

Aug. 12, 1958

C. W. STUDER

2,846,793

SMOOTHING IRON SOLEPLATE

Filed April 21, 1955

3 Sheets-Sheet 1

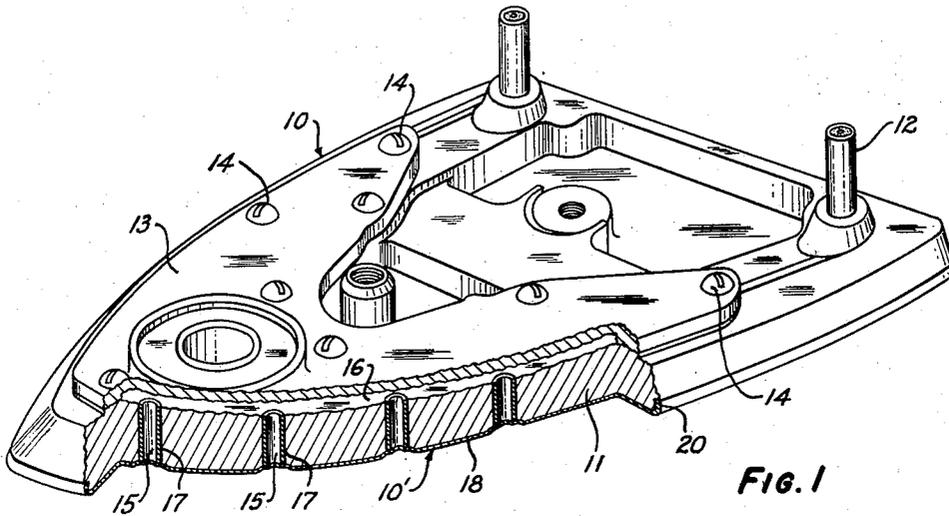


Fig. 1

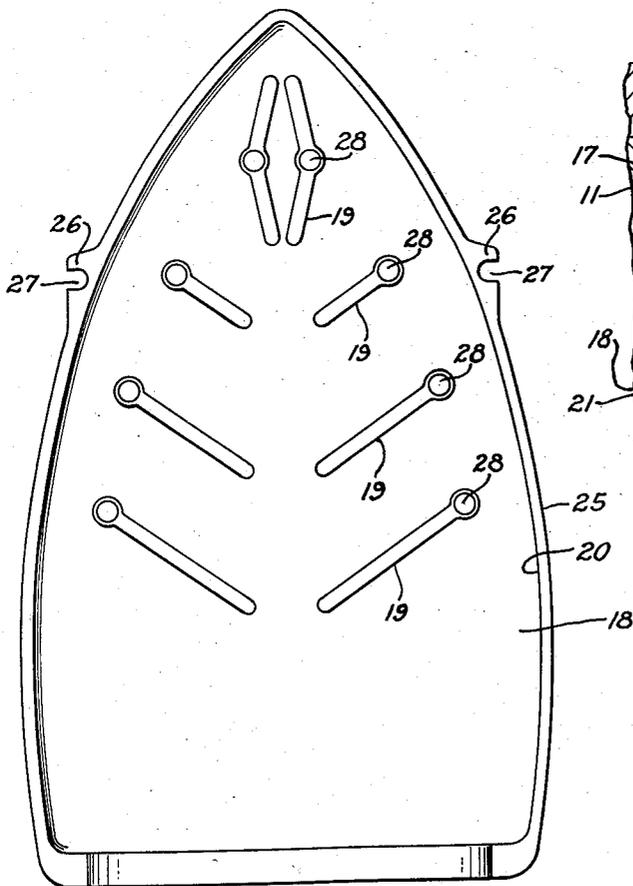


Fig. 3

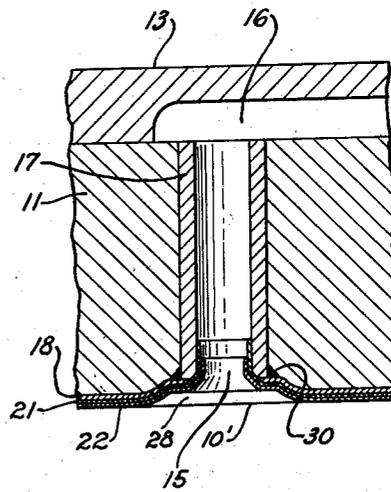


Fig. 2

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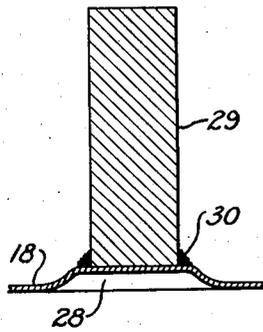


FIG. 4

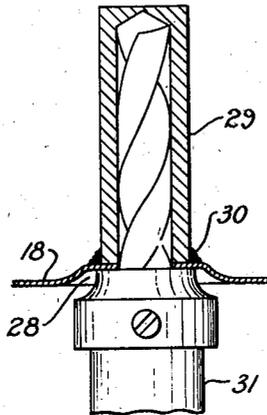


FIG. 5

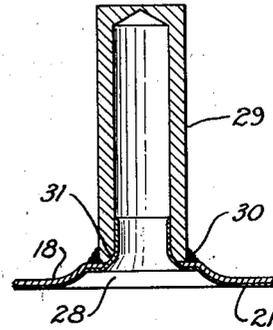


FIG. 6

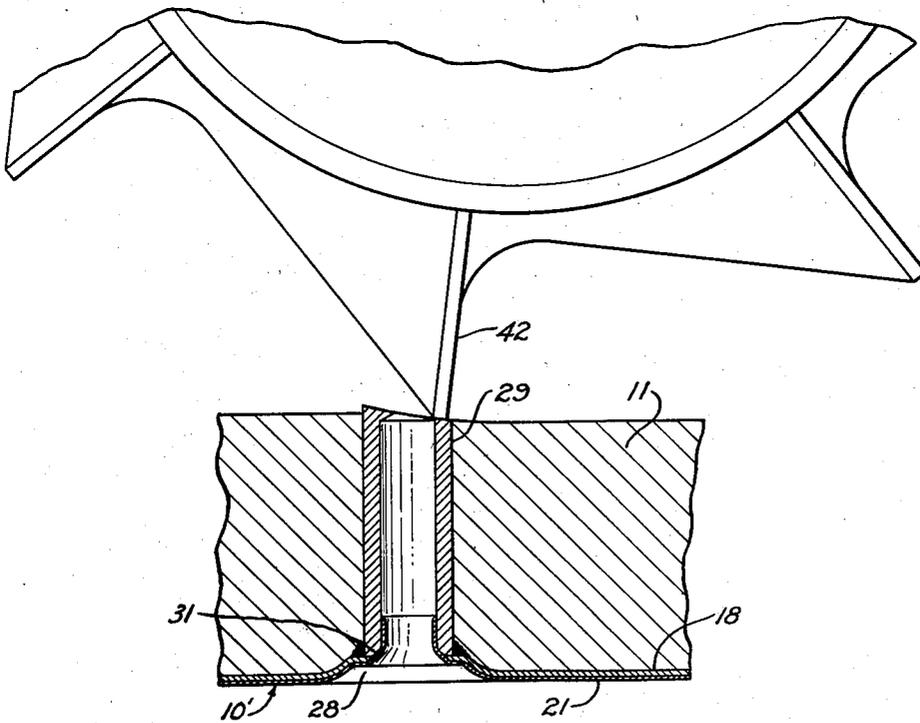


FIG. 8

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SMOOTHING IRON SOLEPLATE

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2 Claims. (Cl. 38—77)

The instant invention relates to the manufacture of soleplates for smoothing irons and more particularly to a novel composite soleplate for such irons and the process of manufacturing such soleplates.

Smoothing irons generally comprise an electrically heated soleplate formed with a smoothing surface, the soleplate including an embedded electrical heating element, usually of a rod type, for heating the smoothing surface. In smoothing irons of the steam generating type, the embedded heating element also serves to supply heat to a boiler for the generation of steam therein. It is customary in the art to form the body of the soleplate of a material having a high heat conductivity, such as aluminum or an aluminum containing metal, preferably a relatively hard aluminum copper alloy. An aluminum sole plate is very desirable because of the feature of high thermal conductivity as well as light weight, pleasing appearance and high corrosion resistance. Such sole plates may be polished to enhance the appearance thereof; however, the sole plates constructed of aluminum do not possess a high resistance to abrasion and are subject to scratching and discoloration so that after continued use, the smoothing surface of the sole plate will present an unpleasing appearance to user.

In accordance with the instant invention, the soleplate of the smoothing iron is formed of aluminum or an aluminum containing metal so as to retain the aforementioned desirable features of the aluminum in the soleplate, and an abrasion resistant shoe is applied to the underside of the aluminum soleplate for protecting the same. The shoe is bonded to the aluminum body by a bond having a high mechanical strength and high resistance to thermal shock. The abrasion resistant shoe applied to the body of the soleplate in turn has applied thereto a sheath of highly corrosion resistant material, which is chrome plated for appearance purposes. There is thus provided a composite smoothing surface on the underside of the soleplate, which surface includes the highly desirable features of high resistance to abrasion, a high resistance to corrosion and presents a pleasing appearance to the user, the smoothing surface so formed not being subject to marring or discoloration. The aluminum body of the soleplate meanwhile retains the features of a high thermal conductivity for most efficient heating of the smoothing surface.

More specifically, the novel sole plate of the instant invention comprises an aluminum body portion to which is bonded a shoe made of a hard carbon steel, the bond being such as to have a high mechanical strength and a high resistance to thermal shock. The steel shoe provides the smoothing surface with a high resistance to abrasion. The shoe in turn is plated with nickel or like material having a high resistance to corrosion, forming a sheath over the shoe for protecting the same against corrosion. The sheath in turn is plated with chrome in order to present a pleasing appearance. It will be apparent that the invention is equally applicable to the for-

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mation of the smoothing surface of irons of the dry or steam generating type.

It is, accordingly, the prime object of the instant invention to provide a novel sole plate structure for smoothing irons, of a composite construction in which the smoothing surface has a high resistance to abrasion, a high resistance to corrosion and a pleasing appearance.

It is a further object of the instant invention to provide a novel sole plate for smoothing irons having a composite construction, in which there is provided a light weight soleplate body having a high thermal conductivity and a smoothing surface comprising a shoe of steel having a high abrasion resistance, and a sheath of nickel having a high resistance to corrosion applied to the shoe, said sheath being chrome plated to give the soleplate a pleasing appearance.

It is also an object of the instant invention to provide a novel method for constructing sole plates for smoothing irons in which the soleplate is of a composite construction, and the smoothing surface thereof has a high abrasion resistance, a high resistance to corrosion and presents a pleasing appearance to the user.

While the invention has been generally described, it will be best understood by those skilled in the art from a consideration of the detailed description of a preferred embodiment of the invention which follows, reference being had to the drawings in which:

Figure 1 is a perspective view, partly in section, of a smoothing iron soleplate constructed in accordance with the instant invention,

Figure 2 is a sectional view of the soleplate illustrated in Fig. 1 showing certain details of construction,

Figure 3 shows the blanked shoe for the novel soleplate of the instant invention,

Figures 4, 5 and 6 show successive steps in the manufacture of the novel soleplate prior to bonding the soleplate body portion to the shoe,

Figure 7 is a sectional view of a casting die in which the body portion of the sole plate is bonded to the shoe, and

Figure 8 illustrates a finishing step in the manufacture of the novel soleplate.

The instant invention is described herein as applied to a soleplate for a smoothing iron of the steam generating type. However, it will be apparent to those skilled in the art that the invention may be utilized to equal advantage in the construction of sole plates for dry irons as well as those of the steam generating type.

Referring to Fig. 1, there is illustrated a soleplate 10 for a smoothing iron of the steam generating type which is constructed in accordance with the instant invention. The soleplate 10 includes a body portion 11 preferably formed of aluminum or aluminum containing metal cast to the desired configuration. The body portion 11 so formed possesses a high thermal conductivity and is light in weight. An electrical heating element 12 of the rod form is embedded within the body portion 11 and has a configuration generally paralleling the profile of the soleplate. A cover 13 overlies a substantial portion of the body 11 and is secured thereto by bolts 14, or the like. The cover 13 cooperates with the body portion 11 to form a steam generating chamber and steam conducting passages for leading the steam to the steam discharge ports 15 which open to the smoothing surface 10' of the iron.

The steam discharge ports 15 are located in two rows of four each, the rows of steam discharge ports 15 being arranged on opposite sides of the soleplate 10 paralleling the edges thereof. A steam conducting passage 16, one on each side of the soleplate 10 paralleling opposite edges of the soleplate 10, overlies the steam discharge ports 15 for directing the steam thereto. The soleplate structure as thus far described is exemplary of known forms of

soleplate structures designed for use in smoothing irons of the steam generating type. It will be understood by those skilled in the art that the aforesaid features of the soleplate are subject to wide modification without departing from the scope of the invention as hereinafter described.

In accordance with the instant invention, the steam discharge ports 15 are formed by tubular inserts 17 embedded within the body portion 11 of the soleplate 10. The tubular inserts 17 extend through the body portion 11 and are formed of a corrosion resistant material such as brass. A shoe 18 made of a material having a high resistance to abrasion is bonded to the body portion 11 and to the ends of the tubular inserts 17. Carbon steel is particularly suitable for the formation of the shoe 18, and in accordance with the invention, is joined to the body portion 11 and the inserts 17 by a suitable bond high mechanical strength and a high resistance to thermal shock. The shoe 18 is formed with recessed channels 19, best illustrated in Fig. 3, which lead from the steam ports 15 to distribute the steam over the article to which the smoothing surface 10' of the soleplate 10 is applied.

The shoe 18 underlies the body portion 11 and forms an abrasion resistant smoothing surface for the soleplate. The shoe 18 includes a peripheral upstanding flange 20, which is also bonded to the body portion 11 and provides protection for the edges of the soleplate 10.

In order to protect the shoe 18 against corrosion, a sheath 21 of corrosion resistant material, such as nickel, is applied to the smoothing surface 10' formed by the shoe 18. The sheath 21 extends upwardly a short distance into the steam discharge ports 15 so as to cover the junction of the shoe 18 with the tubular insert 17, and to provide corrosion protection at this point also. The corrosion resistant sheath 21 is plated with chrome 22 to present a pleasing appearance to the user. The smoothing surface so formed will have the desirable features of high corrosion resistance, high resistance to abrasion and will have a bright non-tarnishing surface that can be maintained in satisfactory condition for the life of the smoothing iron.

The novel method of manufacturing the soleplate of the instant invention will now be described. Referring to Fig. 3, there is illustrated a shoe 18 which is formed by a die cutting and drawing or stamping operation to the illustrated configuration, having a profile generally similar to that of the finished soleplate. The blanked shoe 18 includes a peripheral upstanding flange 20 terminating in a laterally extending flange 25, which is formed with a pair of projecting ears 26 having slots 27 for a purpose to be described hereinafter. The blank 18 is stamped with a plurality of dimples 28 to locate the steam discharge ports in the finished soleplate 10. The dimples 28 are arranged in two rows of four each, the rows being arranged to substantially parallel the opposite edges of the soleplate, in accordance with the distribution of the steam ports 15 as previously described. Recessed channels 19 for distributing the steam under the smoothing surface of the soleplate 10 are also formed in the blanked shoe 18 by the stamping operation, and extend from the dimples 28.

The blank shoe 18 is then placed on a fixture or support of any suitable form and a plurality of inserts in the form of solid cylindrical plugs 29, made of brass or like non-corrosive material, are placed on the shoe 18, one in alignment with each of the dimples 28. The cylindrical plugs 29 are then bonded to the blanked shoe 18 by welding or brazing 30. The length of the plugs 29 is such that they will project slightly above the upper surface of the body portion 11 when the latter is in its unfinished state after it is cast onto the shoe 18, as will be described in greater detail hereinafter.

The shoe 18 with the plugs 29 bonded thereto is removed from the aforementioned fixture and secured in a second fixture of a suitable form which is adapted

to hold the plugs 29 with the underside of the shoe 18 exposed. A drill 31 is then applied to each of the plugs 29 drilling through the blanked shoe 18 and into the plugs 29 for giving the latter a hollow cylindrical configuration. It will be seen in Fig. 5 that the plugs 29 are not drilled through to the ends thereof, but rather the ends remain closed and the plugs 29 are drilled through only to a length approximately equal to or slightly in excess of the finished length of the tubular insert 17 illustrated in Fig. 1 and 2. A bevelled edge 31 is formed at the junction of the plugs 29 and the blanked shoe 18 to avoid a sharp bend at this point for the purpose of facilitating the next step in the formation of the novel soleplate.

A sheath 21 of corrosion resistant material, such as nickel, is now applied to the underside of the shoe 18. The sheath 21 is bonded to the shoe 18 and is most conveniently applied by a conventional plating operation. A sufficient amount of the plated material is deposited as to cover a short length of the inner surface of the plug 29, so that the sheath 21 will extend over the junction of the shoe 18 and the plug 29. The bevelled edge 31 facilitates the plating operation on the junction of the shoe 18 and the plug 29.

The blanked shoe 18 with the sheath 21 and the bonded plugs 29 is then placed in a suitable mold, illustrated in Fig. 7, for die casting of the sole plate body portion 11 onto the shoe 18. Such mold may comprise mating mold parts 32, 33. The mold parts 32, 33 are guided into juxtaposed relation by a pair of aligning pins 34 to form an internal mold cavity 35 for the formation of the body portion 11. The mold parts 32, 33 are initially separated for placement therein of the shoe 18. The one mold part 32 is formed with a plurality of recesses 36 which are aligned with the plugs 29 on the shoe 18 to receive the closed ends of the plugs 29 for holding and positioning the shoe 18 within the mold cavity. The mold part 32 also includes a pair of locating pins 37, one on each side of the mold cavity 35 which pins are adapted to be received within the slots 27 formed in the ears 26 projecting from the shoe 18. The pins 37 operate to align the shoe 18 for placement of the plugs 29 within the recesses 36. When the shoe 18 has been positioned on the mold part 32 as above described, the mold part 33 is closed thereon, and the mold maintained in a sealed condition. The face of the mold part 33 is formed with a surface contour which is complementary to that of the shoe 18 to provide a backing therefor during the casting operation. The molten metal is forced into the die cavity 35 by a plunger 38 applying pressure to the molten metal and feeding it through the passageway 39. The molten metal 40 flows through the passage 39 and into the die cavity 35 to fill the latter, the pressure of the metal forcing the shoe 18 against the face of the mold part 33. The molten metal bonds with the shoe 18 to produce the composite soleplate structure. The bond between the shoe 18 and the soleplate body portion 11 may be achieved by the methods known to the art or in the manner described in copending application Ser. No. 395,782 filed on December 2, 1953, and assigned to the assignee of the instant invention.

It will be understood that the mold parts 32, 33 include means for securing a preformed heating element 12 of the rod type within the molding cavity 35 so that the heating element will be embedded within the body portion 11 of the soleplate 10 during the casting operation. This is a conventional procedure in the art, and accordingly, it is not deemed necessary to illustrate the same in the drawings. In the sectional view of the die casting mold illustrated in Fig. 7, the cast body portion 11 has been shown in section, with the section line passing through four of the plugs 29 on one side of the body portion 11 for the purpose of providing the best illustration.

The cast body portion 11 and the bonded shoe 18,

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when removed from the casting dies 32, 33, includes flash 41 which may be removed by grinding, or a like operation. Simultaneously, with the removal of the flash 41, the laterally extending flange 25 is removed, leaving the soleplate 10 in a semi-finished condition with the up-standing rim flange 20 covering the edge of the body portion 11. The partially finished soleplate is then placed on a suitable fixture of a conventional form and a milling cutter 42 passed over the upper surface of the body portion 11. The milling cutter 42 reduces the upper surface of the body portion 11 to a flat, substantially smooth surface for the application thereto of the cover plate 13 to form a water tight seal between the cover plate 13 and the body portion 11 for the purpose of defining the steam passages therebetween. During the operation of milling the top surface of the body portion, the closed ends of the inserts 29 are also removed, thereby opening the ends thereof and forming the tubular insert 17 as illustrated in Figs. 1 and 2.

The next step in the formation of the novel soleplate is to polish and buff the corrosion resistant sheath 21. A flash chrome plate 22 is then applied to the sheath 21 in a known manner for the purpose of enhancing the appearance of the smoothing surface 10' of the soleplate 10. The chrome plated surface may be maintained in a highly polished condition for the life of the iron.

The instant invention in a novel soleplate for smoothing irons, and the process of manufacturing that soleplate has been described herein as embodied in a preferred construction. It will be understood by those skilled in the art that the described embodiment is subject to modifications falling within the spirit of the invention, and

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accordingly, it is not intended that the scope of the invention be limited except as set forth in the claims which follow.

I claim:

1. A composite soleplate for smoothing irons comprising a body portion of aluminum having a high heat conductivity, tubular inserts embedded in the body portion extending between the underside of the body portion and the opposite face thereof forming steam passages for the delivery of steam to the smoothing surface of the soleplate, a highly abrasion resistant steel shoe bonded to the underside of the body portion and the contiguous end portions of the inserts, a non-corrosive sheath of nickel covering the shoe and extending into the inserts to cover the junction of the shoe and the inserts.

2. A composite soleplate for smoothing irons as recited in claim 1 in which the tubular inserts are formed of brass and are brazed to the shoe, steam passages formed in the smoothing surface of the soleplate comprising recesses in the shoe leading from the tubular inserts, and a heating element embedded in the body portion for heating the soleplate and generating steam.

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