March 8, 1949. L. S. LONGENECKER 2,463,633

SAND SEAL SHOE

Filed Feb. 13, 1943 3 Sheets-Sheet 1

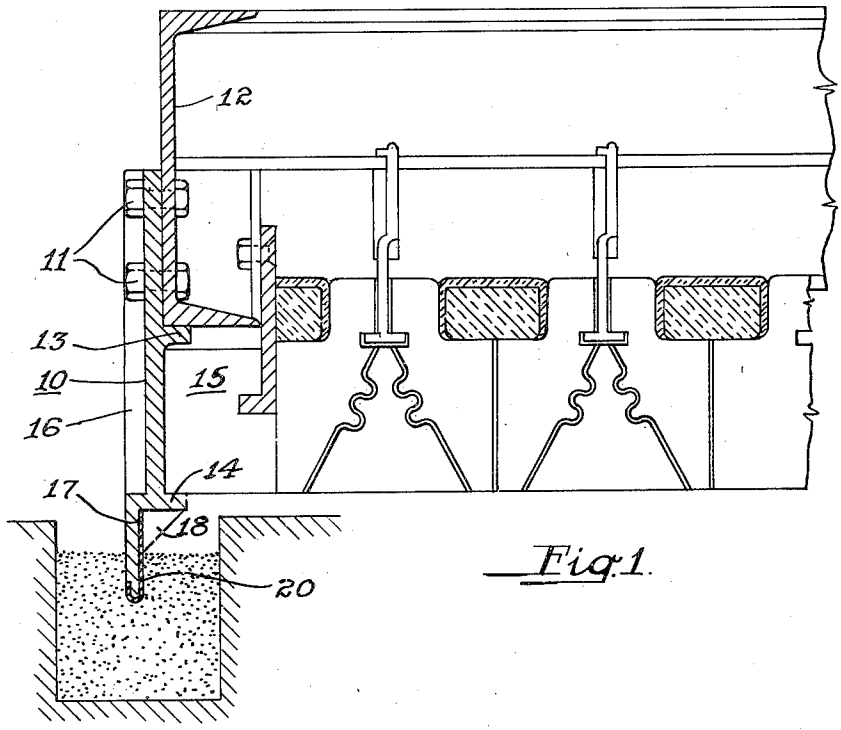


Fig. 1.

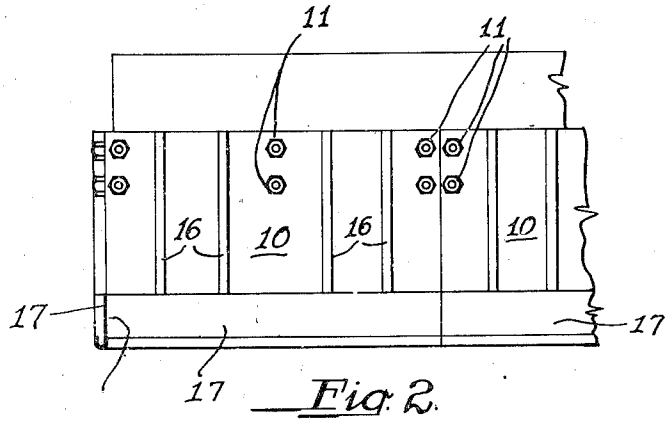


Fig. 2.

INVENTOR

Levi S. Longenecker

By Green & McCallister

His Attorneys

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SAND SEAL SHOE

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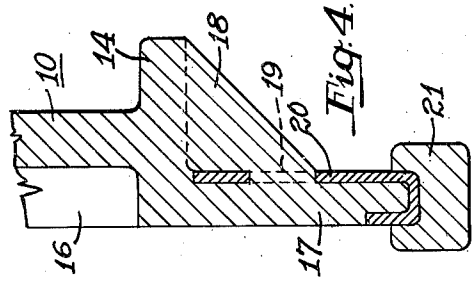


Fig. 4.

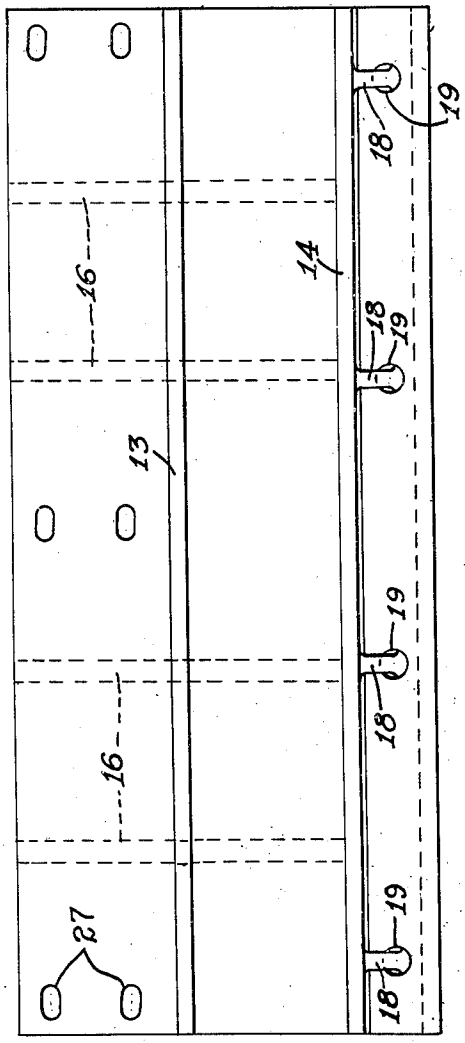


Fig. 3.

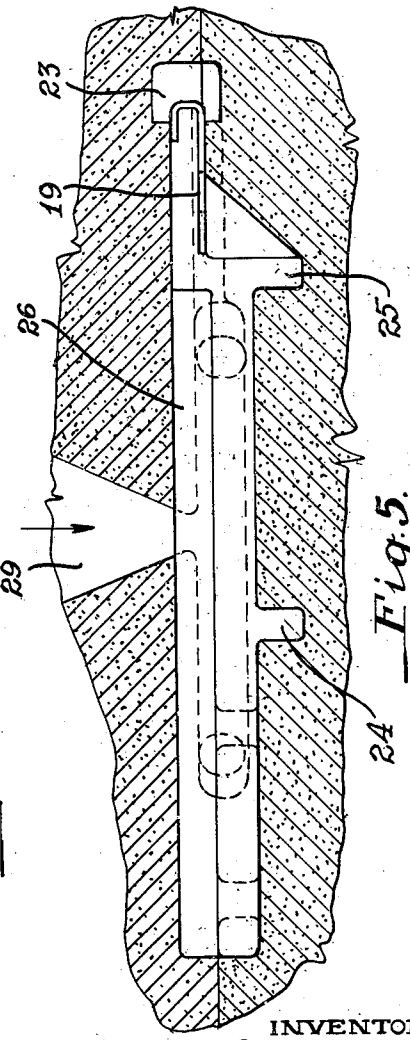


Fig. 5.

INVENTOR
Levi S. Longenecker
By Green & McCallister
His Attorneys

March 8, 1949. L. S. LONGENECKER 2,463,633

SAND SEAL SHOE

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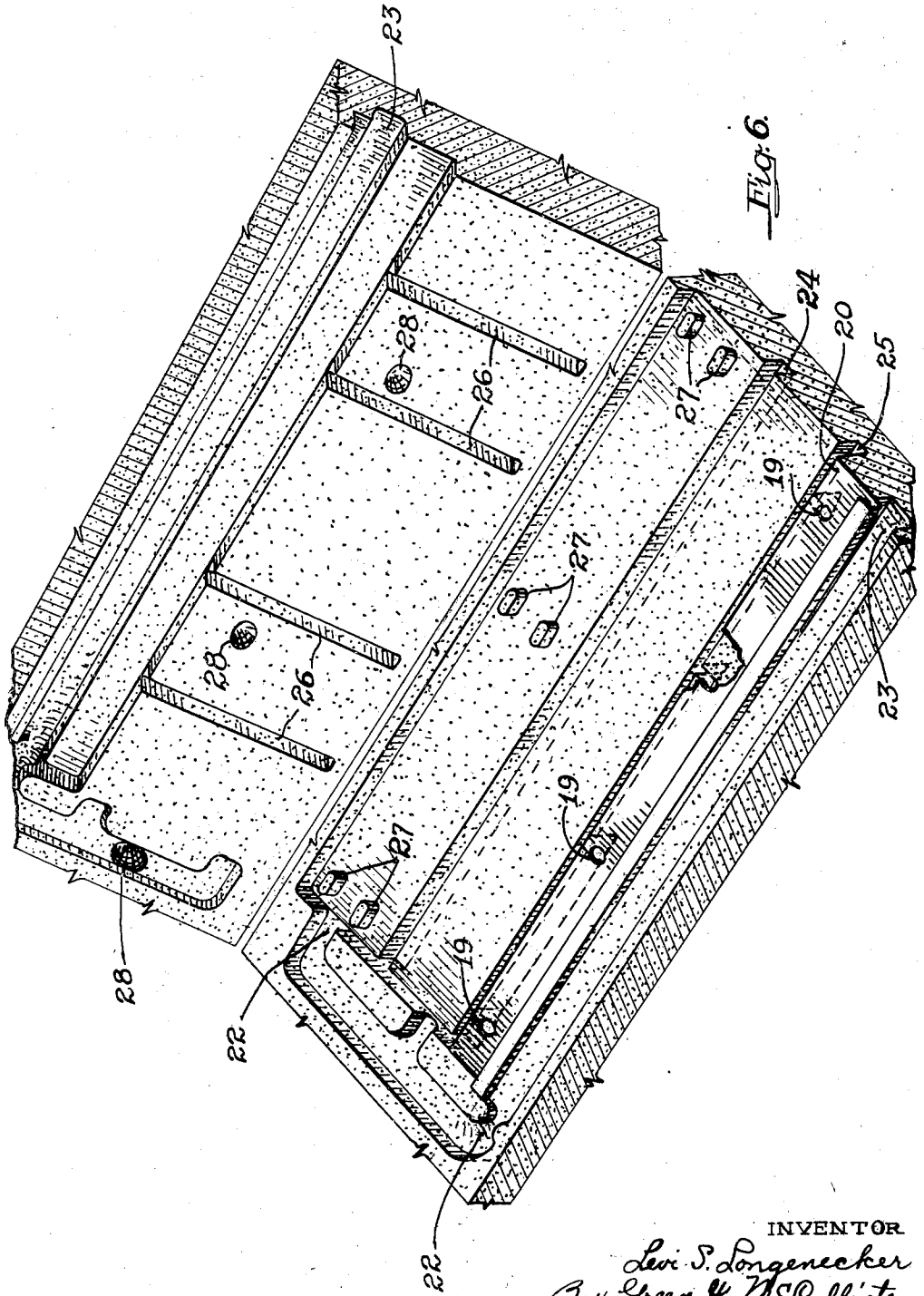


Fig. 6.

INVENTOR
Levi S. Longenecker
By Green & McCallister
His Attorneys

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UNITED STATES PATENT OFFICE

2,463,633

SAND SEAL SHOE

Levi S. Longenecker, Mount Lebanon, Pa.

Application February 13, 1943, Serial No. 475,730

4 Claims. (Cl. 263—1)

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This invention relates to sand seal shoes for use in the make-up of soaking pit covers and other devices or apparatus where sand seals are used and to a method of making such shoes and other articles which are cast from ferrous metal and will be benefitted by a protective sheath or shield of heat resistant alloy material for a portion thereof.

Soaking pit covers and the covers of other apparatus in which sand seals are used are sometimes provided with a blade-like surrounding flange which depends or extends downwardly from the cover for co-operation with a body of sand which in some instances is located within a channel or depression which surrounds the space to be sealed.

In the case of soaking pits, this channel or groove usually surrounds the mouth of the soaking pit so that this blade-like flange, when the cover is lowered into place, is forced into the body of sand, and with the same forms a seal.

In Patent 2,178,668 issued to me on November 17, 1939, I disclose a soaking pit cover having such a depending blade-like flange which is adapted to cooperate with a body of sand located within a channel which surrounds the soaking pit mouth.

In said patent, this flange is formed in segments arranged in side-by-side abutting relation to form a complete blade-like flange which depends from all sides of the soaking pit cover. As shown in said patent, each segment of this blade-like flange is the extreme lower portion of a sand seal shoe. These shoes are bolted to the outer surrounding channel or structural metal member of the cover frame, and not only provide the depending blade-like flange, but they assist in supporting the outer rows of refractories of the cover below which said flange projects a sufficient distance to form an effective sand seal flange element.

It will be understood that most soaking pit covers are carried to and from mouth registering position by some means such as a traveling crane or a truck, and are raised to a position above the top of the soaking pit before being moved from position over the soaking pit mouth or charging opening. Raising and lowering of the cover, as will be apparent, subjects the blade-like flange to the abrasive action of the sand. This abrasive action is particularly serious, since this flange, or at least the inner surface thereof, is subjected to the intense heat and hot gases within the soaking pit. The lower edge portion of the flange is also subjected to the intense

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heat and hot gases as the cover is moved to and from position.

Under the conditions encountered, oxidation of the surfaces of the sealing flange is fairly rapid with the result that they are thus placed in condition to be readily worn away by abrasion as the flange is driven into and pulled out of the sealing sand during removal and replacement of the soaking pit cover.

This invention has as one of its objects to so improve the blade-like portions of sand seal shoes that oxidation thereof is practically eliminated, whereby abrasion by the sealing sand is reduced to a minimum.

Another object is to produce a sand seal shoe having a blade-like flange which is so sheathed with sheet-like heat resistant alloy material that its effective life is greatly increased over the usual life of malleable iron shoes of the same design and used for the same purpose under the same conditions.

A still further object is to produce a sand seal shoe having a blade-like sand contact portion which has part of the inner side, its lower edge and a part of its outer side formed of sheet-like heat resistant alloy.

Another object is to produce a malleable iron sand seal shoe having a blade-like portion adapted to co-operate with sand in forming a seal and which is sheathed, at least in part, by a sheet-like member formed from heat resisting alloy which is tightly secured thereto during the casting procedure of making a shoe.

These and other objects which will be apparent to those skilled in the art to which this invention relates, I attain by means of the sand seal shoe described in the specification, illustrated in the drawings accompanying and forming part of this application and set forth in the claims.

In the drawings:

Figure 1 is a sectional view of one corner of a soaking pit cover such as disclosed in my said Patent 2,178,668 with part of the blade-like portion of the sand seal shoe provided with a sheath or protective covering of sheet-like heat resisting alloy material attached thereto in accordance with this invention;

Fig. 2 is an elevational view looking toward the right of Fig. 1 with the cover of Fig. 1 raised above the soaking pit. This view shows the outer face of one complete sand seal shoe, a portion of the next adjacent shoe and an edge view of part of the adjacent shoe at the adjacent corner of the soaking pit cover.

Fig. 3 is an elevational view looking toward the back face of one of the shoes of Fig. 2;

Fig. 4 is a fragmentary enlarged view in transverse section of the shoe casting with the sheath of heat resisting metal anchored in place on the blade-like portion of the casting and just after the casting has been removed from the mold.

Fig. 5 is a more or less schematic view in transverse section of a mold within which the shoe of this invention may be cast. In this view, the sheath or protective member formed from heat resisting alloy is shown in position in the mold cavity; and

Fig. 6 is a fragmentary perspective view illustrating a major portion of the mold of Fig. 5 and within which the shoe of this invention may be cast. In this view the member made from heat resisting alloy material and which is to form the protective sheath for the blade-like portion of the casting is shown in place on the drag portion of the mold.

For the purpose of showing the application of the present invention to the sand seal shoes of a soaking pit cover, I have more or less accurately copied Figures 4 and 5 of the drawings of my said patent and they appear here as Figs. 1 and 2 of the drawings of this application. I have applied the protective sheath of this invention to the depending blade-like portion of each such shoe.

The sand seal shoes **10** are bolted, as shown at **11**, to the surrounding channel **12** of the soaking pit cover. Each shoe is provided with inwardly projecting horizontal flanges **13** and **14**. Flange **13** contacts with the lower face of channel **12** of the frame, while flange **14** forms a supporting ledge for the outer row of refractory blocks **15**. Each shoe (when in place) on its outer side is provided with a series (in this case four) of vertically extending stiffening ribs **16** and in line with ribs **16**, each shoe is provided with a downwardly extending blade-like flange **17**. A series (in this case four) of gusset-like members **18** connects flange **14** with the depending blade **17**.

In order to prevent oxidation of the inner face, the lower edge and the lower part of the outer face of the depending blade-like portion **17** of each sand seal shoe, I form such inner face, the lower edge and the lower part of the outer face of heat resisting alloy. In order to accomplish this, I make a sheath, preferably from one of the high chromium high nickel ferrous alloys, and so place this sheath within the mold in which the shoe casting is to be made, that the sheath becomes part of the blade-like flange **17**.

The sheath for each shoe is made from a sheet-like strip of such heat resisting alloy, and has a length equalling the width of the shoe and a width sufficient to cover the inner face of blade-like portion **17**, the lower edge of such portion and part of the outer face thereof.

This piece of sheet-like material is bent along one long edge as clearly shown in Fig. 4, so that the piece assumes a substantially J shape in transverse section. The long leg of the J section is provided with four holes **19** which are so located that the metal which forms members **18** flows therethrough. The sheath is so placed in the mold cavity that when the shoe is cast, molten metal flows into the bend of the sheath and through openings **19**, whereby when the shoe is finished and is ready for use, it is sheathed with heat resistant alloy material as disclosed at **20** in Figs. 1, 2, and 4, where the sheath forms the

inner face, the lower edge, and part of the outer face of blade-like flange **17**.

The protective sheath is securely anchored in place by gussets **18** and the cast metal lying within openings **19** which connects the gussets to the cast portion of blade-like member **17**.

I have found that the lower or U part of the J-shaped strip, and particularly the straight lower edge of such part, tends to pull away from the lower edge of the cast metal portion of blade-like part **17**, probably during cooling. In order to prevent this pulling away, and to make sure that the lower edge of the composite blade-like portion **17** is substantially straight from end to end, I cast a chunk of metal **21** which contacts with the lower edge of the J-shaped piece, extends partway up the inner and outer faces thereof and from end to end thereof. This chunk of metal **21** does not contact with the cast portion of the shoe except by the metal within the gates **22**, leading to the cavity **23** within which the metal chunk **21** is cast. Cavity **23** is partly in the drag and partly in the cope.

After the casting is finished and has cooled sufficiently the metal within the gates is broken from the main casting and the metal chunk **21** drops away from position in contact with the U portion of the sheath.

It will be apparent that horizontal ribs **13** and **14** are formed within portions **24** and **25** respectively of the mold cavity; that vertical ribs **16** are formed within portions **26** of the mold cavity and that the holes or openings for bolts **11** are formed by core prints **27**.

Holes **28** represent the lower openings of the sprues, such as sprue **29**.

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

1. A sand seal shoe element comprising a ferrous metal body which at its lower end has as a unitary part thereof a blade-like portion provided bracing members and a protective sheath which covers part of the inner and outer faces of such blade-like portion; such protective sheath being formed of rolled sheet-like heat resisting alloy having openings therein in line with said bracing members and through which portions of such members extend; said sheath being united to said blade-like portion during casting of the shoe element.

2. A sand seal shoe comprising a unitary casting consisting of a body portion, a blade-like portion and bracing members which extend from the body to the blade-like portion; and a sheath-like member of rolled sheet-like heat resisting alloy covering part at least of the inner and outer faces of the blade-like portion and having openings therein through which such bracing members extend.

3. A sand seal shoe comprising a unitary ferrous metal casting consisting of a body portion, a blade portion, gusset-like braces extending from the body portion to the blade portion, and a protective sheath for the blade portion; such sheath being formed of heat resisting alloy rolled to sheet-like form, bent upon itself to provide a sheath of J-section and having spaced holes formed in its long leg; such sheath being secured in place by having the blade portion cast thereto with portions at least of said braces extending through said holes.

4. A sand seal shoe comprising a unitary ferrous metal cast member consisting of a body

portion, a blade-like portion and braces connecting said body and blade-like portions, and a protective sheath which covers the lower edge and part of the inner and outer faces of the blade-like portion and is secured in position thereon by so casting such blade-like portion in contact with such sheath that metal forming said blade-like portion flows into the bend of the sheath, and metal forming said braces flows through openings in such sheath.

LEVI S. LONGENECKER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,043,809	Dickinson	Nov. 12, 1912
2,088,594	Harris	Aug. 3, 1937
2,105,838	McCormick	Jan. 18, 1938
2,178,668	Longenecker	Nov. 7, 1939
2,219,951	Dunn	Oct. 29, 1940

OTHER REFERENCES

Chemiker-Zeitung, 47, July 7, 1923, page 581, Dr. Pfanhauser.

Pages 220 and 221 of Trink's "Industrial Furnaces," vol. II, 2nd Edition, published by John Wiley & Sons, Inc., New York, N. Y., copyright 1925 and 1942.