

R. E. CRANE.  
MANUFACTURE OF WALL TANKS.  
APPLICATION FILED MAY 1, 1909.

958,231.

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Fig. 1.

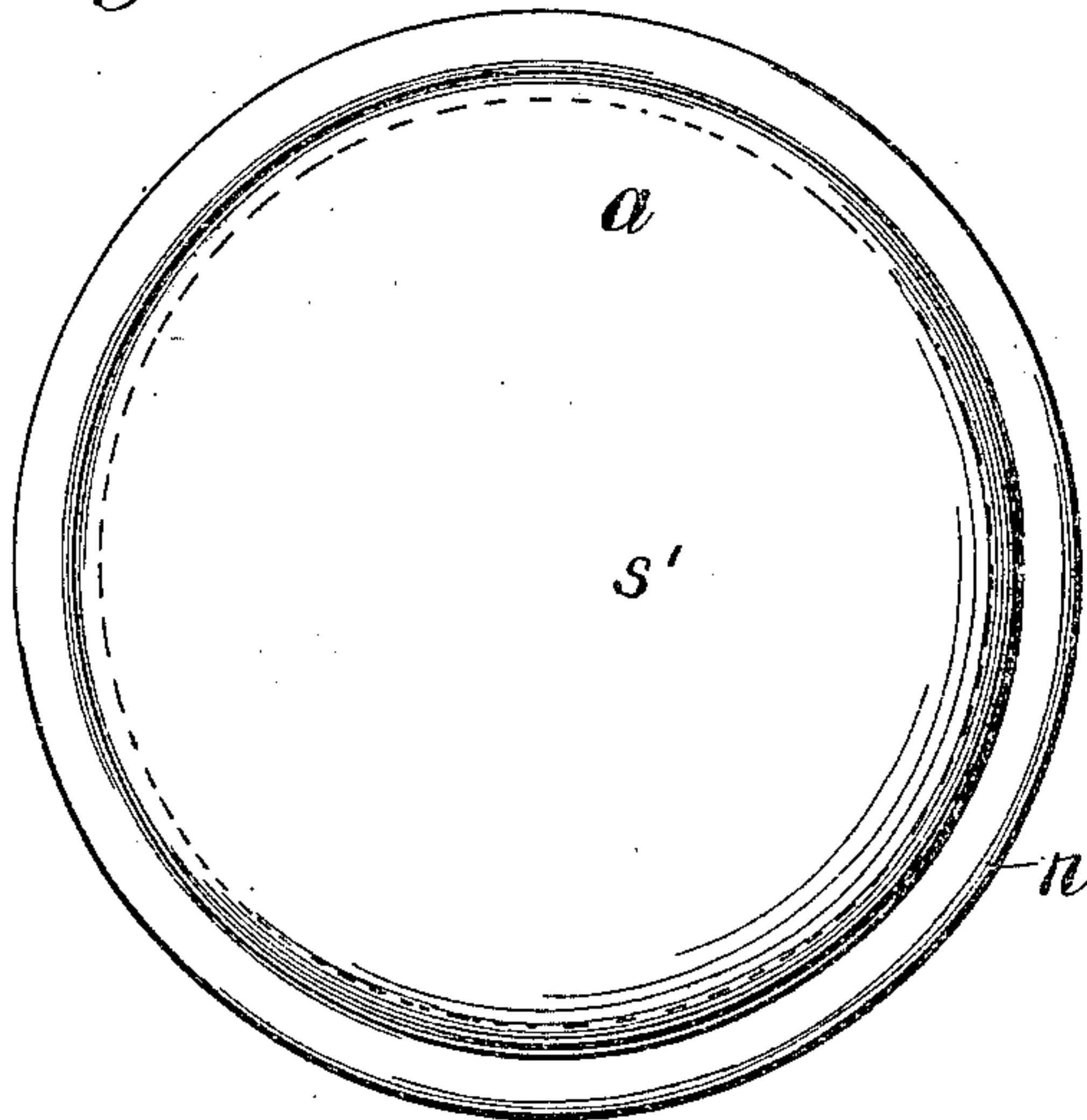


Fig. 2.

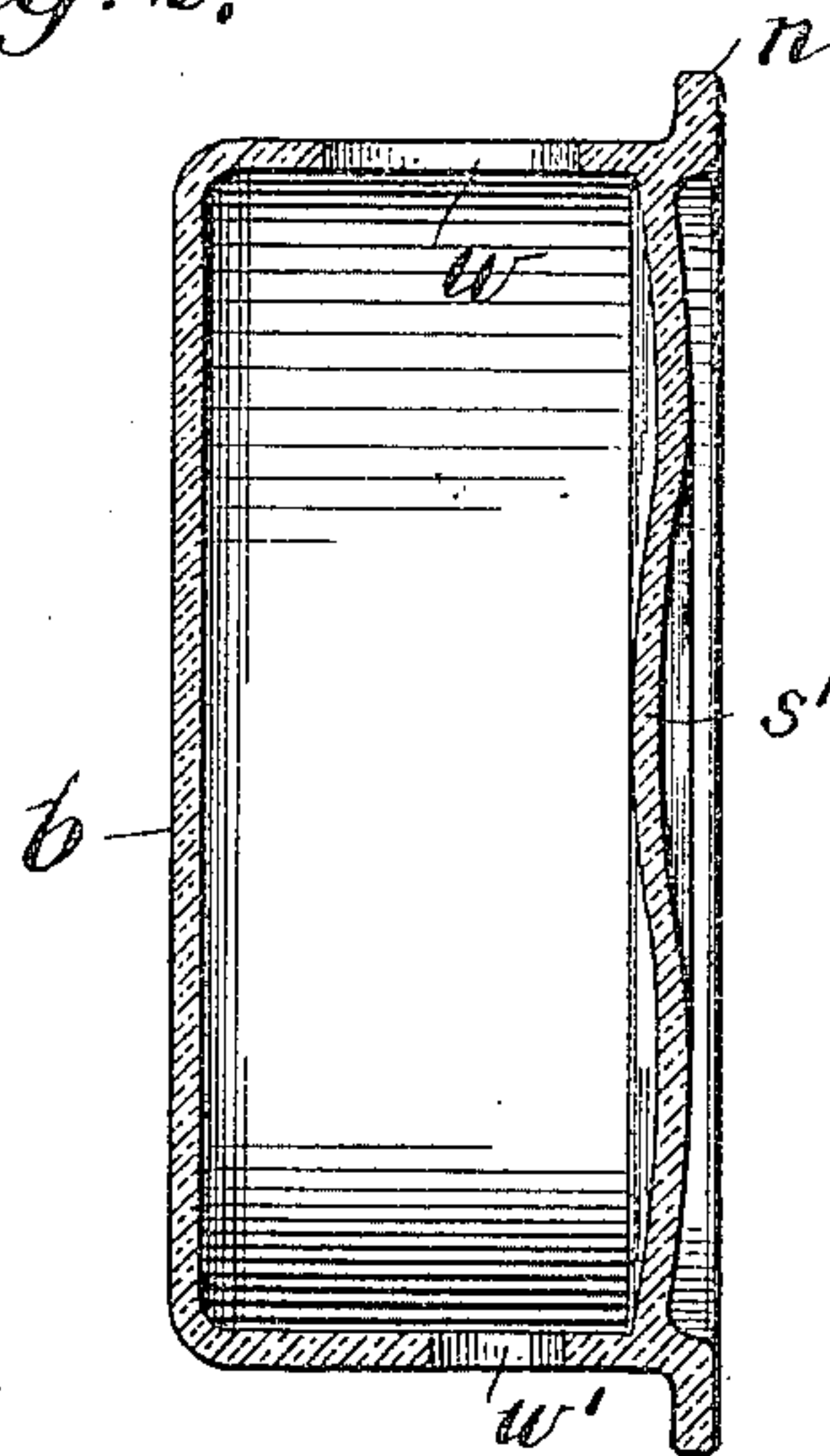


Fig. 5.

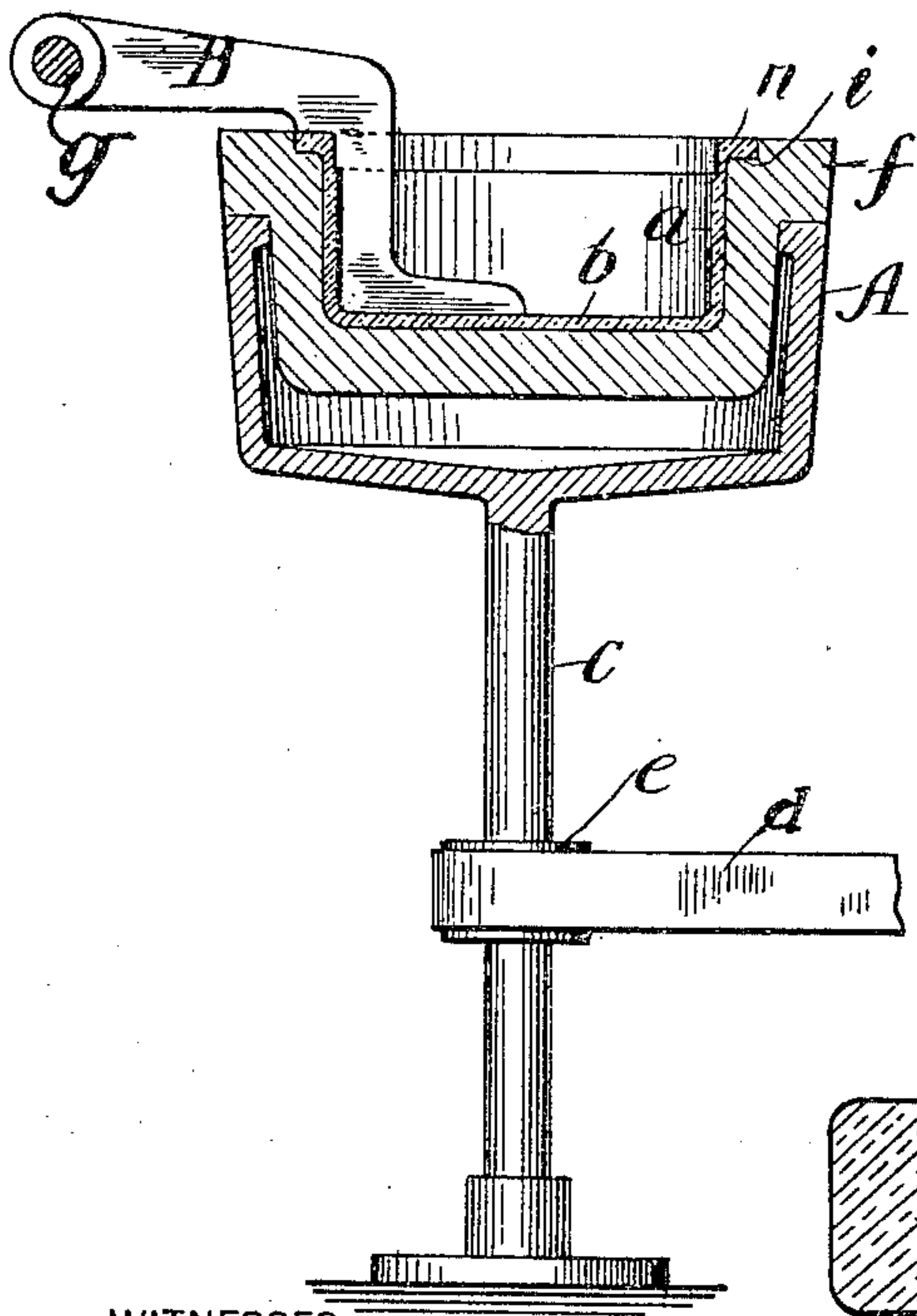


Fig. 3.

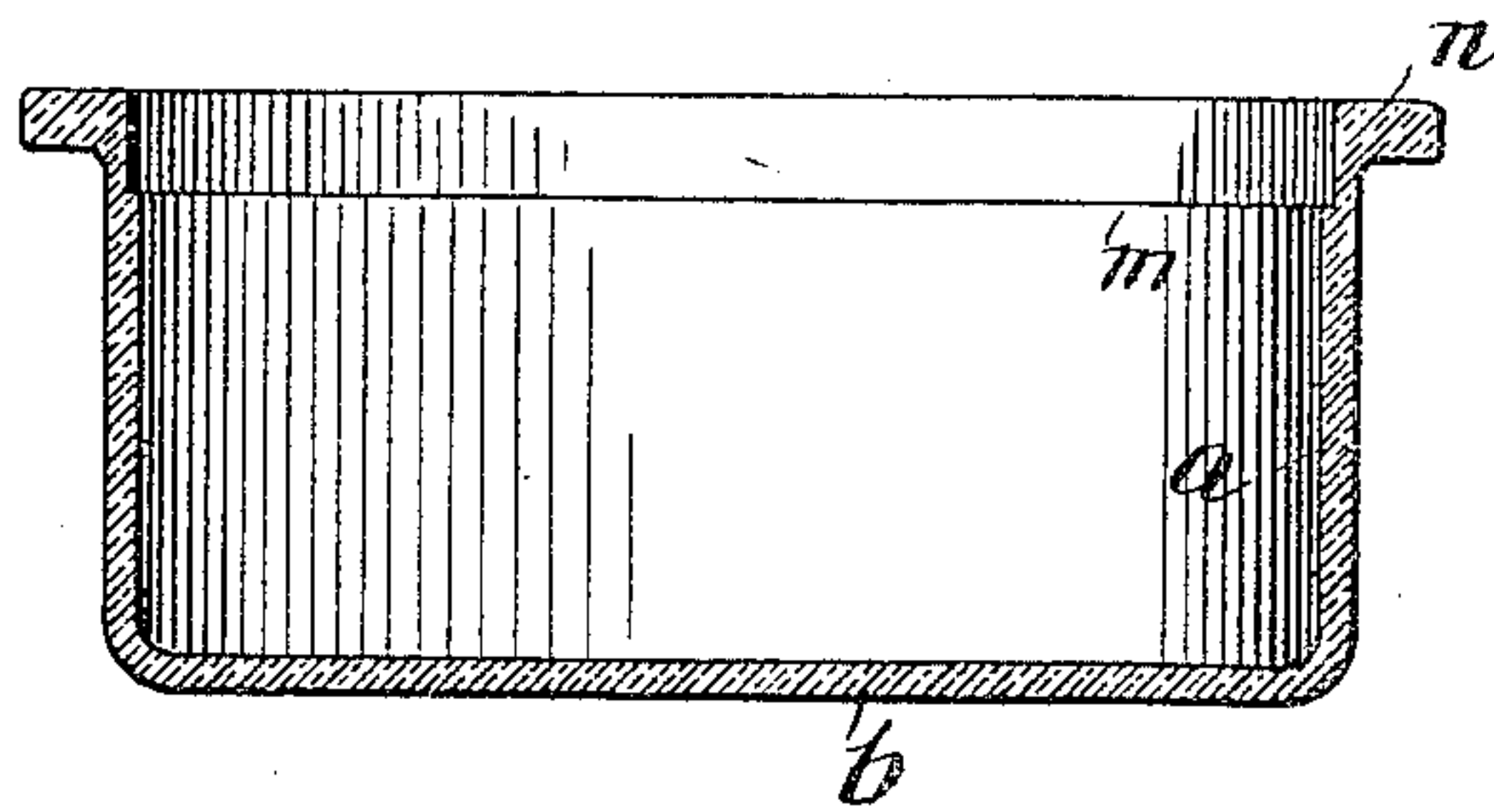
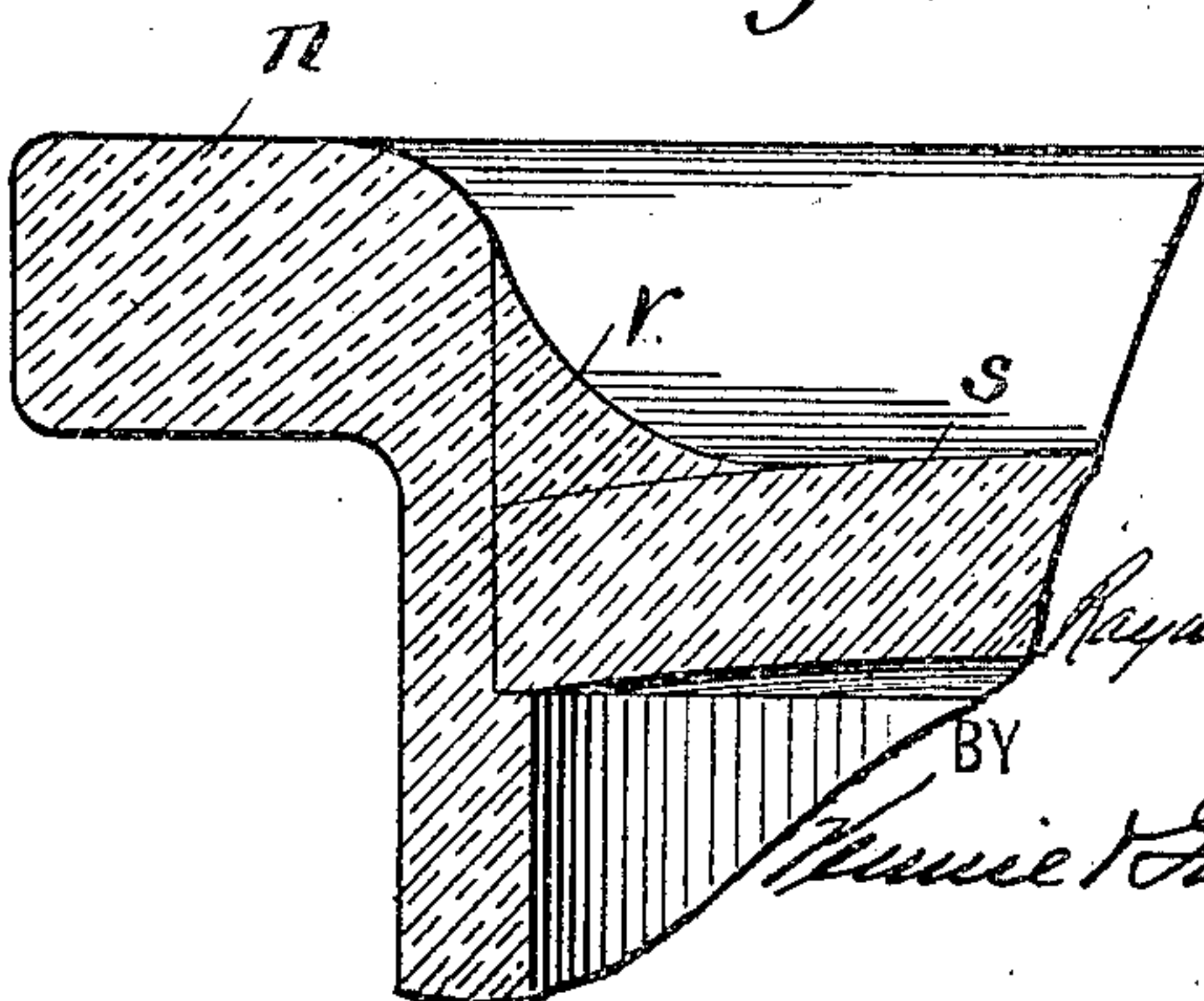


Fig. 4.



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## MANUFACTURE OF WALL-TANKS.

958,231.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, RAYMOND E. CRANE, a citizen of the United States, residing at Cameron, Marshall county, West Virginia, have invented certain new and useful Improvements in the Manufacture of Wall-Tanks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the manufacture of wall tanks of hard fired and highly vitrified china ware, and particularly to the method of making up the individual parts of the complete tank, in the green or unfired ware, so that in the subsequent operation of kiln firing, a practically homogeneous integral product will be produced which is protected against deformation at the extreme temperature to which it is subjected by the manner in which the constituent parts of the ware mutually coöperate to resist and nullify distorting contractile strains.

The purpose of the invention is to construct a tank whose main body portion shall be of cup-shaped contour, with closed sides or ends, one of which is provided with a peripheral marginal flange, this construction presenting not only an article of appropriate design, but also one of great inherent strength, particularly adapted for the purposes for which it is intended. The peripheral or marginal flange is intended to lie closely adjacent to the wall surface from which the tank is suspended and in order that it may do so with uniformity of contact, it is obviously essential that it shall not suffer distortion or deformation when exposed to the extreme temperatures of the kiln which rise to a degree sufficient even to melt cast iron, and wherein the contraction of the fired goods amounts on the average to as much as one-eighth of their diameter when in the unfired or green state. I have ascertained, by practical experimentation and successful commercial use that I can produce a china or porcelain tank of the kind specified and with a marginal rim flange of circular contour making close contact throughout with the usual smooth wall surface against which it is adapted to rest, and also with a cup-shaped body portion which has suffered no deformation in the kiln heat, by so making up the elements of the structure, in the unbaked or green ware

that they will mutually coöperate to prevent any substantial warpage.

In carrying out my invention, I so arrange that the cup-shaped main body portion of the unfired or green ware shall be guarded against deformation in the firing operation, by the resistance which is exerted by the side proximate to the marginal flange referred to. This likewise has the effect of correspondingly preventing the deformation of the marginal flange itself which is in immediate proximity to the said tank side, and, as an additional precaution against deformation of the marginal flange I preferably provide a strengthening and bracing angular filling between the inner periphery of the marginal flange and the proximate outer surface of the side of the tank. Under these conditions, moreover, the side wall of the main body portion of the tank, and the mass of the margin and of the angular filling prevent any distortion of the tank side at its junction with the main body portion of the tank, while at the same time permitting the said tank side to yield sufficiently at its middle portion to protect the shrinking ware from fracture as it contracts.

In the accompanying drawing, Figure 1 is a front elevation of a wall tank constructed in accordance with the invention. Fig. 2 is a longitudinal section of the same. Fig. 3 shows the parts of the tank as formed from the green or unfired clay and preparatory to assembling. Fig. 4 is a detail section through the joint between the parts, and Fig. 5 shows how the main body portion of the tank is spun from the clay.

In making up the green or unfired wall tank, I construct it in two parts. The main body portion, which may be provided with the cylindrical wall *a* and side *b* I form from a sheet of soft clay, upon a mold, into substantially the form indicated in Fig. 5. This roughly molded shape I then insert in the recess or well cavity of the rotary jigger *A*, mounted upon a suitable spindle *c* which is adapted to be rotated in any suitable manner as for instance by a belt *d* acting upon pulley *e*. The recess or well cavity is made within a plaster mold *f* of the jigger, which mold is provided with an annular shoulder or ledge *i*, upon which is to be formed the marginal flange *n* which constitutes the surface intended for contact with the wall against which the tank is to rest. The main body portion of the tank, in the green or un-



baked ware is thereupon carefully spun in the jigger, which is rotated for that purpose, while, at the same time, the jigger-blade B, conforming to the desired interior configuration of the said main body portion is caused to bear down upon the roughly molded clay, compacting, working, and fashioning it, as the jigger revolves, until the roughly molded clay assumes the final shape desired for the unbaked ware. The compacting, shaping and spinning operation being completed, the jigger-blade B is swung back upon its pivot support *g*; whereupon, the spun main body portion of the tank may, after a short interval, be removed from the plaster mold *f*, having sufficiently contracted for that purpose. The main body portion has then assumed the definite outline indicated in the lower part of Fig. 3 and presents a ledge or shoulder *m*, somewhat below the level of the marginal flange *n*. This ledge or shoulder *m* is designed to receive one of the sides *s* of the green or unbaked ware, which side *s* is likewise spun in a plaster mold to the shape indicated in central cross-section in the upper part of Fig. 3, which illustrates it as slightly dished or concaved upwardly. On the following day, the two parts of the green or unbaked ware having sufficiently dried for the purpose, the slab like side *s* is put in place, as indicated in Fig. 4 and rests upon the ledge *m*. In order to make a satisfactory joint, the operator moistens the contacting surfaces of the two parts and so presses and manipulates them that they become substantially homogeneous across the plane or planes of jointure. At the same time, the operator braces and strengthens the joint by filling in with soft clay the angular filling *v* inserted between the inner periphery of the marginal flange and the proximate outer surface of the tank side *s*, and to make the filling-in the more homogeneous and effective, he first appropriately moistens the surfaces with which it comes in contact. At the same time, the openings (indicated at *w* and *w'* in the finished tank) for filling and emptying the tank are cut by hand in the green ware.

The green or unbaked ware, as thus made up is then permitted to dry, at ordinary atmospheric temperature and in a drying room for about ten days or until it has given up a very large portion of its contained moisture and is capable of bearing its burden in the firing kiln, when built up therein with other like ware, as in the firing kiln practice. The green or unbaked ware, thus preliminarily dried is then placed in the kiln, as described, with other like articles and is fired therein for a period of about seventy hours, or until it is fully vitrified, at a heat that would melt cast iron. During the firing operation, the ware as it gives up moisture and becomes thus highly vitrified is subjected to con-

tractile strains, whose magnitude is apparent when we consider that the ware shrinks to such a degree that its diameter is diminished by one-eighth at the termination of the firing operation. The tendency of these contractile strains would be to cause the main body portion of the ware to become distorted at the region of the marginal flange *n*, were it not for the resistance offered by the presence of the tank side *s*, whose rate of contraction is found to be so related to the rate of contraction of the main body portion and the marginal rim that the cylindrical contour of the walls of the main body portion is preserved and therewith the circular contour of the marginal rim. The relatively large cross-sectional area of the comparatively heavy marginal rim, together with the mass of the angular filling-in portion *v* moderates the speed of contraction of these parts, making it more uniform and gradual, and it is found that any excess of contracting strains that might possibly be due to the character of the clay mixture or the particular conditions of firing is compensated by a slight yielding of the side *s* at its central portion, as indicated at *s'* in Fig. 2.

At the termination of the firing operation, the goods are permitted to cool in the usual manner before removal and are found to be fired with substantial uniformity whatever their position in the kiln. The side wall of the finished article has retained its original configuration, the side integral therewith during the formation of the green or unbaked ware remains flat, and the marginal flange not only has retained its original contour but is flat along the surface designed to make contact with the wall. The side proximate to the marginal flange and which has sustained the burden of the contractile strains which it has resisted is usually slightly dished inwardly as indicated at *s'* and to somewhat different degrees according to the location of the ware within the firing kiln and the conditions of the firing operation thereat; but, as this side of the tank is concealed from observation, in the normal use for which it is intended, any irregularity in surface contour of the said side is without importance and is usually too slight to be ordinarily noticed. The entire finished article is a highly fired and highly vitrified product, substantially homogeneous throughout and particularly adapted for the purposes for which it is intended because of its absolute regularity of outline and because of the close contact permitted between the flat surfaces of the marginal flange and the wall surface against which it rests.

The slab like wall *s* is placed out of the plane of the marginal flange *n*, and farther away from the rear edge of the tank, for the reason that during a part of the firing oper-



ation the tank is rested on the flange *n*. This sometimes causes a bulging of the wall *s*, and if the latter were not offset from the plane of the flange, as indicated, the latter could not be placed in contact with the wall on which the tank is to be secured.

One of the important features of the process is the provision of the permanent marginal flange on the cup-shaped body portion, said flange serving as a strong reinforcement for the body portion during the process of manufacture in addition to its subsequent function of an attaching flange whereby the tank is supported on the wall or other support. While the cup-shaped body portion is still green, it is braced in two directions, like angle irons, and the piece is much more liable to hold its shape during the shrinkage prior to its firing. This makes the insertion of the rear wall in the cup-shaped body portion much easier than it would be otherwise. A further advantage arises from the fact that a substantially homogeneous joint is formed between the slab-like rear wall and the body portion, without the interposition of cement or other binding substance. According to the process described, the joint is made of maximum strength, and the omission of cement simplifies the construction of the joint to a considerable extent.

It is to be understood that the tank may be made in other shapes than the cylindrical one illustrated, it being only necessary to have the body portion of substantially cup-shaped form.

Having thus described my invention, what I claim is:

1. The method of making wall tanks comprising a cup-shaped body portion and a slab-like rear wall, which consists in constructing the unit made up of said parts, from the soft clay, with a reinforcing flange extending from the rear portion of the tank, said reinforcing flange being sufficiently heavy to strengthen the tank and reduce the warpage thereof during firing, and then firing the structure at a heat which will cause a substantial contraction and density in the unit thus formed, substantially as described.

2. The method of making wall tanks comprising a cup-shaped body portion and a slab-like wall, of highly fired earthenware,

which consists in constructing the cup-shaped body portion from the clay and providing it with a heavy permanently formed outwardly extending reinforcing flange or extension, constructing the slab-like wall separately, uniting the separately constructed wall to the main body portion at the open end of the latter, adjacent the permanently formed reinforcing flange or extension, preliminarily drying the assembled parts, and finally firing the structure, substantially as described.

3. The method of making wall tanks comprising a cup-shaped body portion and a slab-like rear wall, of highly fired earthenware, which consists in constructing the cup-shaped body portion from the clay and providing it at its open end with a heavy integral laterally and outwardly extending reinforcing flange that is permanently formed thereon, constructing the slab-like rear wall separately from the clay, uniting said separately constructed wall to the main body portion at the open end of the latter by a homogeneous joint formed between the adjacent clay surfaces of the wall and the body portion, preliminarily drying the assembled parts and then firing the structure, substantially as described.

4. The method of making wall tanks comprising a cup-shaped body portion and a slab-like rear wall, of highly fired earthenware, which consists in constructing the cup-shaped body portion from the clay with a heavy laterally extending marginal flange at its open end, constructing the slab-like wall separately from the clay, uniting the separately constructed wall to the main body portion by a joint between the adjacent clay surfaces formed by the edge of the wall and the inner surface of the body portion, at a point offset from the plane of the marginal flange, bracing the joint thus formed by an angular clay filling laid in between the flange and the slab-like wall, drying the structure thus formed, and then firing it, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

RAYMOND E. CRANE.

Witnesses:

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JAMES F. CLEGG.