March 19, 1935. B. STOCKFLETH 1,995,258

APPARATUS FOR PRODUCING BIMETAL STRIPS

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Fig. 1.

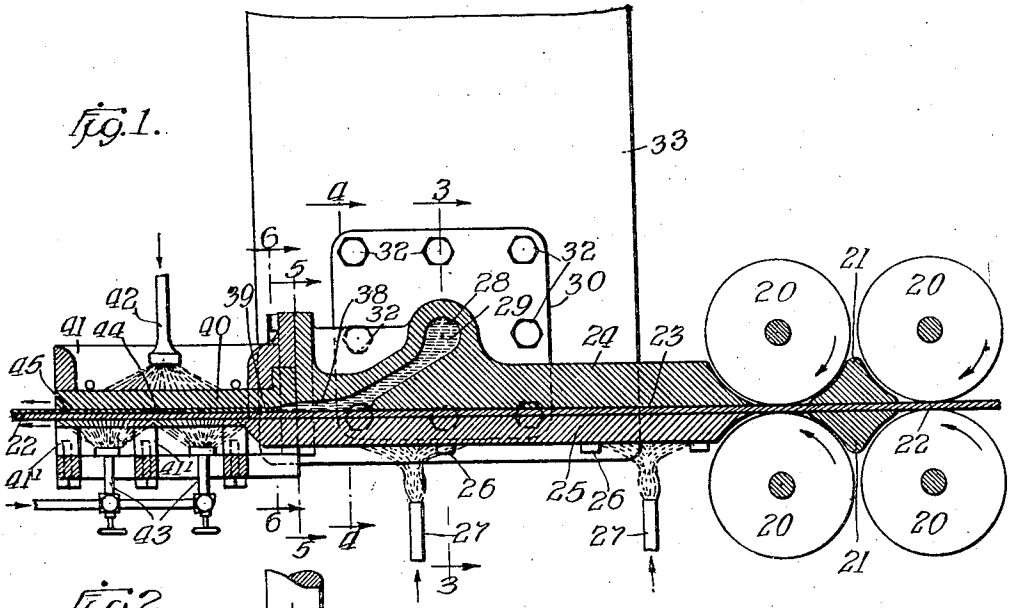


Fig. 2.

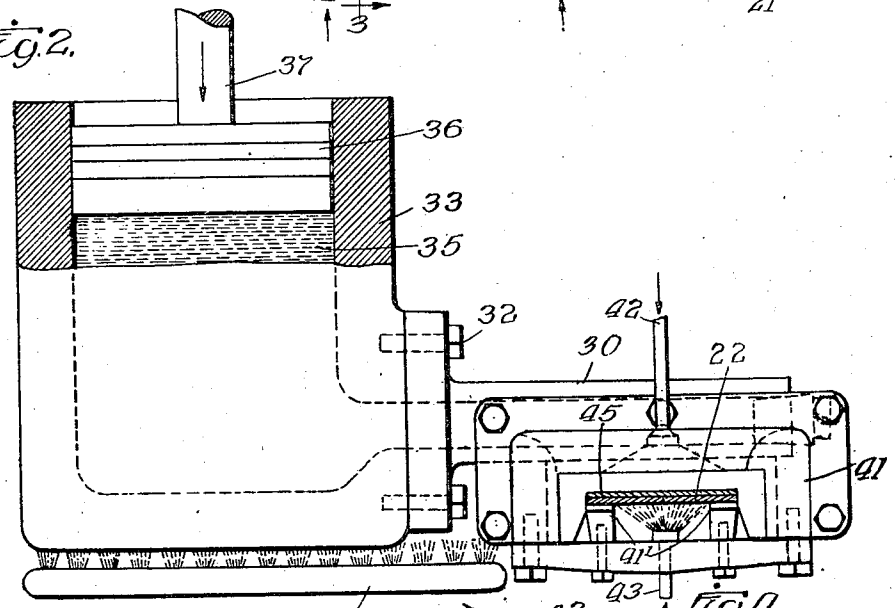


Fig. 3.

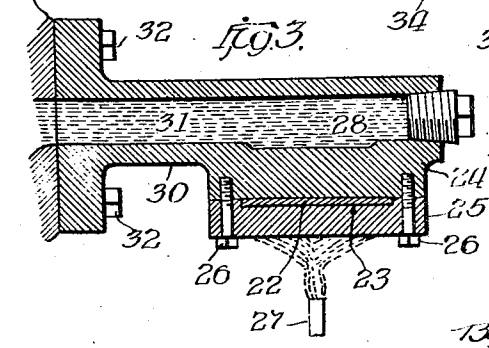
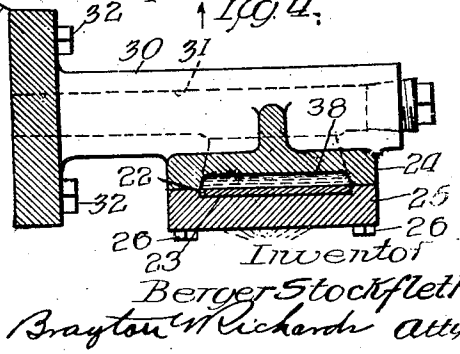


Fig. 4.



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APPARATUS FOR PRODUCING BIMETAL STRIPS

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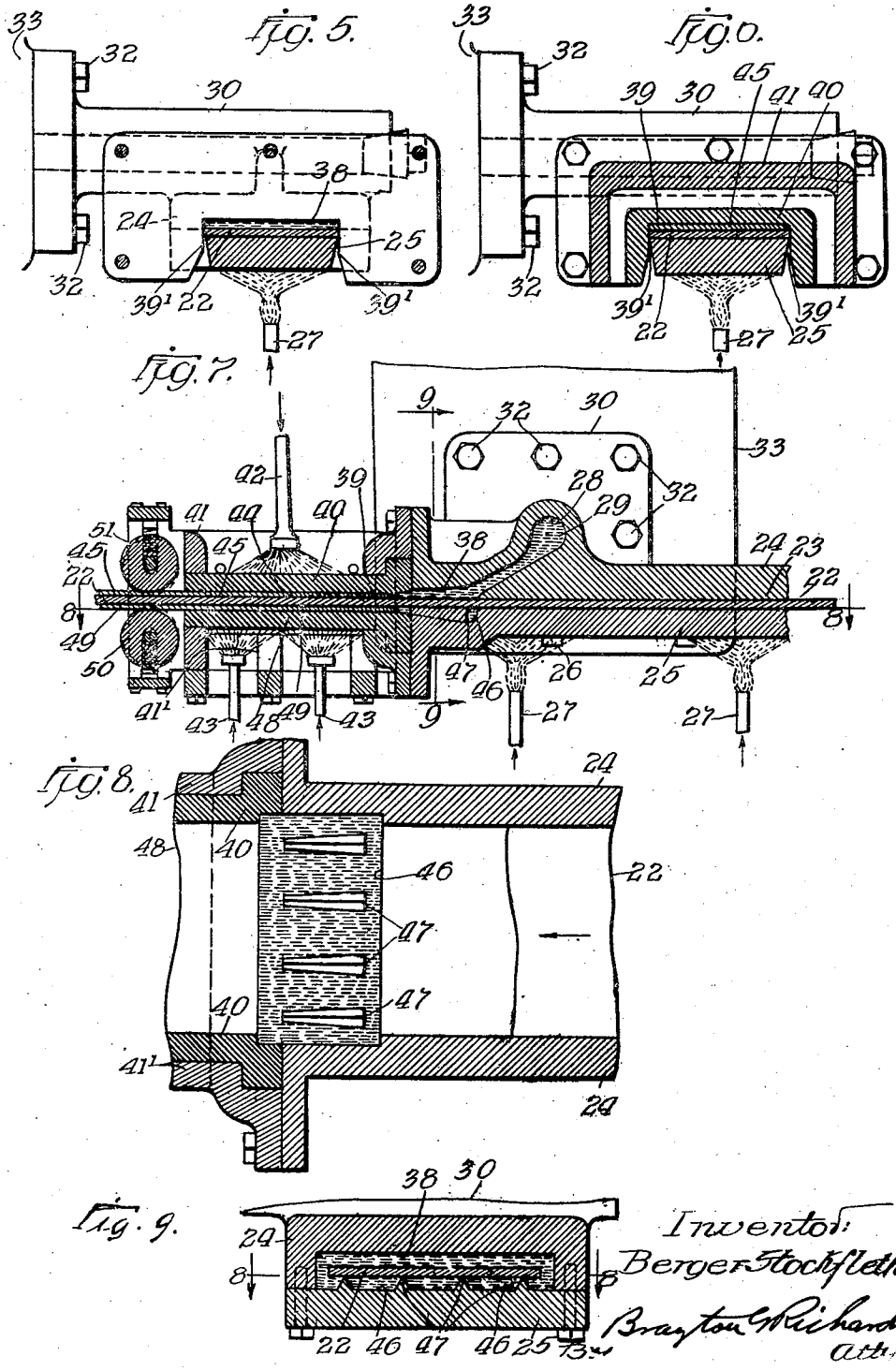

Patented Mar. 19, 1935 1,995,258

UNITED STATES PATENT OFFICE

1,995,258

APPARATUS FOR PRODUCING BIMETAL STRIPS

Berger Stockfieth, Niles, Mich., assignor to The Cleveland Graphite Bronze Company, Cleveland, Ohio, a corporation of Ohio

Application March 23, 1932, Serial No. 600,706

5 Claims. (Cl. 207—11)

The invention relates to an improved apparatus for producing bi-metal strips, and has for its primary object the provision of an improved apparatus of the character indicated for producing bi-metal strips in which the two metals are perfectly and uniformly united and bonded together.

Another object of the invention is the provision of an improved apparatus of the character indicated for producing such bi-metal strips rapidly and economically.

Another object of the invention is the provision of apparatus whereby two sides of a flat strip may be simultaneously coated with another metal, thereby forming a bi-metal strip having an interior portion of one metal and the opposed sides of a different metal.

Other objects will appear hereinafter.

The invention consists in the improved method of procedure and in the combinations and arrangements of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings forming a part of this specification and in which:

Fig. 1 is a partial, longitudinal section taken through apparatus embodying the invention;

Fig. 2, an end view of the same shown partially in section;

Fig. 3, a transverse section taken substantially on line 3—3 of Fig. 1;

Fig. 4, a transverse section taken substantially on line 4—4 of Fig. 1;

Fig. 5, a transverse section taken substantially on line 5—5 of Fig. 1;

Fig. 6, a transverse section taken substantially on line 6—6 of Fig. 1;

Fig. 7, a partial, longitudinal section similar to Fig. 1 but showing a modified form of apparatus by means of which both sides of a metal strip may be coated with a coating of another metal;

Fig. 8, a horizontal section taken substantially on line 8—8 of Fig. 7; and

Fig. 9, a transverse section taken substantially on line 9—9 of Fig. 7.

The embodiment of the invention illustrated in Figs. 1 to 6, inclusive, of the drawings, comprises two pairs of combined feed and guide rollers 20 arranged as indicated on opposite sides of guide blocks 21 whereby the strip 22 may be fed and guided into and through a passageway 23 arranged on the underside of a supporting body 24 closed on its underside by means of a bottom plate 25 removably secured to the bottom of the body 24 by means of bolts 26. Arranged under the plate 25 are suitable burners 27 by means of which the plate 25 and the body 24 will be heated to impart a suitable preliminary heating to the strip 22 for applying a metal coating thereto.

Arranged in the body 24 is a coating chamber or reservoir 28 adapted to contain a body or supply of molten metal 29 to be used for applying a coating to the strip 22, the lower portion of said chamber registering with the passageway 23, as shown. As best shown in Fig. 3, the body 24 is provided with a lateral extension 30 having a passageway 31 communicating with the coating chamber 28, said extension 30 being secured to one side of a melting pot 33 by bolts 32 as indicated, with the passageway 31 in open communication with the interior of said pot. A suitable burner 34 is arranged under the pot 33 and the extension 30 to maintain the same at a suitable temperature to maintain the body of molten metal 35 therein in a thoroughly liquid or molten state. The pressure piston 36 is arranged to operate in the upper portion of the pot 33 and is carried by a plunger or ram 37, whereby heavy pressure may be applied to the molten metal.

At its lower end the chamber 28 is provided with a forward extension 38 leading into a shallower cooling chamber 39 formed in the underside of a cooling plate 40 mounted in a supporting bracket 41 at the forward end of the body 24, as best shown in Fig. 1. I have found that the material known on the market as stellite constitutes a suitable material for the formation of the cooling chamber plate 40, although cast iron will also serve the purpose if the surfaces thereof are sufficiently smooth. Cooling sprays 42 and 43 are arranged to play upon the top of the plate 40 and on the underside of the strip 22 to cool said strip and its coating.

In carrying on the method and in utilizing the apparatus, the strip 22 is first treated on its upper surface at least so as to facilitate union or bonding of the metal in the vessel 28 therewith. In the apparatus illustrated, the coating of a strip of steel 22 is contemplated, and the application thereto of a coating of suitable bearing metal is also contemplated. To this end, of course, the molten metal provided in the pot 33 will be a suitable bearing metal, and the treatment of the upper surface of the strip 22 will be such as to facilitate the ready union or bonding of said bearing metal therewith.

As shown, the arrangement is such as to cause the strip 22 to traverse the lower portion 38 of the coating chamber 28 and then pass into the cooling chamber 39. Owing to the heavy pressure applied to the body 29 of molten metal within the coating chamber 28, the molten metal will be more or less compressed and applied to the upper surface of the strip 22 under pressure so as to effect a perfect and uniform union or bonding therewith. As the coating thus provided on the upper side of the strip 22 proceeds through the cooling chamber 39, it is gradually chilled, becoming more and more solidified and being compacted and compressed during such solidification by the heavy pressure applied

thereto. By the time the coating reaches a central point 44 of the cooling chamber 39, the same has become practically or substantially solidified so that from the point 44 forward, the coating 45 is a solidified coating which constitutes, in effect, an abutment or plunger resisting the escape of the molten metal and also serving to apply a longitudinal pull to the strip 22. The pressure applied to the molten metal should be sufficient not only to force the molten metal into intimate contact with the strip 22 but also sufficient to cause said coating to travel through the cooling chamber without any aid from the strip itself so that there is and can be no tendency to tear the metal coating loose from its union with the strip. For this purpose the pressure imparted to the molten metal should be sufficient to overcome all friction or other resistance to the travel of the bearing metal coating through the cooling chamber or guides. It is also to be noted that the pull thus exerted on the strip 22 will ease its movement through the apparatus and thereby ease the action of the feed and guide rollers 20 and also tend to overcome and prevent any tendency of the strip 22 to pucker. The heavy pressure used on the molten metal will compact the same as it is congealing or solidifying and thereby improve its texture and its bond with the strip 22. The preliminary heating of the strip 22 will also tend to render the union or bond more perfect.

As best illustrated in Fig. 6, crevices 39' are provided at the edges of the entry end of the cooling chamber 39 so that any of the coating metal which should happen to escape around the edges of the strip 22 will be free to escape completely from the cooling chamber and will thus be prevented from forcing itself under the bottom of the strip 22 and undesirably coating the bottom of said strip. As best shown in Figs. 1 and 4, reinforcing or supporting bars 41' are provided on the bracket 41 to support the edges of the strip 22 so as to render the same capable of resisting the heavy pressure applied to the upper side thereof.

In the modification illustrated in Figs. 7, 8 and 9, the coating chamber 28 is provided at its bottom with an extension 46 extending under and around the strip 22, and a plurality of V-shaped rests or supports 47 are arranged as shown in the chamber 46 to support the strip 22 centrally therein. The bottom of the cooling chamber 39 is closed by a plate 48 preferably of the same material as the plate 40 and arranged as shown to form a cooling chamber or passageway adjacent the underside of the strip 22.

In this instance, the strip 22 is first treated on both its upper and lower surfaces so as to facilitate union or bonding of the metal in the vessel 28 therewith.

By this arrangement a coating 49 will be applied on the underside of the strip 22 similar in all respects to the coating applied to the top thereof. In order to insure the positioning of the strip 22 centrally in the cooling chamber, combined spring-held guide and positioning rollers 50 and 51 are provided at the forward end of said cooling chamber, as shown. By this arrangement, it will be observed that a suitable bearing coating will also be applied to the underside of the strip 22.

While I have illustrated and described the preferred method and apparatus for carrying my invention into effect, these are capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details set forth but desire to avail myself of such variations and modifications as fall within the scope of the appended claims.

I claim:

1. Apparatus of the class described, comprising a reservoir for molten metal; means for maintaining the metal in said reservoir in molten condition; a cooling chamber adjacent to and in communication therewith; means for chilling said metal in said chamber to solidify it after it has passed partially therethrough; means for passing a base strip through said reservoir and chamber; and means for subjecting said molten metal to sufficient pressure to cause the coating on said strip to travel through the cooling chamber without material aid from said strip.

2. Apparatus of the class described, comprising a reservoir for molten metal; means for maintaining the metal in said reservoir in molten condition; a cooling chamber adjacent to and in communication with the bottom thereof and of sufficient length to cause solidification of the molten metal therein; means for passing a base strip through the bottom of said reservoir and chamber; and means for subjecting said molten metal to sufficient pressure to cause the coating on said strip to travel through the cooling chamber without material aid from said strip.

3. Apparatus of the class described, comprising a body containing a reservoir for molten metal and a passageway traversing said reservoir; means for maintaining the metal in said reservoir in molten condition; means for feeding a base strip through said passageway and said reservoir; a cooling chamber leading from said reservoir in registration with said passageway and of sufficient length to cause solidification of the molten metal therein; means for passing a base strip through said passageway, reservoir and cooling chamber; a melting pot in open communication with said reservoir; and means for subjecting the metal in said pot and reservoir to relatively heavy pressure.

4. Apparatus of the class described, comprising a reservoir for molten metal; means for maintaining the metal in said reservoir in molten condition; a cooling chamber adjacent to and in communication therewith; means for passing a base strip through said reservoir and the central portion of said chamber whereby a coating will be applied to opposite sides of said strip; and means for subjecting said molten metal to relatively heavy pressure.

5. Apparatus of the class described, comprising a reservoir for molten metal; a plurality of parallel spaced supports in the bottom of said reservoir; a cooling chamber adjacent to and in communication with the bottom of said reservoir; means for passing a base strip through said reservoir over said supports and centrally through said cooling chamber whereby a coating will be applied to opposite sides of said strip; and means for subjecting said molten metal to relatively heavy pressure.

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