

No. 725,751.

PATENTED APR. 21, 1903.

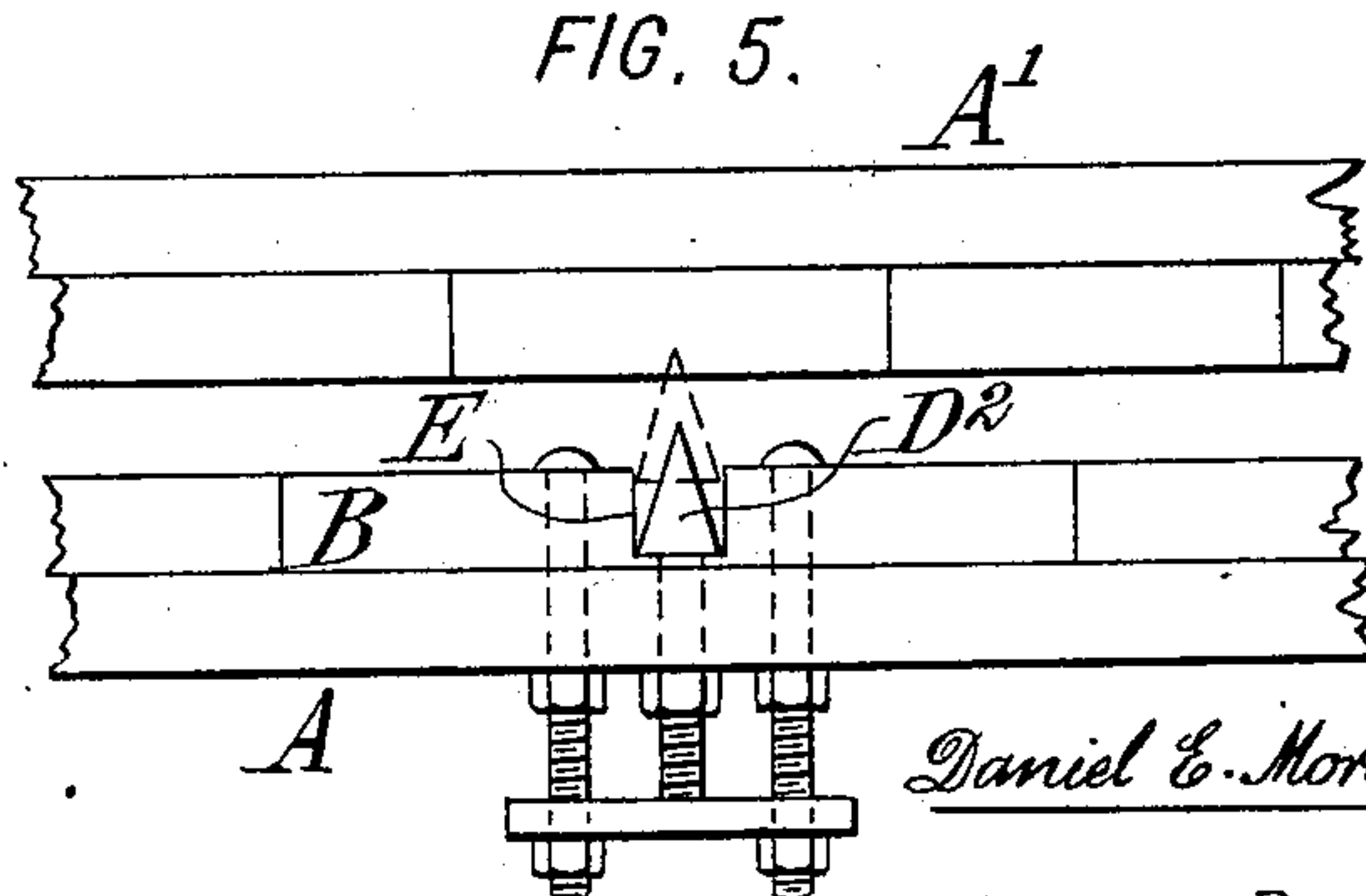
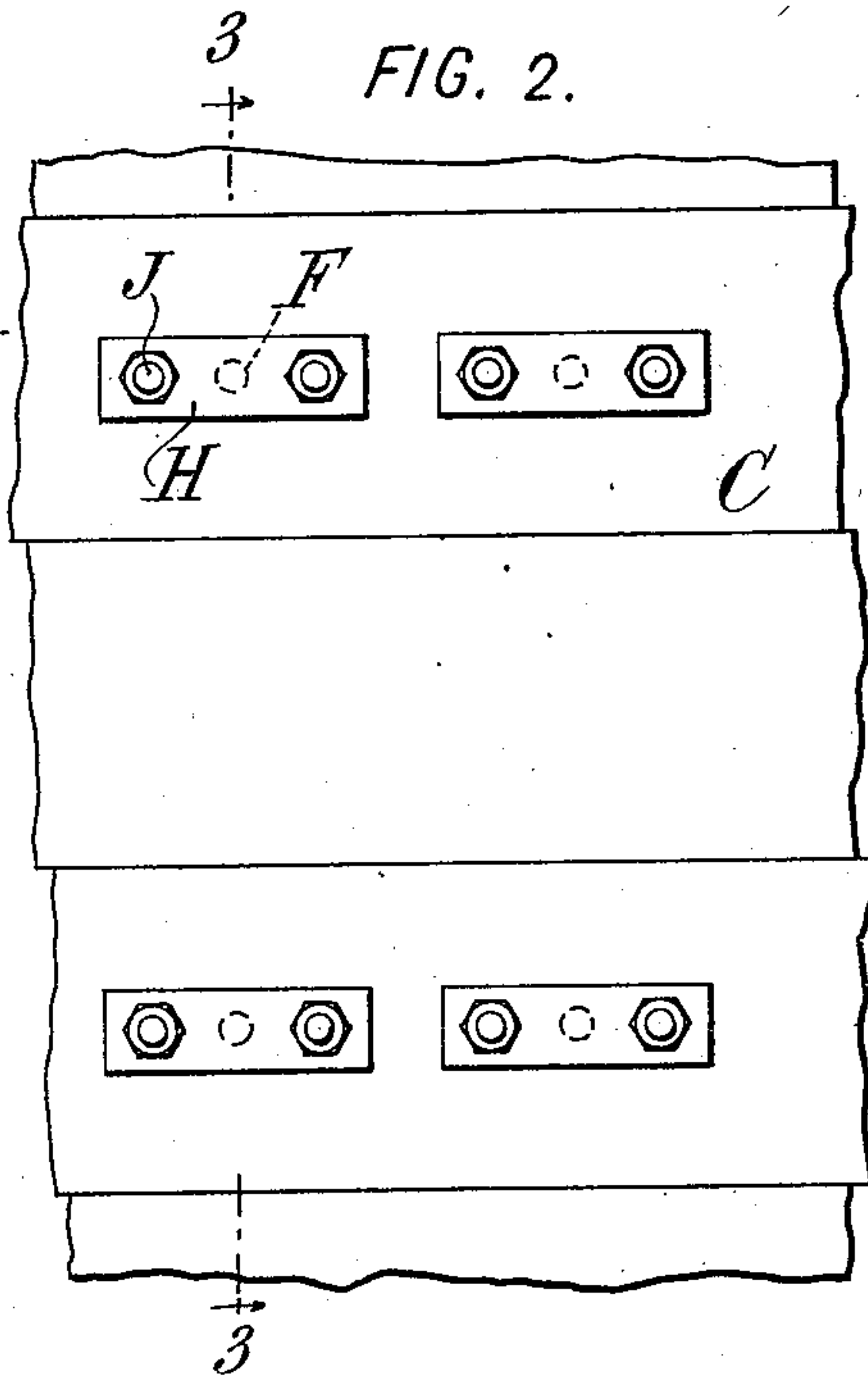
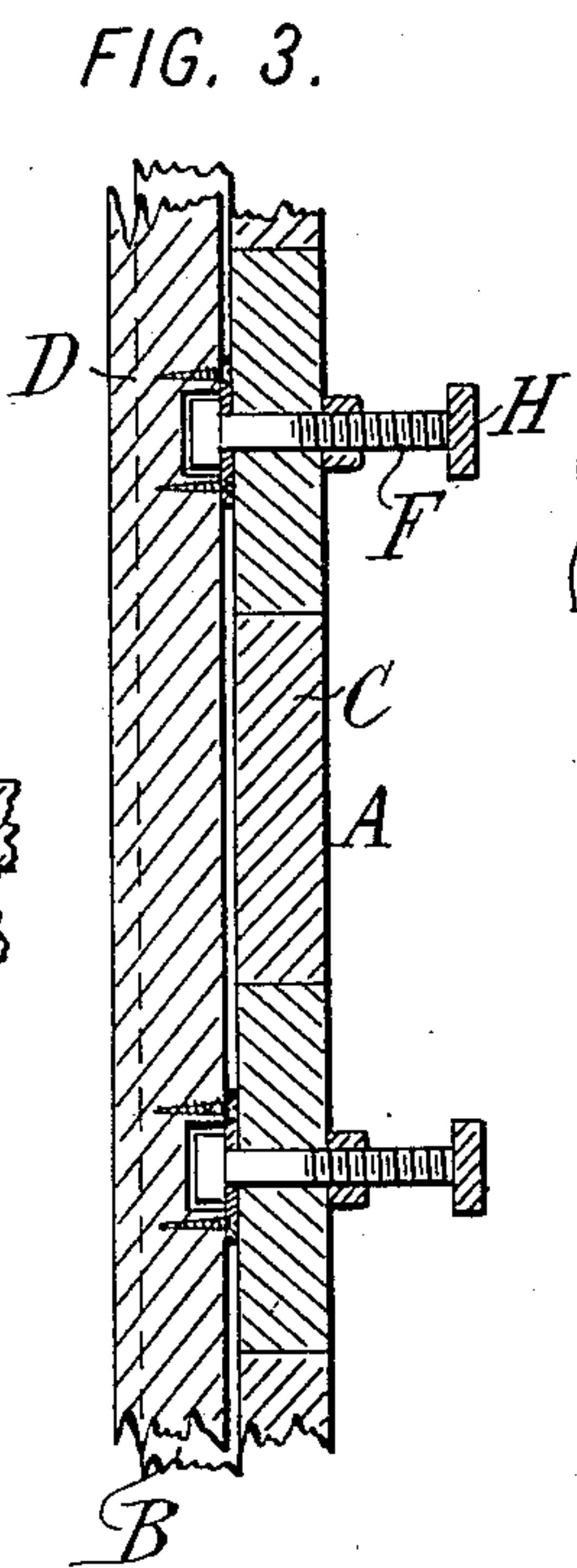
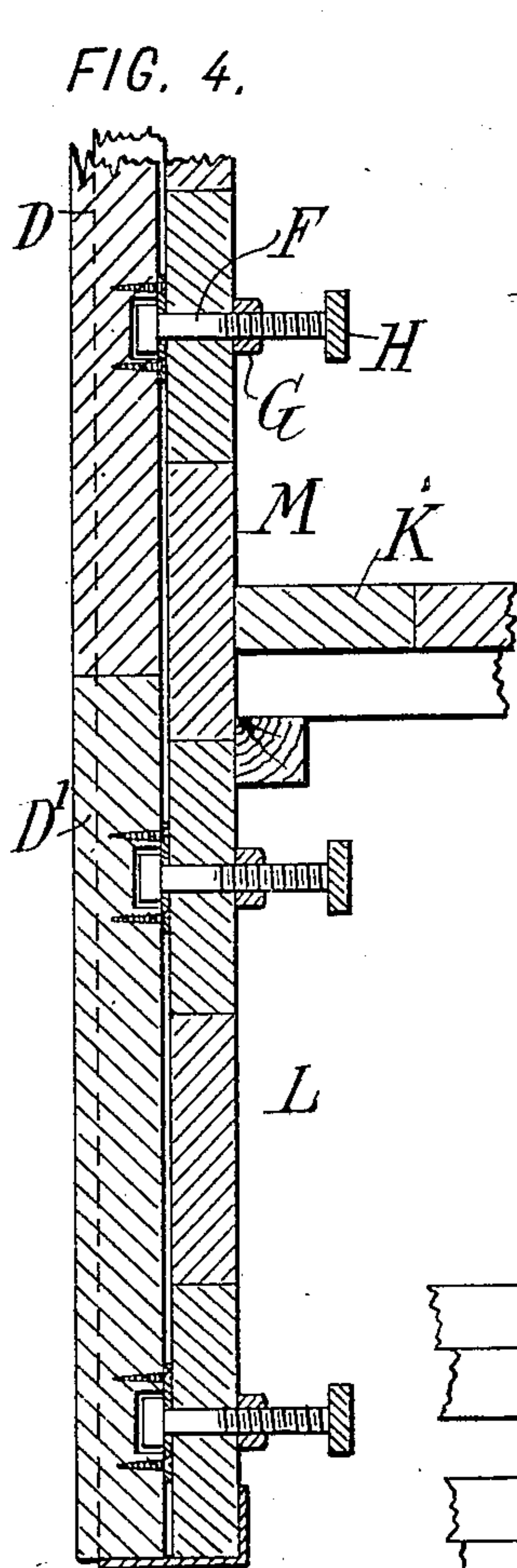
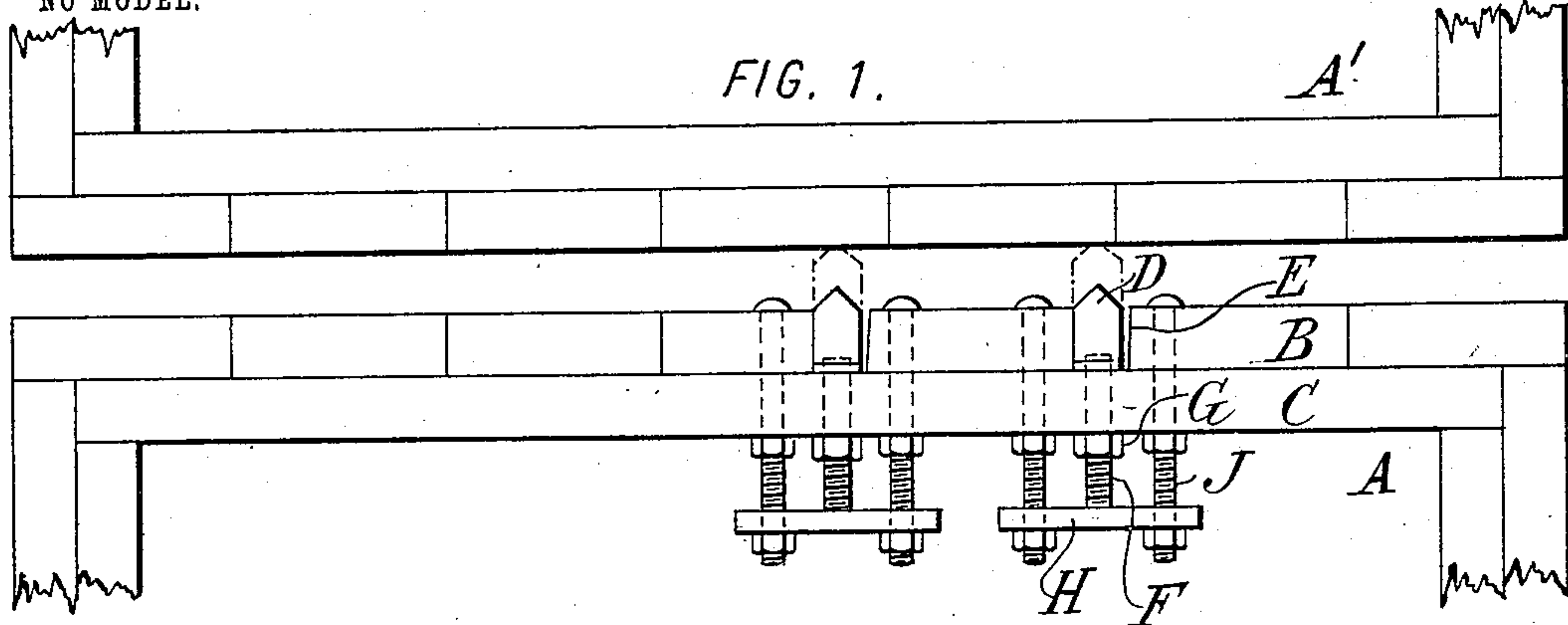
D. E. MORAN & E. S. JARRETT.

CAISSON OR COFFER-DAM.

APPLICATION FILED JAN. 30, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



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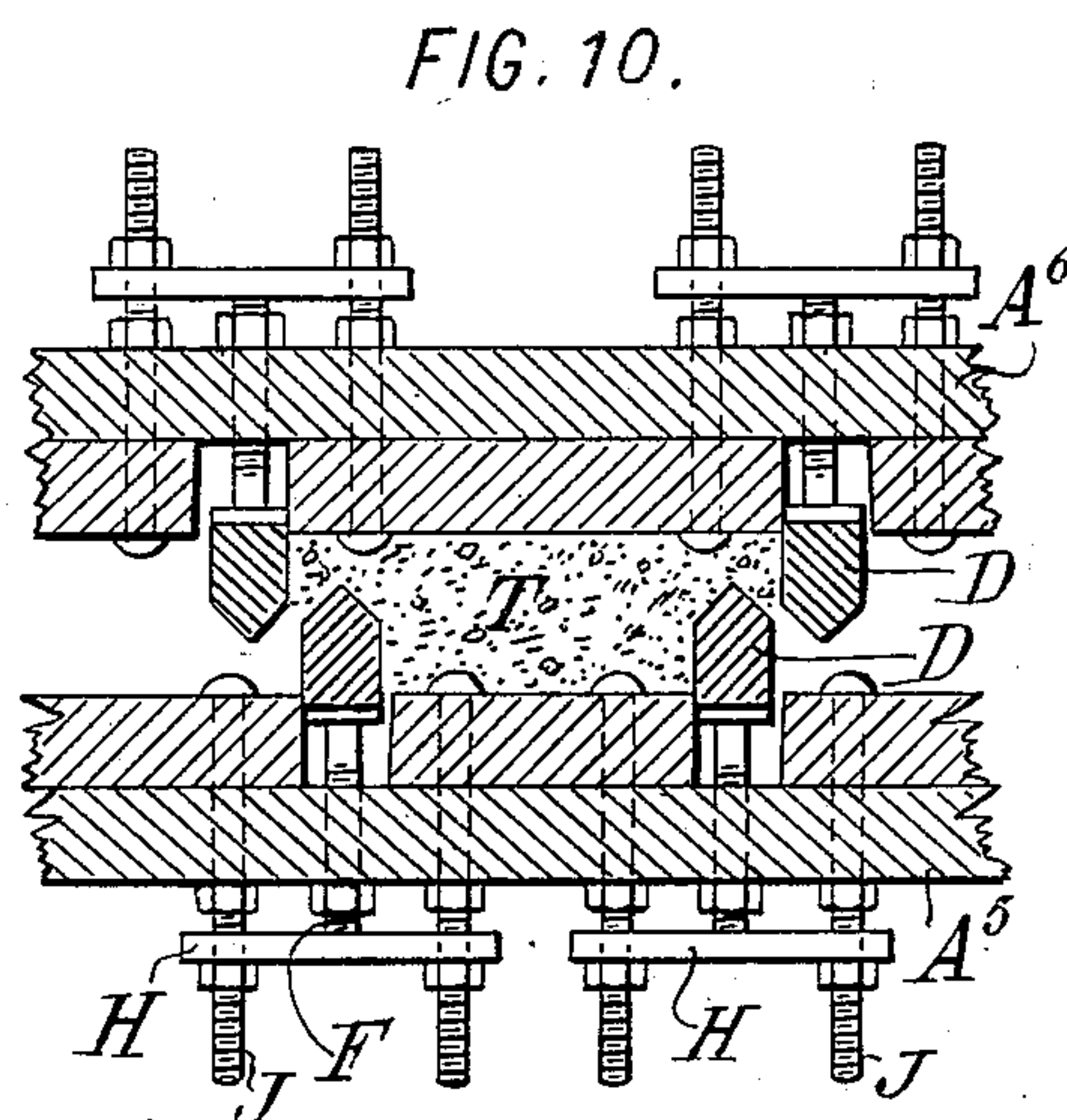
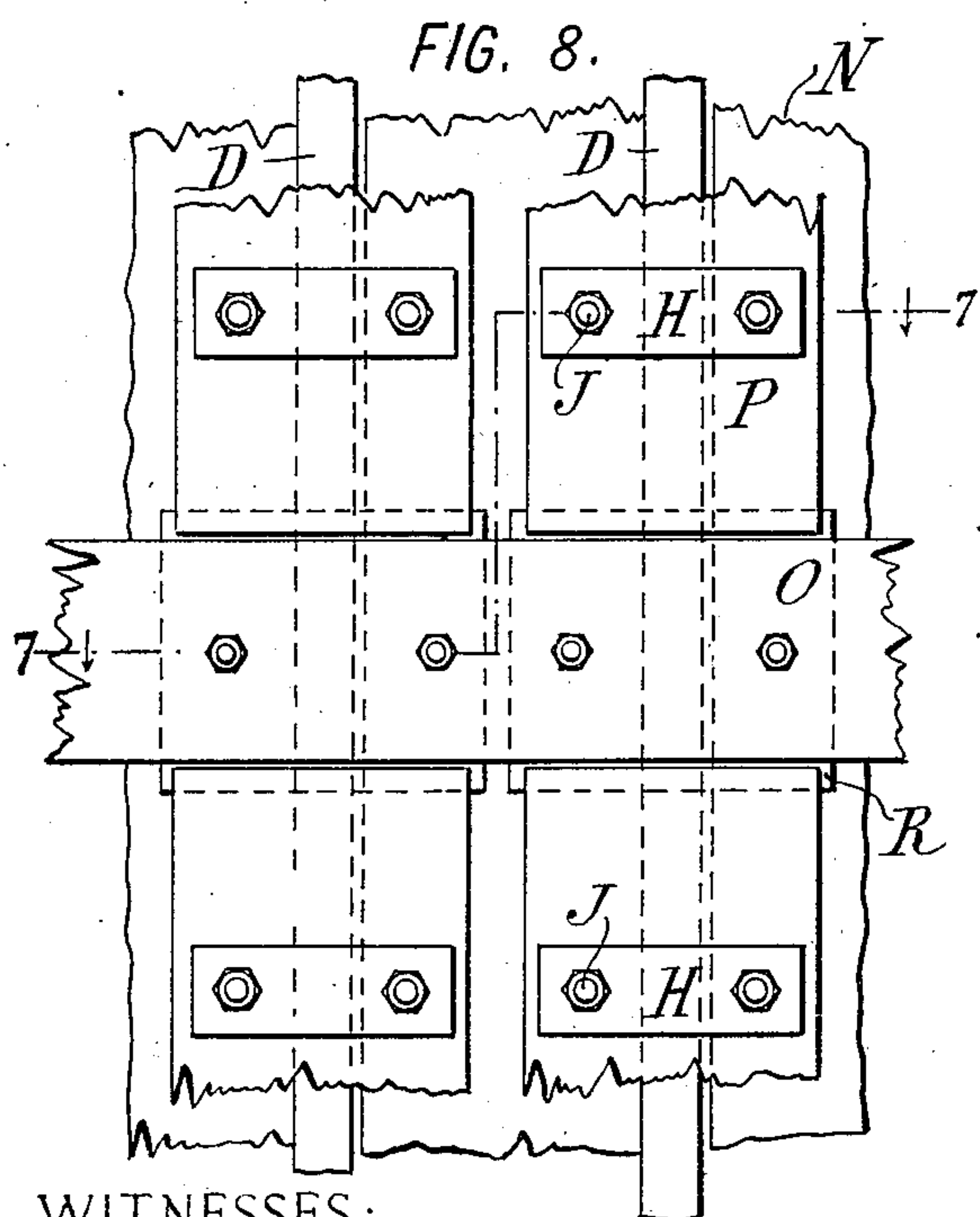
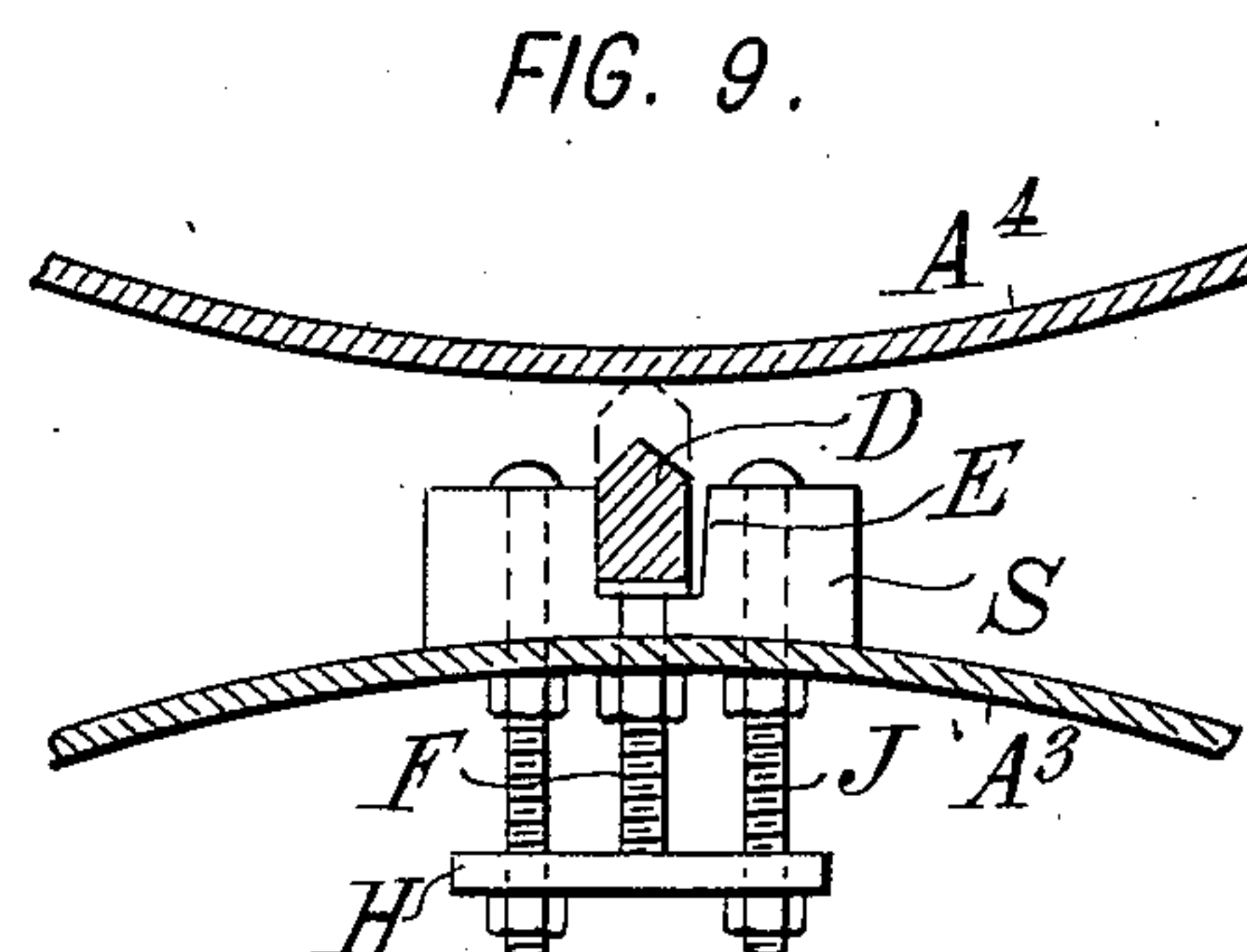
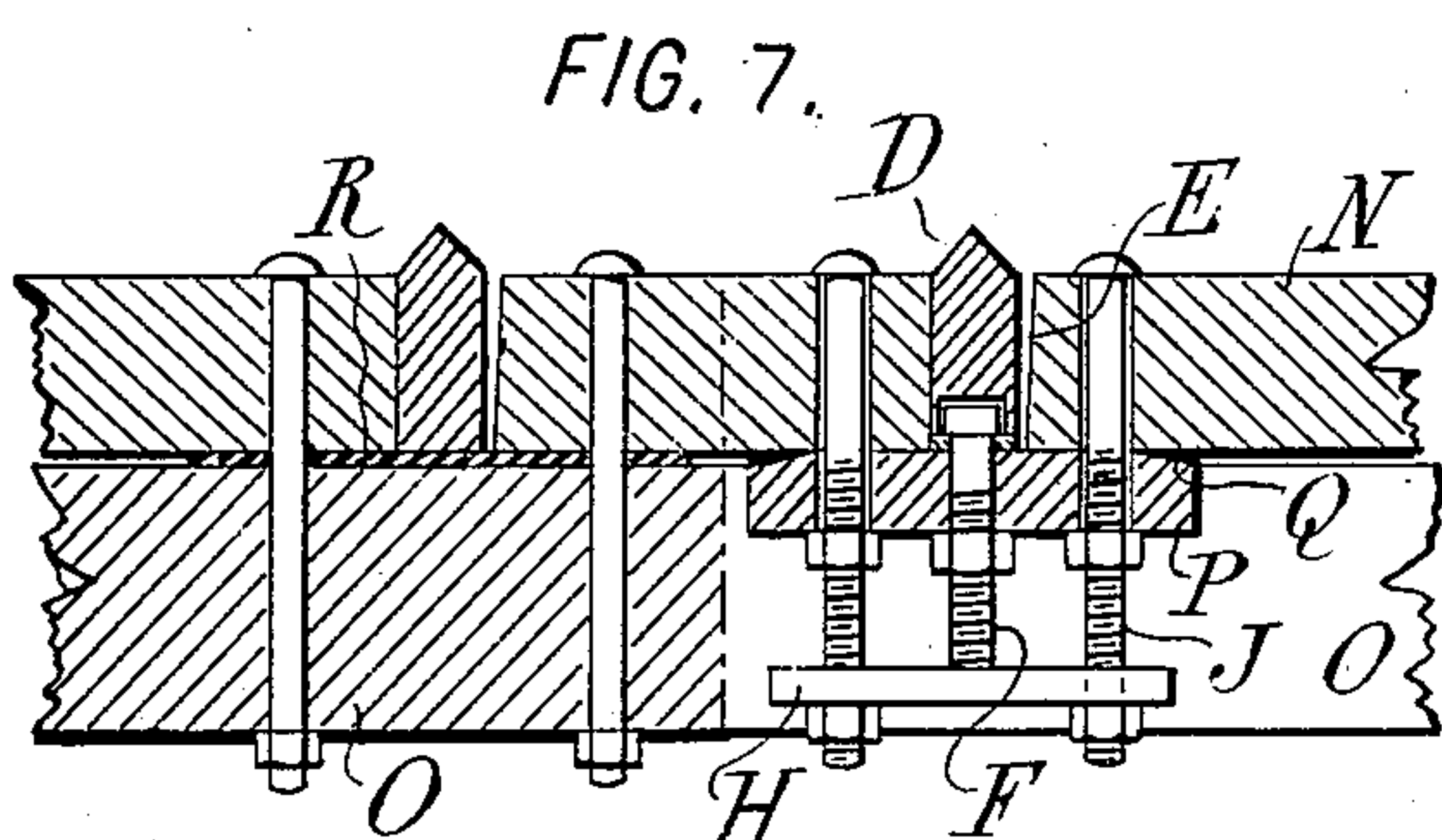
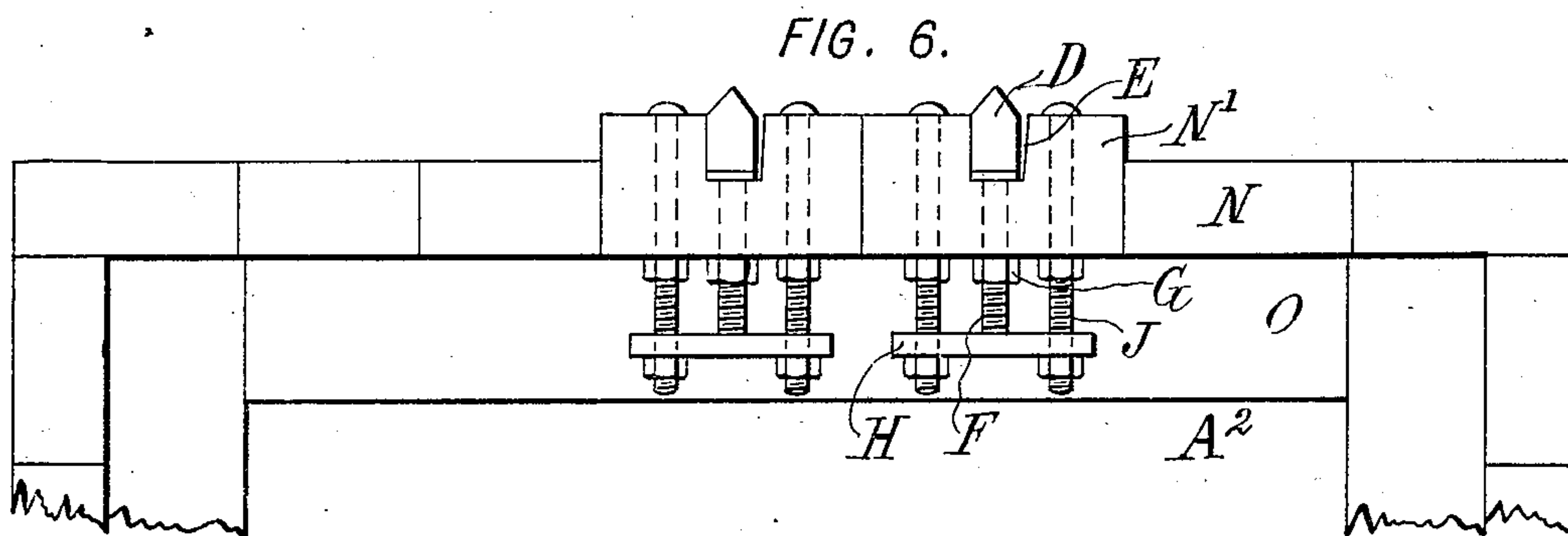
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NO MODEL.

3 SHEETS—SHEET 2.



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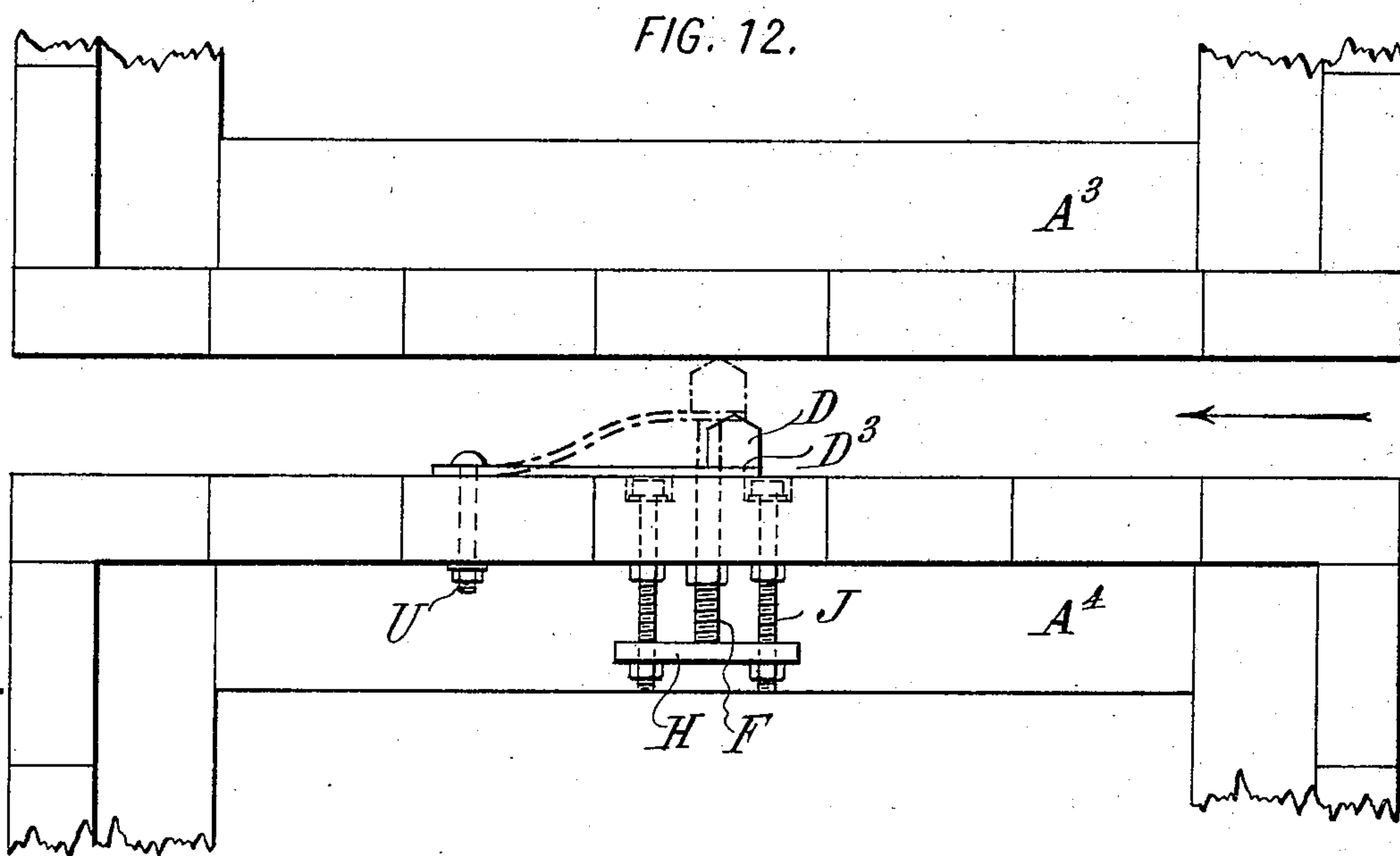
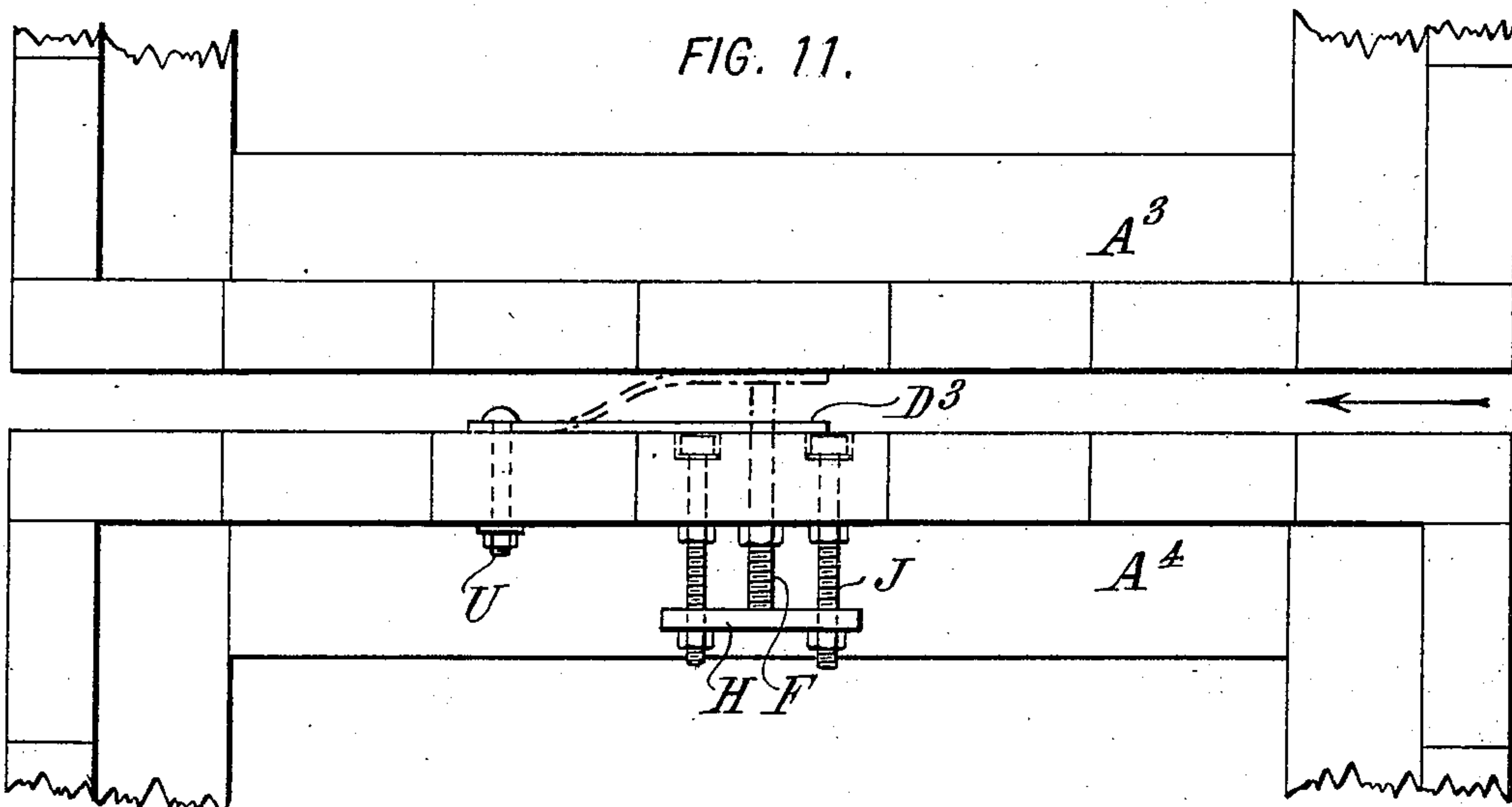
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NO MODEL.

3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

DANIEL E. MORAN, OF MENDHAM, NEW JERSEY, AND EDWIN S. JARRETT, OF NEW YORK, N. Y., ASSIGNORS OF ONE-THIRD TO FRANKLIN REMINGTON, OF GREENWICH, CONNECTICUT.

## CAISSON OR COFFER-DAM.

SPECIFICATION forming part of Letters Patent No. 725,751, dated April 21, 1903.

Application filed January 30, 1903. Serial No. 141,115. (No model.)

*To all whom it may concern:*

Be it known that we, DANIEL E. MORAN, residing at Mendham, in the county of Morris and State of New Jersey, and EDWIN S. JARRETT, residing in the borough of Manhattan, city, county, and State of New York, citizens of the United States, have jointly invented certain new and useful Improvements in Caissons or Coffers-Dams, of which the following is a specification.

Our invention aims to provide certain improvements in caissons or coffer-dams whereby the periphery thereof may be extended.

The improvement is especially useful where it is desired to entirely surround a space, such as a deep foundation or a basement for buildings, by a series of caissons or coffer-dams which shall hold back substantially all the water and earth on the outside of the inclosed space or wherever it is desired to construct a wall consisting of caissons or coffer-dams arranged alongside of each other and adapted to resist the passage of water or the like. According to our invention these objects are attained by a means which is extremely simple in construction and cheap and which can be operated very easily and efficiently. Various other advantages of our invention are referred to in detail hereinafter.

Referring now to the embodiments of the invention illustrated in the accompanying drawings, Figure 1 is a plan view of the adjacent ends of two timber caissons or coffer-dams, showing our improvements applied thereto. Fig. 2 is a view of the inner face of the caisson or coffer-dam shown in Fig. 1. Fig. 3 is a section of Fig. 2, taken on the line 3 3. Fig. 4 is a view similar to Fig. 3, showing the construction preferably adopted at the lower portion of a pneumatic caisson. Figs. 5 and 6 are plan views of other embodiments of the invention. Fig. 7 is a transverse section of another form of the invention, taken on the line 7 7 of Fig. 8. Fig. 8 is an inside face view of the construction shown in Fig. 7. Fig. 9 is a sectional view showing one manner of applying the improvement to metallic caissons. Fig. 10 illustrates a still further adaptation of the invention. Figs.

11 and 12 are plan views of other embodiments of the invention applied to a single-walled timber caisson.

The forming of a continuous wall more or less water-tight by setting a series of caissons or coffer-dams alongside each other and subsequently filling the space between them has been accomplished in various ways. In all the structures with which we are familiar the space between the caissons has been gotten at either from the top of the work or from one of the caissons by cutting out a portion of its wall, the filling material introduced between the caissons being entirely independent of the caissons themselves. For example, concrete has been filled into the space between the caissons by cutting out the sides of the latter and laying the concrete from within the caissons. The chief objections to these various processes are their great cost and the difficulty of doing the work well. If the filling material is inserted from above, it is difficult to insure its proper location throughout the length of the caisson. If it is laid from within the caissons, the workmen are cramped for room, especially in pneumatic work. We propose to avoid these difficulties by providing means for extending the periphery of a caisson, which means are carried by the caisson, so that they may be quickly and easily made to occupy their final position after the caisson is in place. We provide also means controllable from within a closed caisson for extending its periphery—that is to say, the operation is effected from within the caisson without the expense or the difficulty of opening a hole in the wall of the latter. The means for extending the periphery consists, preferably, of a device such, for example, as a vertical calking-strip carried in a position adjacent to the wall of the caisson and adapted to be moved outward, so as to extend the periphery of the caisson until it presses against the wall of the adjacent caisson, and thus closes the space between the two. We use the word "caisson" both in its ordinary meaning of a vertical tubular structure having a continuous closed peripheral wall and arranged to be sunk under pneumatic pres-



sure and also as referring to an open-topped tubular structure or coffer-dam having such a wall.

Referring now to the embodiments of the invention illustrated in the drawings, Figure 1 shows a pair of rectangular timber caissons A A', arranged alongside each other and as close together as they can conveniently be sunk. The object of our invention is to bridge the space between two such caissons. The caissons shown in this figure are a common type of rectangular double-walled caissons. The outer wall B consists of vertical timbers arranged as close together as possible, but not necessarily water or air tight. The inner wall C consists of similar timbers horizontally arranged and bolted to the outer wall, so as to brace the latter. The inner wall is preferably calked tightly to make it substantially air-tight where pneumatic pressure is used and water-tight in all cases. With caissons of this construction the calking-strip D for extending the periphery of the caisson preferably lies in a vertical groove E, formed in the outer wall B, and consists of a wooden strip preferably extending throughout the depth of the caisson. By forcing this calking-strip out from the caisson A its edge is pressed against the wall of the adjacent caisson A' with any desired degree of pressure. The groove E and the calking-strip D are of such depth that the latter engages the wall of the adjacent caisson A' before it can escape from the groove E, so that after it occupies its operative calking position it still lies in part in said groove. Any suitable means may be provided for holding the calking-strip withdrawn into the groove E during the sinking of the caisson and for forcing it out and against the adjacent caisson when desired. The means which we show comprises a series of bolts F, connected to the calking-strip at suitable intervals of its length and extending into the caisson, where it may be drawn inward by means of a nut G, and means within the caisson for pressing against the bolts consisting, preferably, of plates H, which bear at their central portion against the ends of the bolts F and which may be drawn up by means of bolts J, fixed in the wall of the caisson and extending through the ends of the plates H. The calking-strip may be continuous from end to end of the caisson, or it may extend over only a portion of the depth of the caisson, or it may extend over the entire depth and be made of any number of separate sections one arranged above the other. For example, we prefer to provide a separate portion which is below the level of the roof K in pneumatic caissons. The portion L of the caisson below the roof K constitutes the working chamber and is under pneumatic pressure. When the caisson is to be filled with concrete, as is usual, the working chamber is filled first. The air-pressure is then cut off and the portion M above the roof K, ordinarily called the "coffer-dam," is then filled. By making the parts D and D'

of the calking-strip separate the workmen in the working chamber can first press out the portion D' independently of the portion D, and after the working chamber has been filled with concrete the portion D of the strip may be pressed out simultaneously along its entire length, thus easing the work and preventing injury to the strip by bending or otherwise. The calking-strip may be of any suitable construction and material. For example, it is shown in Fig. 5 as a triangular strip D<sup>2</sup> of iron or steel, so that when it is pressed outward against the wall of the caisson A' its edge will enter such wall for a short distance, as shown in dotted lines, instead of being flattened, as is the case with the wooden strip D of Fig. 1. The strip D<sup>2</sup> may be carried, as shown, in a groove E in the outer wall B of the caisson, similarly to Fig. 1, or it may be carried in any other suitable way, such as those hereinafter described.

It is to be understood that the invention is applicable to caissons or coffer-dams of any construction, those shown being simply to illustrate its adaptation to a common form of caisson.

Fig. 6 shows a mode of applying the improvement to a caisson A<sup>2</sup> having a single wall N of vertical timbers braced at intervals of their length by interior braces O. The single wall N must in this case be made substantially water-tight by calking. The calking-strips, such as D, may be carried in grooves E, formed in the outer portion of timbers N', forming part of the wall of the caisson, but made of extra thickness to allow for the formation of the groove E. The means illustrated for forcing the strip outward are the same as those shown in the previous figures, the complete mechanism for each strip D being preferably carried by the timber N' in which the strip is carried.

Another suitable construction for single-walled caissons is shown in Figs. 7 and 8. In this case the groove E extends through the wall N of the caisson, and security against the admission of water is obtained by applying a covering-strip P over the inner side of the groove, the latter being made tight by calking with oakum or the like Q. The covering-strips P may be held in place by the bolts J, which form part of the means for pressing the calking-strips outward. To prevent leaking at the braces O, gaskets R, of any suitable packing material, may be arranged between the brace and the wall of the caisson, their edges extending a slight distance under the ends of the covering-strips P, as shown in Fig. 8.

In the previous constructions we have shown the calking-strips arranged in pairs, so as to give greater security. This is not essential, however, as a single calking-strip will ordinarily secure the desired tightness.

The invention is equally adapted to steel-walled caissons as to timber caissons and may be applied thereto in a variety of ways. For



example, in Fig. 9 we show the adjacent portions of a pair of steel caissons  $A^3 A^4$ , to the former of which is applied a calking-strip D, carried in a groove E of a vertical timber S, bolted to the outside of the caisson  $A^3$  by means of the bolts J of the strip-pressing mechanism. If it be found that this construction on the outside of the caisson interferes with the regularity of its sinking, the caisson may be formed with an inward groove in its wall, in which the calking-strip is set so as to avoid any substantial projection beyond the periphery of the caisson proper.

Our invention provides also for the closing of a space between two caissons or analogous structures by means of adjustable outward projections therefrom forming a pocket between the caissons and a filling of suitable material in said pocket. For example, as shown in Fig. 10, the caissons  $A^5 A^6$  may be double-walled caissons similar to those shown in Fig. 1 and may be provided with pairs of calking-strips D so arranged relatively to each other that when extended to the positions shown they overlap each other and form a pocket which may be filled with concrete, clay, or other suitable material T, the earth, where there is any, being removed for this purpose. This construction may be advantageously used where the space between the caissons is too great to permit of its being spanned by a single calking-strip.

The style of the calking-strip and the manner of carrying the same are not material to the broad invention. For example, the calking-strip may consist of a flat plate  $D^3$ , Fig. 11, attached at one end—as, for example, by a bolt U—and made of soft enough material to permit the free end being pushed out, as indicated in dotted lines, or made of either metal or wood and hinged near its point of attachment. Such a construction has the advantage that when placed with its free end toward the direction from which the pressure (indicated by an arrow) comes this pressure tends constantly to press the free end of the strip against the opposite caisson and so make a closer joint, so that the strip will assume somewhat the shape shown in dotted lines. Any suitable mechanism for pressing the strip outward may be utilized. In fact, without any special means for moving the strip outward the result may be obtained by arranging it with its free end held slightly away from the caisson-wall, so that after the caisson is sunk the lateral pressure will force the free end gradually over against the opposing caisson. Preferably, however, we use mechanism controllable from within the caisson for moving the strip out, which mechanism may consist, as shown, of the bolts F and J and the plate H, previously described. This form of the invention may be obviously applied to various styles of caissons. We have shown it in use with single-walled timber caissons  $A^3 A^4$ . It is specially adapted for this style of caisson, because it does not necessi-

tate cutting into the wall of the caisson or any other special provision for carrying and guiding the strip.

In Fig. 12 we show a similar pair of caissons  $A^3 A^4$ , provided with a compound calking-strip composed in part of a timber strip D, similar to that shown in Fig. 1, and a flat plate  $D^3$ , similar to that shown in Fig. 11. The position of the strip is determined by the previously-described bolts F and J and plate H. This calking-strip, if desired, may be countersunk.

Though we have described with great particularity of detail certain constructions embodying our invention, yet it is to be understood that the invention is not limited to the specific structures disclosed. Various modifications of the details and of the arrangement and combination of the parts are possible to those skilled in the art without departure from the invention.

We claim as our invention—

1. The combination with a caisson having a continuous closed peripheral wall, of means carried thereby for extending its periphery.
2. The combination with a caisson having a continuous closed peripheral wall, of means controllable from within the same for extending its periphery.
3. The combination with a caisson having a continuous closed peripheral wall, of means carried in a position adjacent to the wall thereof and adapted to be moved outward to extend the periphery thereof.
4. In combination with a caisson having a continuous closed peripheral wall, a device carried in a position adjacent to the wall thereof, and means controlled from within said caisson for moving said device outward to extend the periphery of the caisson.
5. In combination with a caisson, a vertical strip along the wall thereof and adjustably connected thereto to permit it to be moved outward to extend the periphery of the caisson.
6. In combination with a caisson having a vertical groove in its periphery, a vertical strip in said groove and adapted to be moved outward to extend the periphery of the caisson.
7. In combination with a caisson, a vertical strip along the outer side of the wall thereof, a bolt connected thereto and extending into the caisson, and means within the caisson for pressing against said bolt to force said strip outward.
8. The combination with a double-walled caisson having a vertical groove in the outer wall, of a vertical strip in said groove and adapted to be moved outward to extend the periphery of the caisson.
9. Means carried by a caisson for extending its periphery independently at points above and below the roof-level.
10. The combination with a pair of adjacent caissons, of a calking-strip between them and adjustable after sinking to close the space between them.



11. The combination with a pair of adjacent caissons one of which has an outer vertical groove, of a calking-strip between them and lying in part in said groove.
- 5 12. The combination with a pair of adjacent caissons, of adjustable outward projections therefrom forming a pocket between them, and a filling of suitable material in said pocket.
- 10 13. The combination with a pair of adjacent caissons, of adjustable outward projections therefrom formed of calking-strips carried by the caissons and forming a pocket between said caissons, and a filling of suitable material in said pocket.
- 15 In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

DANIEL E. MORAN.  
EDWIN S. JARRETT.

Witnesses:

DOMINGO A. USINA,  
FRED WHITE.