially leaving a surrounding slot between the surface of the rib and the walls of the bore; and a plate on which said rib is mounted secured to the body of the die along said slot, said plate forming one wall of the slot in the assembled die.

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

ADOLPH G. KLING.

Witnesses:
C. A. MASTEN,
Jos. E. NASON.