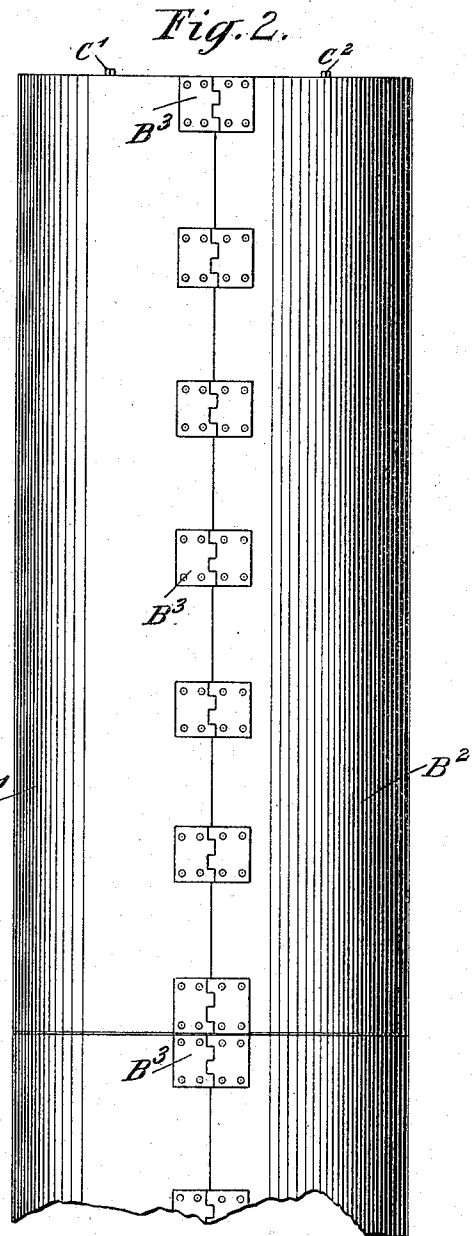
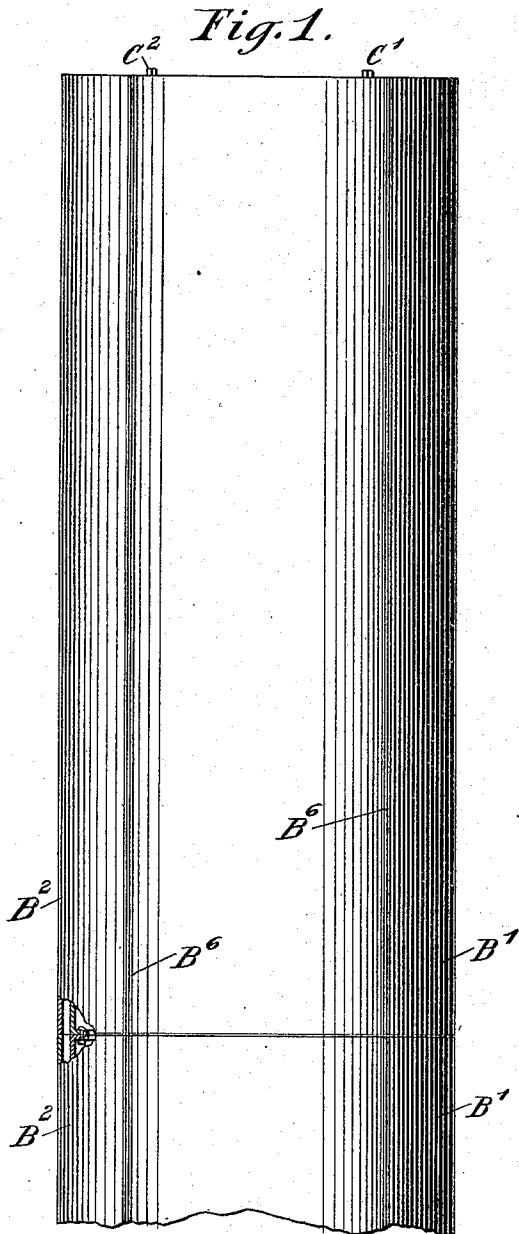


932,770.

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SHAFTING FOR CAISSONS.
APPLICATION FILED AUG. 7, 1908.

Patented Aug. 31, 1909.
3 SHEETS—SHEET 1.



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Fig. 6.

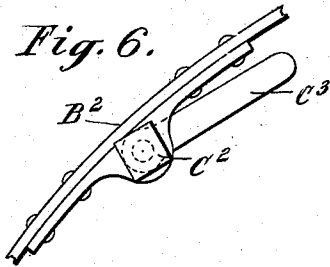


Fig. 4.

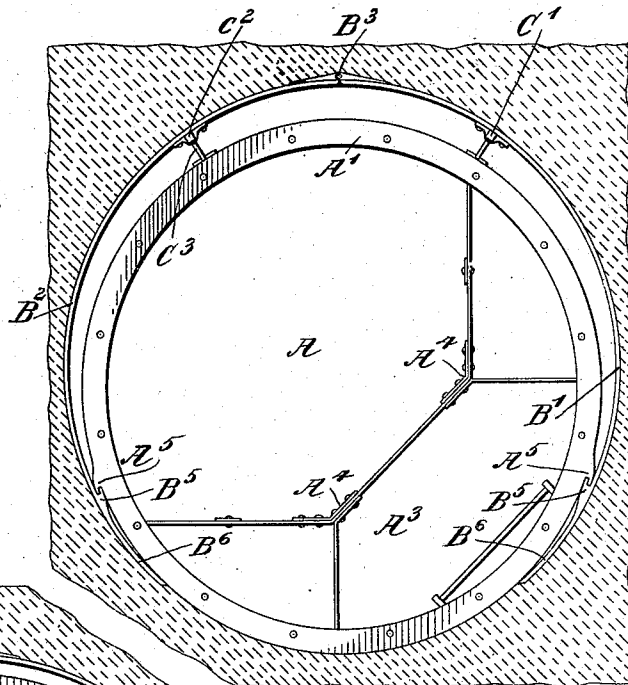
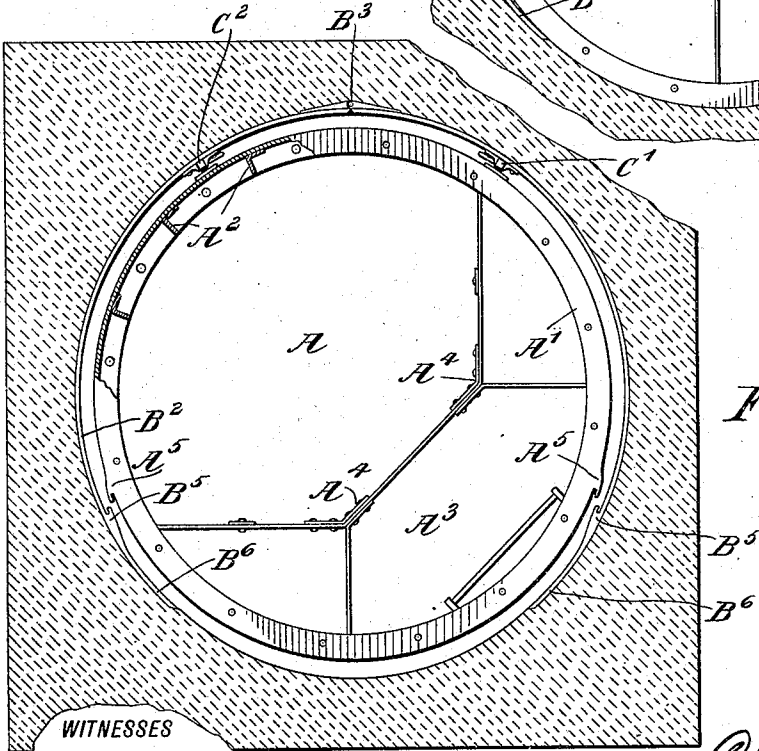


Fig. 3.



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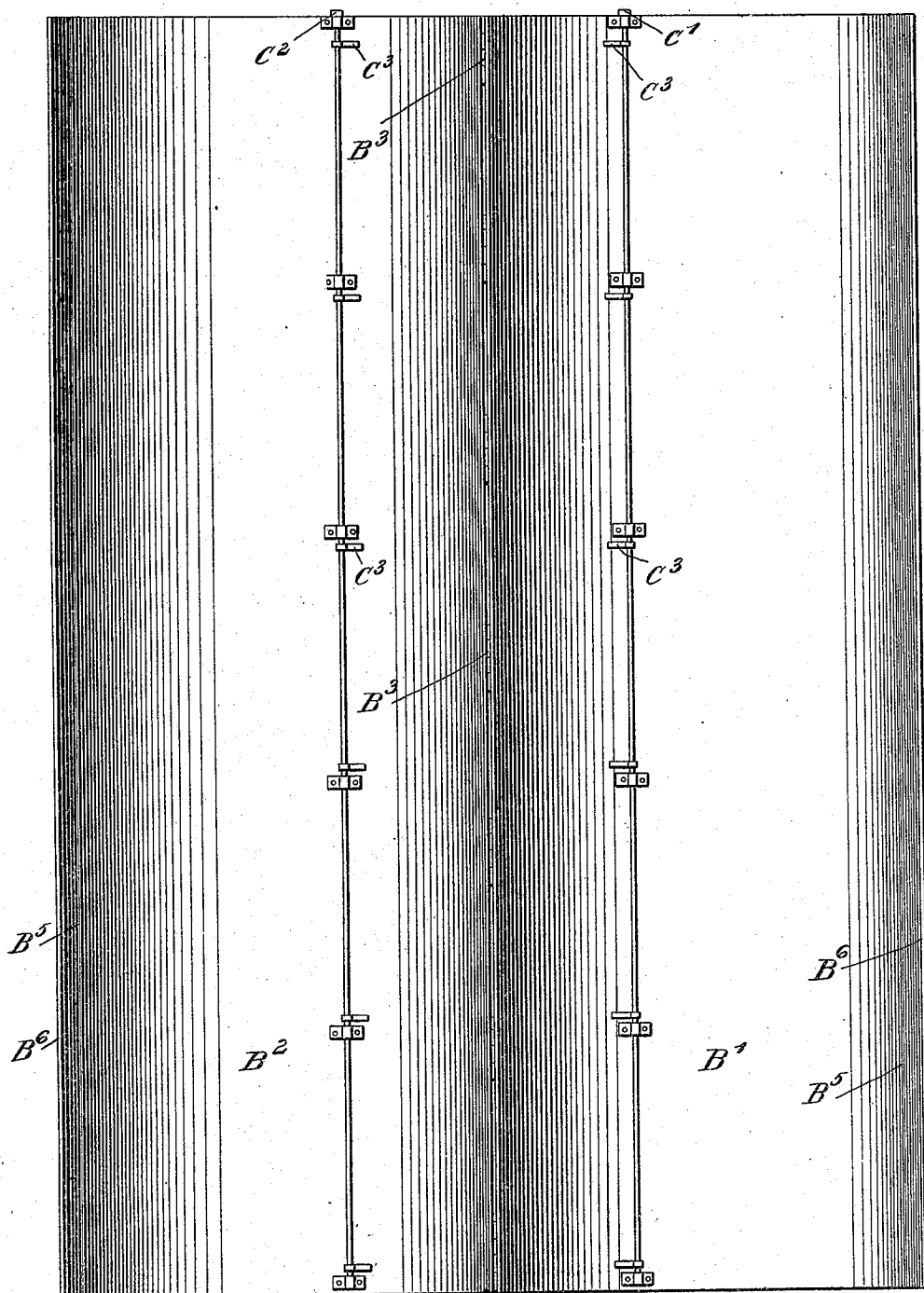
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Fig. 5.

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UNITED STATES PATENT OFFICE.

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SHAFTING FOR CAISSONS.

932,770.

Specification of Letters Patent.

Patented Aug. 31, 1909.

Application filed August 7, 1908. Serial No. 447,349.

To all whom it may concern:

Be it known that I, CHARLES P. DOWNING, a citizen of the United States, and resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Shafting for Caissons, of which the following is a specification.

This invention relates to improvements in shafting for caissons.

In the drawings:—Figure 1 is a side elevation of a construction embodying this invention, the view being taken from the front side. Fig. 2 is a side elevation of a construction embodying this invention, the view being taken from the rear side. Fig. 3 is an elevation of the shield sections thrown back to show the interior construction. Fig. 4 is a plan view of a construction embodying this invention, showing the same in the concrete block being locked in position. Fig. 5 is a plan view of a construction embodying this invention, and showing the same in a concrete block and in position to be withdrawn therefrom. Fig. 6 is a detail view of the end of one of the locking rods.

The invention has for its principal object to produce a shafting around which the cement is poured and set, and which after the same is set may be easily and quickly collapsed and withdrawn from the pier. With this object in view the drums A, are formed as at present, but of a slightly diminished diameter. These drums are usually constructed in sections of about ten feet in length. At suitable intervals they are provided with annular flanges A'. The flanges at the ends are perforated to receive bolts to secure the drums together. This joint is packed to prevent the leakage of air when under pressure. It is into the inside of these drums that the compressed air is introduced. Between the annular flanges are the upright-guide bars A², which fend off the carrying bucket when the same is being raised and lowered. The interior of these drums is equipped with a ladder for the mechanics ascending and descending. To protect the men while on the ladder the guard A³, is formed. It is constructed of strap iron of suitable shape and dimension and secured to the drums as shown. These guards are held in position by upright bars, preferably angle bars, A⁴. Each drum A, is thus provided so that when several drums are secured one to the other the ladder is continuous.

Surrounding the drums A is a collapsible shield. This is formed in two parts or sections B', B², which are hinged at B³. The hinge is of any suitable construction adapted to form a tightly closed joint about the butts of the hinge to exclude any cement entering the space, and thereby interfering with the operation of the hinge, or admitting the cement to the space between the shield and the drums. The sections are formed to substantially the same length as the drums. They are constructed from heavy sheet or plate metal suitable to withstand the compression of the cement. They are suitably reinforced where this is deemed advisable. Care in this reinforcing is, however, to be exercised not to fill the space between the drums and shield to the extent that the operation of this invention would become impossible or difficult.

As stated the sections are joined by being hinged together. Each section is provided with a pivoted rod C', C², pivotally mounted on the inner side of the shield section to extend vertically when the shield is in place. These rods are provided at the upper end with a suitable shape or construction, whereby the rods may be grasped to be rotated. The form shown is an end squared to suit a monkey wrench. At suitable intervals the rods are provided with the dogs C³. These are formed to throw inward against the outer skin of the drums. The action is to force the drums and the shield sections apart. The separation of the drums and shield is prevented by the engagement of the hooks B⁵, and A⁶. The hooks are shaped substantially as shown and the hook, B⁵, is formed on the shields while the hook, A⁶, is formed on the drums, and they are so formed and placed that they engage by forcing the shield and drums apart by the dogs C³. A lock for the dogs, C³ is produced as the said dogs pass the central line of their movement. This lock is that which all constructions of this character have in passing the direct line of strain. Any suitable device to limit the movement of the dogs on the locking side is provided. When the hooks are in engagement the end sections B⁶, B⁶, of the shield hug the outer surface of the drums to form a closure against the admission of the cement. To aid in this action the end sections are shaped to a slightly smaller diameter, so that they exert a spring pressure in being forced into the

position they assume when the shield is in working position.

The drums, A, are mounted on the caisson proper or crib which usually consists in an inverted box-like structure having at the bottom a cutting edge and formed with a solid top having an opening for the entrance of the mechanic who removes the earth or rock from under the caisson. The first drum is secured directly over the opening and the succeeding drums are secured each on the others, as the caisson is sunk, each drum in turn being provided with the air-lock head generally used in this work. The area covered by the caisson is larger than the drum. Above the caisson is built a cofferdam or crib. Between the crib and the drum and shield B'-B² is poured the cement to form the pier. This sets while the excavation is being carried on within the caisson. When the caisson is finally on bed rock the solid cement pier rests above it to the surface of the ground with the sections or drums, A, and the shields, B'-B² being held in the cement. The caisson is then filled with cement, which is lowered through the shaft formed by the drums, A. When this cement is set, the air pressure is taken off and the air-lock at the top of the shaft is removed, and the drums, A, and shields, B'-B² are drawn out of the shaft, section by section. The shaft is then filled with cement.

In operation the shield may be placed around the drum prior to the drums being set. But usually I first set the drum. This is done by bolting the succeeding drums to that which has gone before. As stated care is used in thus joining the drums to prevent the leakage of the air under pressure. When the drum is set I open the sections B', B² of the shield and encompass the drum with it. The shield is somewhat longer than the drum, so that the lower edge of the shield when placed will override the upper edge of the shield of the preceding drum. This construction while preferred by me is not essential to the operation of this invention. A straight joint is practical at this point. When the sections are in position the end sections B⁶, B⁸, are drawn over the hooks A⁵, A⁵, the rods C', C², are rotated to throw the dogs C³ against the drums to force the shield B, from the drum and hooks B⁵, under the hooks A⁵. The form is now in position to receive the cement. When the cement is set and the forms are to be withdrawn this is accomplished by rotating the rods C', C², to throw the dogs C³, away from the drum. The bolts securing the drums together are removed and the drum moved laterally against the shield. The drum is now free to be withdrawn. This is done by drawing the drum upward and out of the shaft. When the drum is thus withdrawn

the shield is folded inward on the hinges, B³. This frees the shield from the cement. Should the metal of the shield adhere to the cement, I provide eyelets, which may be engaged by a block and tackle and thus the sections be drawn together. The shield is then raised out of the shaft. The drums and shields are raised in succession from the shaft, each drum being unbolted from the one beneath it. In order that the shields may not slip off of the drums when the same are being lifted into position, I have provided lugs, on the side of the drums over which the dogs throw when in operative position.

Having thus described this invention, it is claimed:—

1. In a shafting for caissons the combination of sectional drums adapted to be joined to form continuous, tight, tubular construction; a shield to surround said tubular construction formed to an inner diameter larger than the outer diameter of the said drums and to an outside diameter equal to the inside diameter of the shaft, said shield being adapted to be collapsed; means for maintaining the shield and drum in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking the said shield to the said drum; substantially as set forth.

2. In a shafting for caissons the combination with a cylinder formed to an outside diameter less than the inner diameter of the shaft; a shield to surround said cylinder formed to an inner diameter larger than the outside diameter of said cylinder and an outside diameter equal to the inside diameter of the shaft adapted to be collapsed; means for maintaining the shield in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking the said shield to the said cylinder; substantially as set forth.

3. In a shafting for caissons the combination with a tubular construction through which the earth and men may pass, formed to an outer diameter of less dimension than the inner diameter of the shaft; a shield to surround said tubular construction formed to an inner diameter larger than the outer diameter of said tubular construction and of an outside diameter equal to the inside diameter of the shaft and adapted to be collapsed; means for maintaining the shield and tubular construction in position to form a continuous surface to form the inner wall of the shaft; and suitable means for locking said shield to the said tubular construction; substantially as set forth.

4. In a shafting for caissons the combination with sectional drums adapted to be joined to form a continuous air tight tubular construction; a shield consisting in a plurality of sections pivotally connected and

formed to an inner diameter larger than the outer diameter of the drums and an outside diameter equal to the inside diameter of the shaft and adapted to be collapsed; means for maintaining the shield and drums in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking said shield to the said drum; substantially as set forth.

5. In a shafting for caissons the combination with a cylinder formed to an outside diameter less than the inner diameter of the shaft; a shield consisting in a plurality of sections pivotally connected and formed to an inner diameter larger than the outer diameter of the cylinder; and an outside diameter equal to the inside diameter of the shaft and adapted to be collapsed; and means for maintaining the shield and cylinder in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking the said shield to the said cylinder.

6. In a shafting for caissons the combination with a tubular construction through which the earth and men may pass and formed to an outer diameter less than the inner diameter of the shaft; a shield consisting in a plurality of sections pivotally connected and formed to an inner diameter larger than the outer diameter of the tubular construction, and an outside diameter equal to the inside diameter of the shaft and adapted to be collapsed; means for maintaining the shield and tubular construction in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking the said shield to the said tubular construction; substantially as set forth.

7. In a shafting for caissons the combination with sectional drums adapted to be joined to form a continuous air tight tubular construction; a shield consisting in two sections hinged together to form an inner diameter larger than the outer diameter on the drums and an outside diameter equal to the inside diameter of the shaft adapted to be collapsed; means for maintaining the shield and drum in position to form a continuous surface to mold the inner wall on the shaft; and suitable means for locking the said shield to the said drum.

8. In a shafting for caissons the combination with a cylinder formed to an outside diameter less than the inner diameter of the shaft; a shield consisting in two sections hinged together and formed to an inner diameter larger than the outer diameter of the cylinder and of an outside diameter equal to the inside diameter of the shaft and adapted to be collapsed; means for maintaining the shield and cylinder in position to form a continuous surface to mold the inner wall of the shaft; and suitable

able means for locking said shield in said cylinder; substantially as set forth.

9. In a shafting for caissons the combination with a tubular construction through which the earth and men may pass and formed to an outer diameter less than the inner diameter of the shaft; a shield consisting in two sections hinged together and formed to an inner diameter larger than the outer diameter of the tubular construction and an outside diameter equal to the inside diameter of the shaft and adapted to be collapsed; means for maintaining the shield and tubular construction in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking the said shield to the said tubular construction; substantially as set forth.

10. In a shafting for caissons the combination with sectional drums adapted to be joined to form a continuous air tight tubular construction; a collapsible shield of larger diameter and substantially equal length with the said drums and adapted to fit over each of the said drums said shield being of an outside diameter equal to the diameter of the shaft; means for maintaining the shield and drums in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking the said shields to the said drums; substantially as set forth.

11. In a shafting for caissons the combination with sectional drums adapted to be joined to form a continuous air tight tubular construction; shields formed to the shape of the shaft having a circular dimension less than the shaft to leave a gap between the edges of the shield and the gapped edges adapted to rest on the drums; means for maintaining the shield and drum in position to form a continuous surface to mold the inner wall of the shaft; and means for locking the said shield to the said drum; substantially as set forth.

12. In a shafting for caissons the combination with sectional drums adapted to be joined to form a continuous air tight tubular construction; a shield formed to the shape of the shaft and of a circular dimension less than the shaft to leave a gap between the edges, said shield being of length substantially equal to the sectional drums; means for maintaining the shield and drums in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking said shield to the said drum; substantially as set forth.

13. In a shafting for caissons the combination with sectional drums adapted to be joined to form continuous air tight tubular construction; a shield consisting in a plurality of sections pivotally mounted and formed to an inner diameter greater than the outer diameter of the drums and an outside diameter

ter equal to the inside diameter of the shaft and adapted to be collapsed; means interposed between said shield and drums to maintain the shield in position to form a continuous surface to mold the inner wall of the shaft, said means being adapted to be withdrawn to allow the shield to be collapsed; and suitable means for locking the said shield to the said drum, substantially as set forth.

14. In a shafting for caissons the combination with sectional drums adapted to be joined to form a continuous air tight tubular construction; a shield consisting in a plurality of sections pivotally connected and formed to an inner diameter greater than the outer diameter of the drums, and an outside diameter equal to the inside diameter of the shaft and adapted to be collapsed; pivotally mounted projections adapted to be rotated to interpose between said shield and drum to maintain the shield and drum in position to form a continuous surface to mold the inner wall of the shaft; and suitable means for locking the said shield to the said drum; substantially as set forth.

15. In a shafting for caissons the combination with sectional drums adapted to be joined to form a continuous air tight tubular construction; a shield consisting in a plurality of sections pivotally connected and formed to an inner diameter greater than the outer diameter of the drum and an outer diameter equal to the inside diameter of the shaft and adapted to be collapsed; a rod ver-

tically mounted between the said shield and drum having a series of projections adapted to force the shield and drum apart when rotated into one position and to permit the shield and drum to be approached when rotated in the reverse direction; and suitable means for locking the said shaft to the said drum; substantially as set forth.

16. In a shafting for caissons the combination with sectional drums adapted to be joined to form a continuous air tight tubular construction; a shield consisting in a plurality of sections pivotally connected and formed to an inner diameter greater than the outer diameter of the drum and an outside diameter equal to the inside diameter of the shaft and adapted to be collapsed; means interposed between said shield and drum to maintain the shield in position to form a continuous surface to mold the inner wall of the shaft, said means being adapted to be withdrawn to allow the shield to be collapsed; and hook-shaped projections, one set on the drum and the other set on the shield so arranged and constructed as to engage when the shield and drum are forced away from each other; substantially as set forth.

Signed at New York city in the county of New York and State of New York this 29th day of July A. D. 1908.

CHARLES P. DOWNING.

Witnesses:

FRANK M. ASHLEY,
E. F. MURDOCK.