I. R. SMITH.

FOUNDRY FLASK.

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**1,043,977.**

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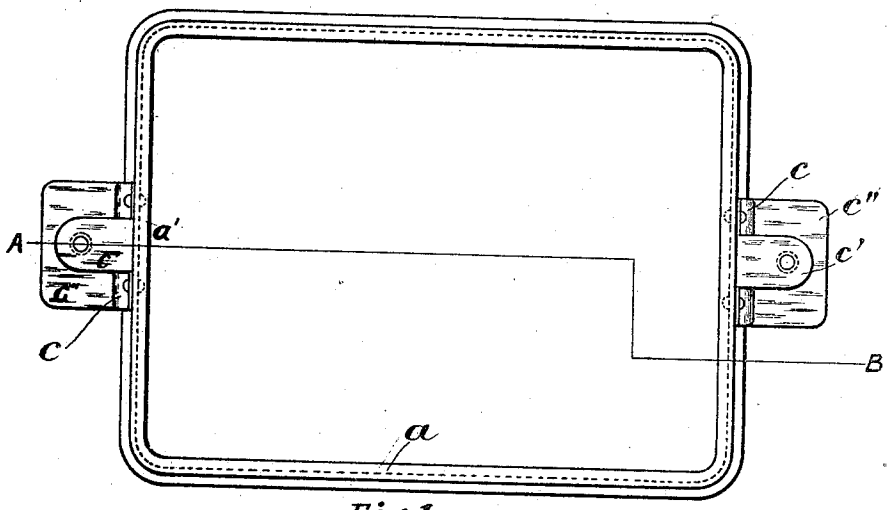


Fig. 1.

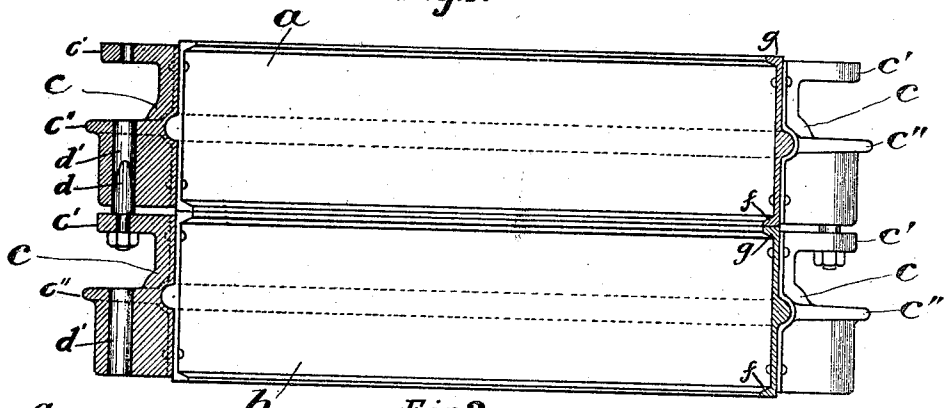


Fig. 2.

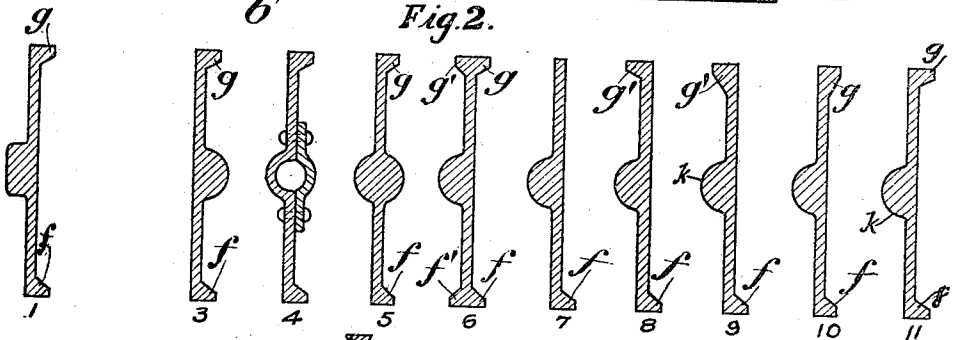


Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## FOUNDRY-FLASK.

1,043,977. Specification of Letters Patent. Patented Nov. 12, 1912.

Application filed October 26, 1908. Serial No. 459,446.

*To all whom it may concern:*

Be it known that I, IRVING R. SMITH, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Foundry-Flasks, of which the following is a specification.

My invention relates to improvements in foundry flasks, and the object of my invention is to provide a foundry flask of metal so that it will be incombustible, have it stiff enough so that it will not spring or weave when in use, as such action would, or might destroy the mold; make it of mild steel or wrought iron so it will not be broken in the rough use of the foundry, and lastly to make the flask as light as possible in view of the other requirements, so that the flask while loaded with moist sand, may be handled by the molder with comparative ease. These objects I accomplish by the structure shown in the accompanying drawing which forms a part of this specification, and in which—

Figure 1 shows a plan view of a foundry flask embodying mv invention. Fig. 2 shows a vertical section of a two part foundry flask taken on the broken line A B of Fig. 1. Fig. 3 shows eleven examples of the form which the rolled section may take, form 11 being the preferred one.

Those acquainted with the iron and brass molder's art, will readily concede that a foundry flask should be made of metal. Flasks of cast iron light enough to obviate unnecessarily fatiguing the molder, would be easily broken in the rough usage of the foundry. I have tried making flasks out of sheet metal and have found such flasks lacking in strength, and particularly are they incapable of resisting torsional strains. The difficulty is not obviated by using heavier sheet metal, as comparatively heavy metal that is flanged, has grooves or ribs rolled therein, and is bent cold, is predisposed to twisting, to say nothing of the prohibitive cost of the work, as those skilled in the art will readily concede. I have, therefore, conceived the idea of making foundry flasks of strips of metal rolled of the requisite section for strength and lightness. As this metal will be rolled hot, there will be no initial twisting strains set up therein, and when metal of this rolled section is on hand, a flask can be made by merely cutting off the requisite length, making the four right angle bends shown in Fig. 1, punching eight rivet holes, and riveting on the two guide pin lugs.

It will be understood, of course, that the strip of rolled metal may be bent into a circular form for a circular flask, or may be given other forms where certain articles are to be manufactured in large numbers.

In Fig. 2 are shown a cope *a* and a drag *b* of a two part flask. The ends of the strip of metal are shown at *a'a'* Fig. 1. The guide pin lug *c* is composed of the lug *c'* in which the guide pin *d* is attached. The flange *c''* serves as a handle or finger hold for lifting the flask, and the hole *d'* is made to fit the guide pin *d*.

The essential feature of my invention, however, resides in the rolled section of which the flask is made. The flanges *f g* at the bottom and top of the flask respectively, perform the three functions of stiffening the flask, lifting the sand as the cope is lifted off, and rolled over for replacing, and affording a substantial engaging surface between the different parts of the flask and for the follow and bottom boards. Flanges are not needed in the drag for lifting the sand, but as the same part is as liable to be used for a cope as it is for a drag, the flange is essential for this function. The inside of the flange is made an obtuse angle to the body of the section, for convenience in rolling, also to facilitate shaking out the sand while still affording sufficient shoulder for lifting, and also to allow the sand to fill the flask properly without time being wasted by special ramming under the flange. Particularly, when the flask is rammed in that class of molding machine called a squeezer, the inclined inside of the flange is necessary to allow the sand to fill in solidly. I have found that the flange *f* should preferably be made at an angle of about 120 degrees to the body of the section, as shown in all the forms of Fig. 3.

The flange *g* may possibly be dispensed with as shown in form 7; but as this might leave the extreme exposed edge too weak or not wide enough for certain purposes an external upper flange *g'*, forms 8 and 9, may be used as a strengthening flange or to provide proper bearing surface, and as such it may make an angle of 150 degrees or any other inclination with the web and in Fig. 10 the inner flange *g* is shown with this same

greater inclination. Also both flanges *f* and *g* or either of them may extend both sides of the web as in form 6, where the external part of the flanges is indicated by signs *f'*, *g'*. In form 2 (Fig. 3) both flanges are external, but provision is made for retaining the sand by using a rolled section or shape having its inner profile concave, the "inner profile" of all forms shown in Fig. 3 being to the right. All of these variations I consider as being included in the spirit of my invention.

One essential feature of my invention is the rolled rib *k*. The preferred form of this rib is shown in forms 6 to 11 inclusive as on the opposite side of the web from the flange *f*, that is, on the outside of the flask, leaving the inside plain. The inside of the flask between the flanges is preferably plain, as it is sometimes necessary to attach cross bars and plates in the cope to lift the sand in the larger flasks, and also, the flask will ram with more certainty and ease if the walls are plain on the inside.

I have found by experiment that a mere groove bent cold in sheet iron is not stiff enough in resistance to torsion. It appears to be necessary to close the open side which can be done by rigidly attaching a separate plate and such plate may be either plain or curved.

One of the principal objects of my invention is to close the side of the groove, which is done in my rolled section by making the rib solid. Any twist or torsion of the flask must twist the rib *k*, and it is evident that the resistance of a pipe or a solid round bar to twisting is greater than the resistance of the same amount of metal in any other form. By dispensing with the rib *k* in form 11 for instance and retaining only the thin plate with the two flanges *f* and *g*, all that is needed to twist the plate would be to spring the two flanges *f* and *g* out of line with each other which involves merely bending the thin plate connecting the flanges. The essential feature therefore to prevent the flask from twisting is a solid or closed rib at the middle of the width of the plate Of course a twisted flask takes one form while it is unconstrained and the mold is being made, and changes that form when the two parts of the flask are clamped together, which at least distorts if it does not ruin the mold. This rib need not necessarily be circular in outline, although such form is the most economical, see form 1. Also, I do not wish to confine myself to one rib as a plurality may be used under certain conditions, that is, provided a dominant, heavier rib is used at the middle of the width than is used at one side thereof.

The rib may be on the same side of the web as the flanges form 3, or possibly on both sides, as shown in form 5. I consider these variations and also attaching a separate plate as within the scope of my invention. In fact, I consider my invention broad enough to cover a foundry flask made of any rolled section consisting of a relatively thin plate having a relatively heavy solid or closed rib continuous along the middle of its length, and sand lifting means on one side of the plate.

My invention is founded on the discovery that all iron flasks as heretofore made are very much stronger than need be to resist vertical bending forces, and that a considerable part of this excessive vertical strength may be sacrificed to gain torsional stiffness and additional resistance to lateral bending forces by crowding surface elements of the cross section away from the ends of the cross section toward its center, thus enabling me to secure greater rigidity of the kind desired with the same material or else all desirable rigidity with less material.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A foundry flask made of a strip of rolled metal bent to the requisite form, said strip consisting in a relatively thin web having one inside edge flanged to constitute a sand retaining ledge, the longitudinal middle part of said web being enlarged in cross section to constitute a relatively heavy compact twist-resisting bar.

2. A foundry flask made of a strip of rolled metal bent to the requisite form, said strip consisting in a relatively thin web having both inside edges flanged to constitute sand retaining ledges, the longitudinal middle part of said web being enlarged in cross section to constitute a relatively heavy compact twist-resisting bar.

3. A foundry flask made of a strip of rolled metal bent to requisite form, said strip consisting in a relatively thin web having both inside edges flanged to constitute sand retaining ledges, the longitudinal middle part of said web being enlarged in cross section externally to constitute a relatively heavy external twist-resisting bar.

4. A foundry flask made of a strip of rolled metal bent to requisite form, said strip consisting in a relatively thin web having both inside edges flanged to constitute sand retaining ledges, the longitudinal middle part of said web being enlarged in cross section externally to constitute a relatively heavy external twist-resisting bar; said sand retaining ledges having their external faces square with the body of the flask and their inner sand retaining faces inclined at an obtuse angle to the inside wall face of the flask.

5. A foundry flask formed of a single strip of metal bent to requisite form, having a rib continuous around the outside, flanged edges square with the web on the outside,

and inclined thereto on the inside, the inside of the web having a plain continuous surface between the flanges, the ends of the strip being secured together by means of a guide pin casting.

6. A foundry flask member formed of one strip of rolled metal having the ends secured together, an inwardly extending flange on one edge of said strip square with the body of the flask on the outside to form a contacting surface with the other flask member, and a closed rib of larger dimensions than the flange running lengthwise of the strip to provide for torsional strains.

7. A foundry flask made of a strip of rolled metal bent to the requisite form, said strip comprising a web and a longitudinal intermediate part of enlarged cross section to constitute a columnar twist resisting bar.

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Witnesses:
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