

No. 782,446.

PATENTED FEB. 14, 1905.

C. GUSTAFSON.  
OUTSIDE FORM FOR CEMENT WORK.  
APPLICATION FILED JULY 6, 1904.

Fig. 1.

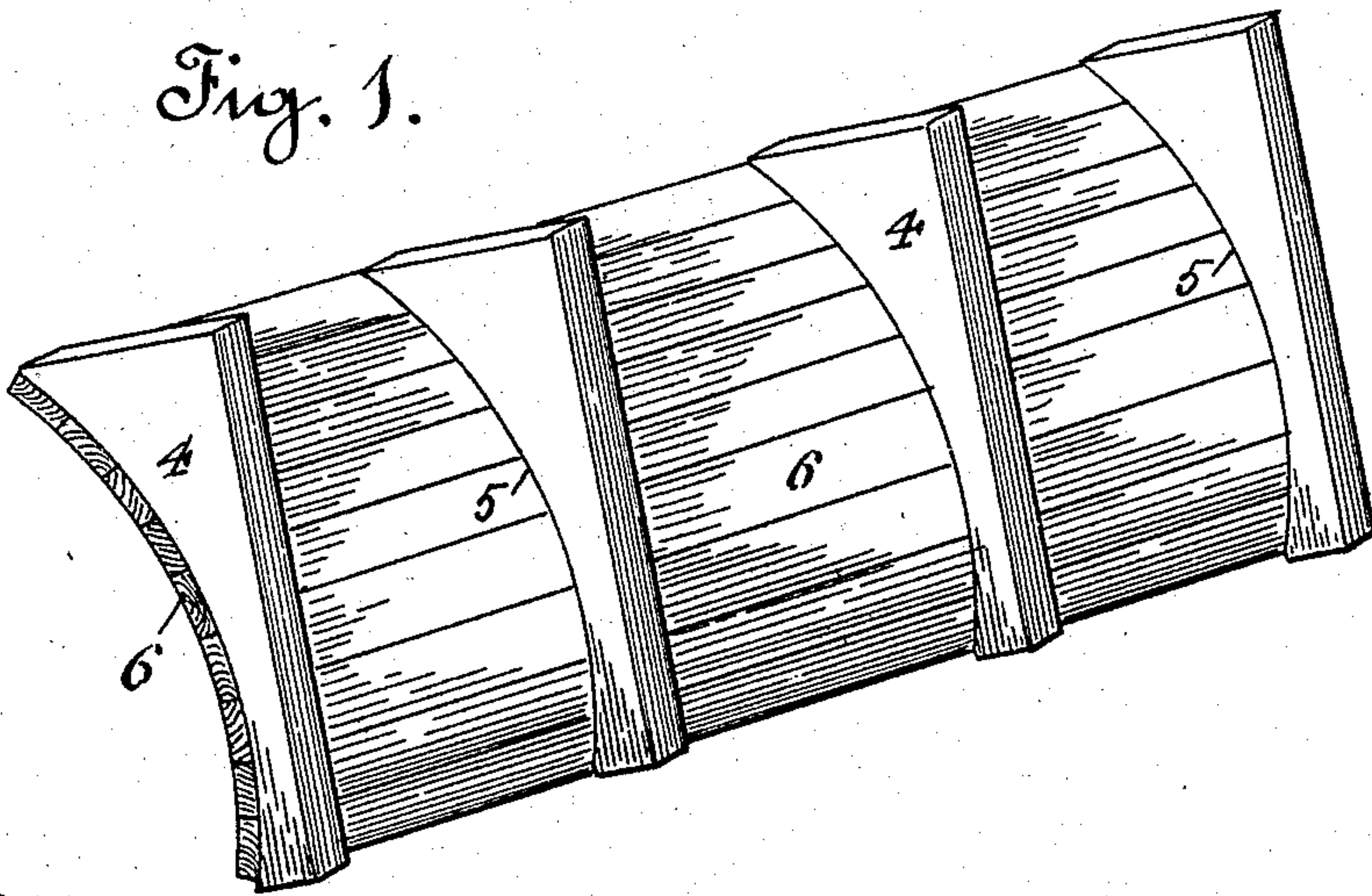
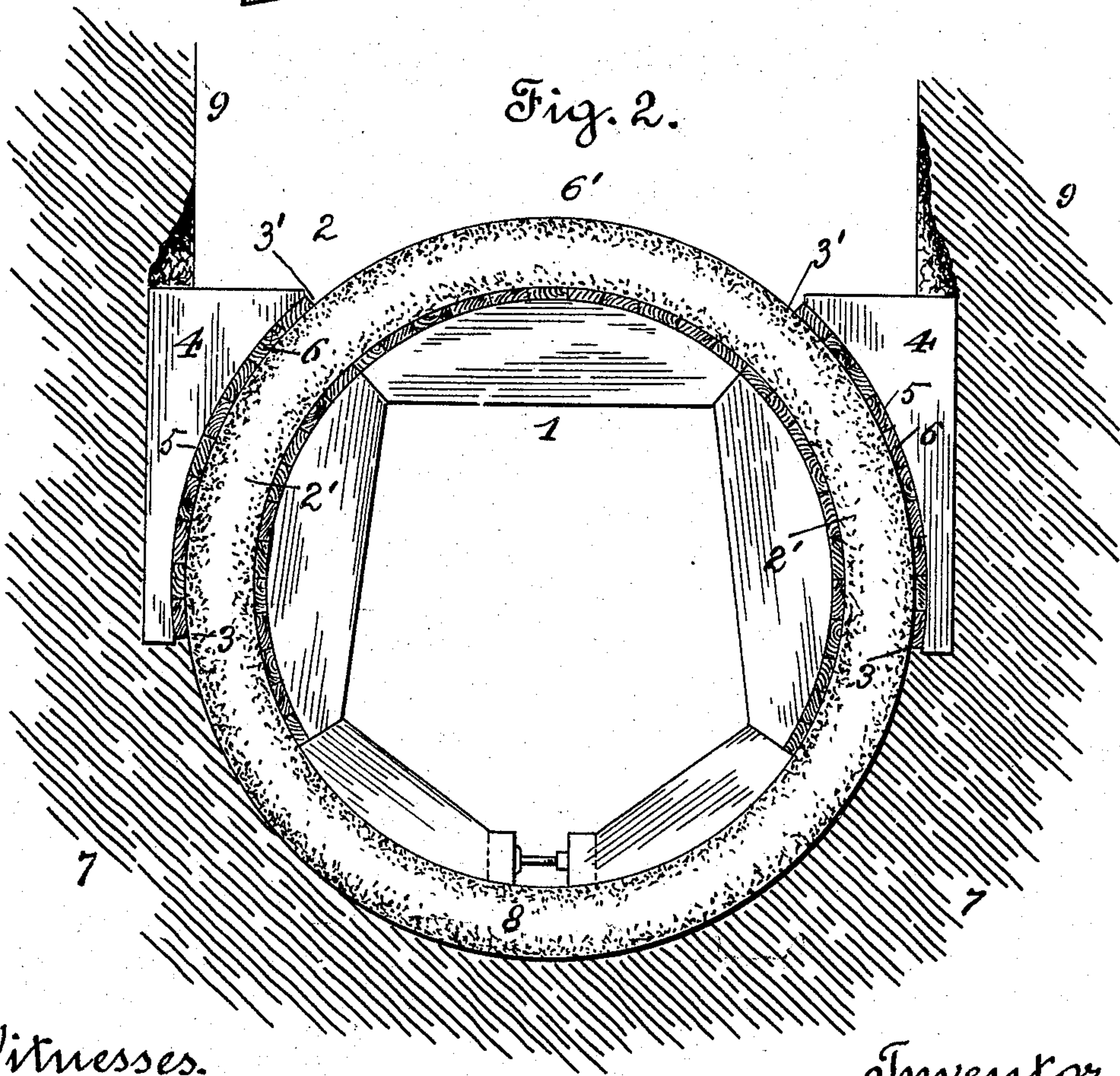


Fig. 2.



Witnesses.

*H. H. H. H. H.*  
*Walter E. Lane.*

Inventor.  
*C. Gustafson*  
by *N. A. Acker*  
his atty



# UNITED STATES PATENT OFFICE.

CREST GUSTAFSON, OF OAKLAND, CALIFORNIA, ASSIGNOR TO E. B. & A. L. STONE COMPANY, OF OAKLAND, CALIFORNIA, A CORPORATION OF CALIFORNIA.

## OUTSIDE FORM FOR CEMENT-WORK.

SPECIFICATION forming part of Letters Patent No. 782,446, dated February 14, 1905.

Application filed July 6, 1904. Serial No. 215,488.

*To all whom it may concern:*

Be it known that I, CREST GUSTAFSON, a citizen of the United States, residing at Oakland, Alameda county, State of California, have invented certain new and useful Improvements in Outside Forms for Cement-Work; and I do hereby declare the following to be a full, clear, and exact description of the same.

In the construction of cement or concrete sewer-work, culverts, &c., it is a difficult matter to properly form what shall be termed the "bench-arc sections," or that portion of the wall which unites the crown-section to the bottom half of the structure, unless a permanent outer form-section be formed. Such outer form-section is usually constructed of planking, which in conjunction with the inner form provides a properly-shaped space into which the material is packed. However, inasmuch as it is required to fill in with dirt back of such constructed forms as the construction of the sewer progresses in order to obtain sufficient resistance to the tendency of the concrete to bulge at such points as the weight of the concrete comes thereon it is apparent that the material from which the forms are constructed is lost, inasmuch as it is not practical to remove the filled-in dirt in order to recover the same. This is an exceedingly expensive item in the construction of a sewer and adds materially to the contract price thereof.

The object of the present invention is to save the expense due to the loss of the lumber heretofore required to construct the bench form for the building of the concrete sewer-work, which saving is accomplished by the use of bench forms which may be readily removed after the concrete has set, which forms may be advanced and placed for use in the formation of additional sections of the sewer-work. By the use of such outside bench forms it is only required that four forms be provided for use in connection with the construction of the sewer, two forms being employed to hold the material while hardening, the remaining two being utilized for the construction of the advanced section of the work or the work taking

place while the concrete of the finished section is hardening or setting.

To comprehend the invention, reference should be had to the accompanying sheet of drawings, wherein—

Figure 1 is a perspective view of the form viewed from the rear; and Fig. 2 is an end view of a completed cylindrical sewer formed of cement, said view disclosing an inner cylindrical former and the outer forms in position.

In the drawings the numeral 1 is used to indicate any suitable style of an inner former, and 2 a completed cylindrical cement sewer. The outer form for what shall be termed the "bench arc" 2' of the cylindrical cement sewer, or that portion of the circle between the points 3 3', Fig. 2, is composed of a series of two or more bench or knee blocks 4. The inner face 5 of each bench or knee block is curved or shaped to conform to the curvature of the bench arc of the sewer to be constructed. Each of the knee-blocks is formed with a straight rear edge adapted to abut against the sides of the excavation when the bench-frames are in place. Preferably four bench or knee blocks are used, which are located a distance of two feet apart in order that each form may be at least six feet in length. However, the length of the form is immaterial, inasmuch as the same may be made longer or shorter, as desired.

The bench or knee blocks 4 are united by means of any suitable face-wall 6, which in the present case consists of a series of longitudinal strips. These strips are secured to the inner curved face 5 of the bench or knee blocks 4. An inner face-wall 6 is thus provided, which conforms to the shape to be given to the outer surface of the cement or concrete sewer 2 between the points 3 3', which in conjunction with the inner former 1 serves to form a channel or properly-curved space into which the concrete may be packed and allowed to set between points 3 3' of the bench arc. The combined width of the face-wall 6 and the lower end of the knee-blocks 4 is much less than the combined width of the face-wall 6 and the upper end of the knee-



blocks 4. By this construction the bench forms can be moved in an arc to remove them after the cement has set without cutting away any part of the side walls of the excavation.

5 The crown arc-section 6', or the section of the cylinder between the points 3', requires no outer form, as the concrete may be readily shaped between said points merely by the curvature of the inside form, which form  
10 supports and holds the material in proper position. No outside form is usually required for the formation of the concrete wall between the points 3 3', inasmuch as the earth wall 7 generally answers for this pur-  
15 pose and serves as a support for the floor or trap section 8 of the sewer.

After the floor or trap section 8 has been completed it is required that the bench forms be secured in position at each side of the cut,  
20 which is done by cutting the embankment 9, so as to permit of the knee-blocks being properly positioned in order to adjust the curved face-wall 6 to the requisite curve of the sewer being constructed. It will be understood that  
25 the bench forms may be held positioned by any suitable means. After the bench forms have been adjusted a filling space of the required depth for the thickness of the sewer-wall will be formed by the curved face-wall  
30 6 and the surface of the inner former 1. This space is filled with concrete, which when set constitutes the bench-section 2' of the sewer when the crown-section 6' has been completed. The bench forms are left in position until the  
35 concrete has thoroughly set, when the same are removed and advanced to a section of the sewer to be built.

By the use of the described bench forms it is not required that an outer wall of wood be  
40 constructed to retain the bench-section of each section of the sewer under construction,

which wall is buried as the sewer is covered. Much time heretofore lost in constructing such wooden bench-walls is thus overcome; besides, the lumber lost is saved. 45

It will be understood that the described form may be constructed of any suitable material and that any given shape may be given to the bench or knee blocks, the said bench or knee blocks merely answering as suitable  
50 means for holding the curved face-wall in proper or adjusted position.

Having thus described the invention, what is claimed as new, and desired to be protected by Letters Patent, is— 55

A bench form for the outer wall of the bench-section of concrete sewer-work, the same comprising a series of bench or knee blocks each provided with a curved inner face shaped to conform approximately to the cur- 60  
vature of the outer wall of the bench-section to be formed and a straight unobstructed rear face adapted to abut against the side wall of the excavation when the form is in position, and a curved face-wall secured to the inner face  
65 of the curved bench or knee blocks, the combined width of the face-wall and the lower end of the knee-block being less than the combined width of the face-wall and the upper end of the knee-block, at the lower end of the  
70 face-wall being substantially level with the center of the sewer when the bench form is in position whereby the form may be moved on an arc to withdraw the same without cutting away the side walls of the excavation. 75

In witness whereof I have hereunto set my hand.

CREST GUSTAFSON.

Witnesses:

N. A. ACKER,  
D. B. RICHARDS.