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J. H. AMES.
BUILT-UP MALE DIE.
APPLICATION FILED MAY 29, 1909.

996,601.

Patented July 4, 1911.

3 SHEETS—SHEET 2.

Fig. 6.

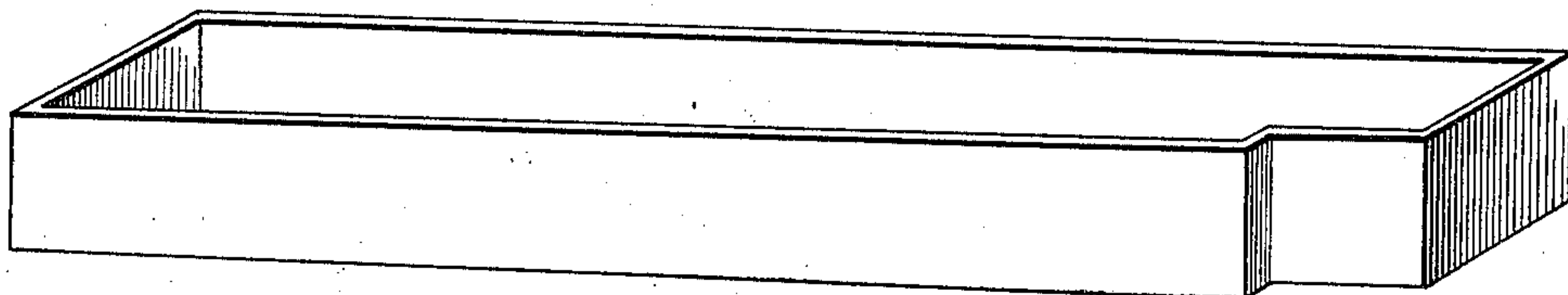


Fig. 7.

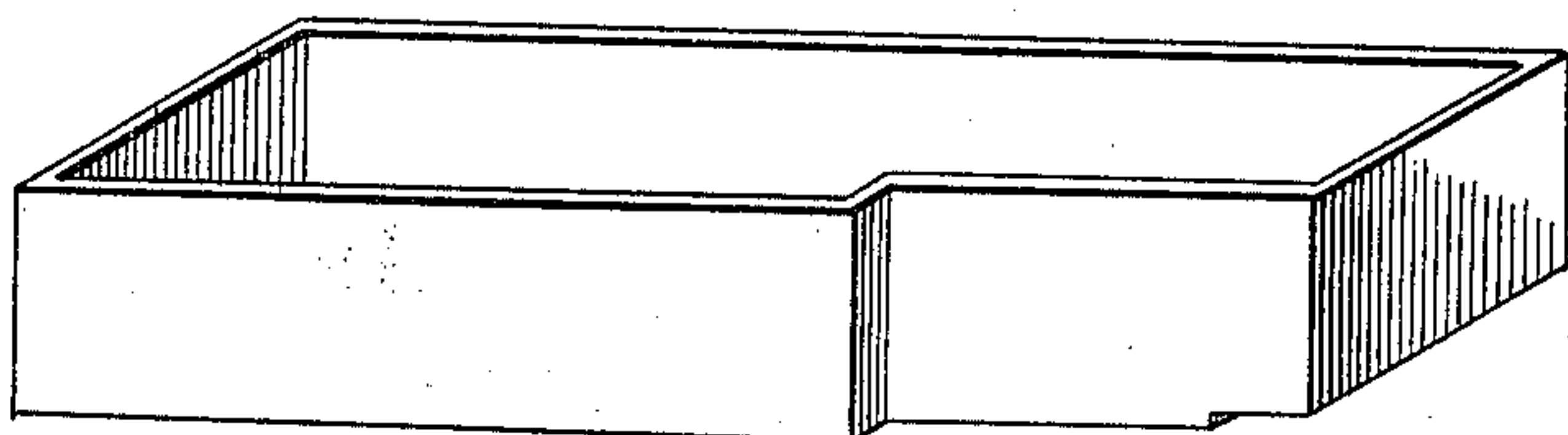


Fig. 8.

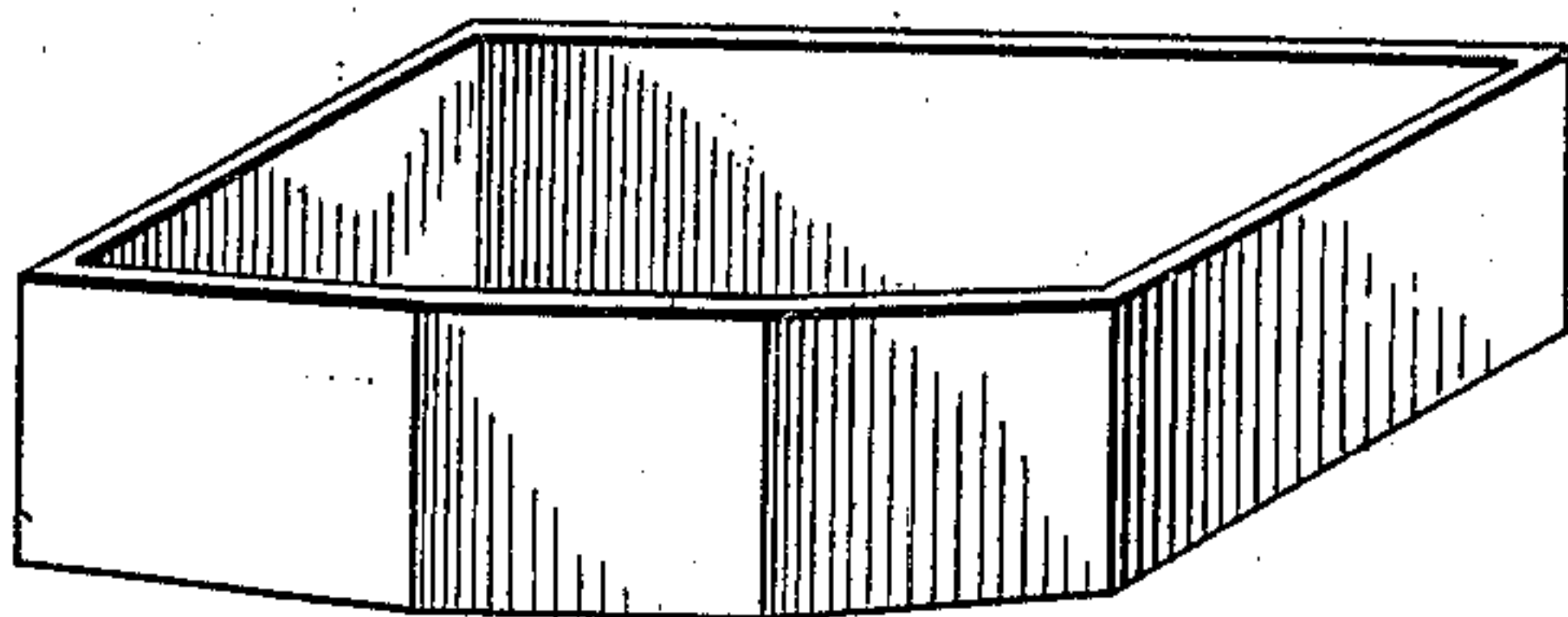
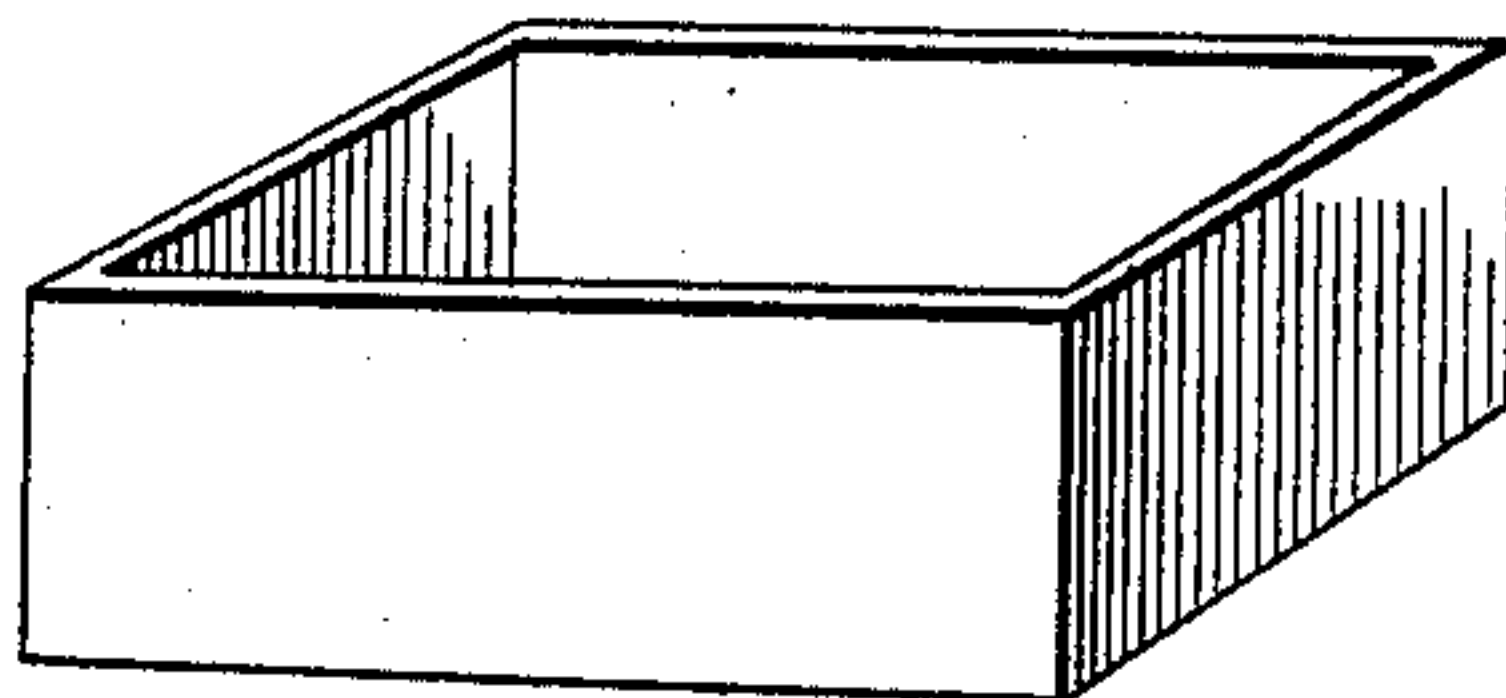


Fig. 9.



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3 SHEETS—SHEET 3.

Fig. 10.

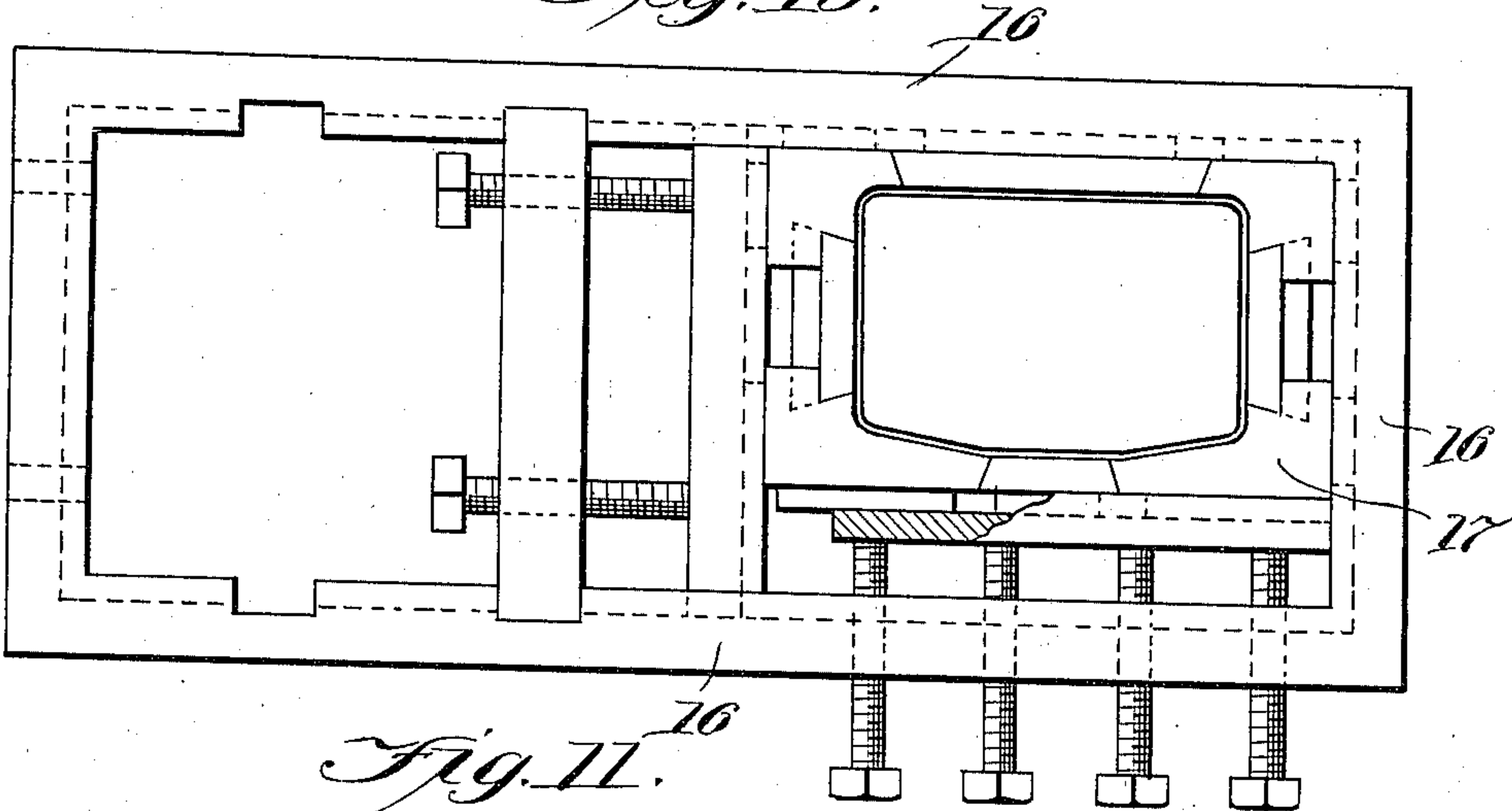


Fig. 11.

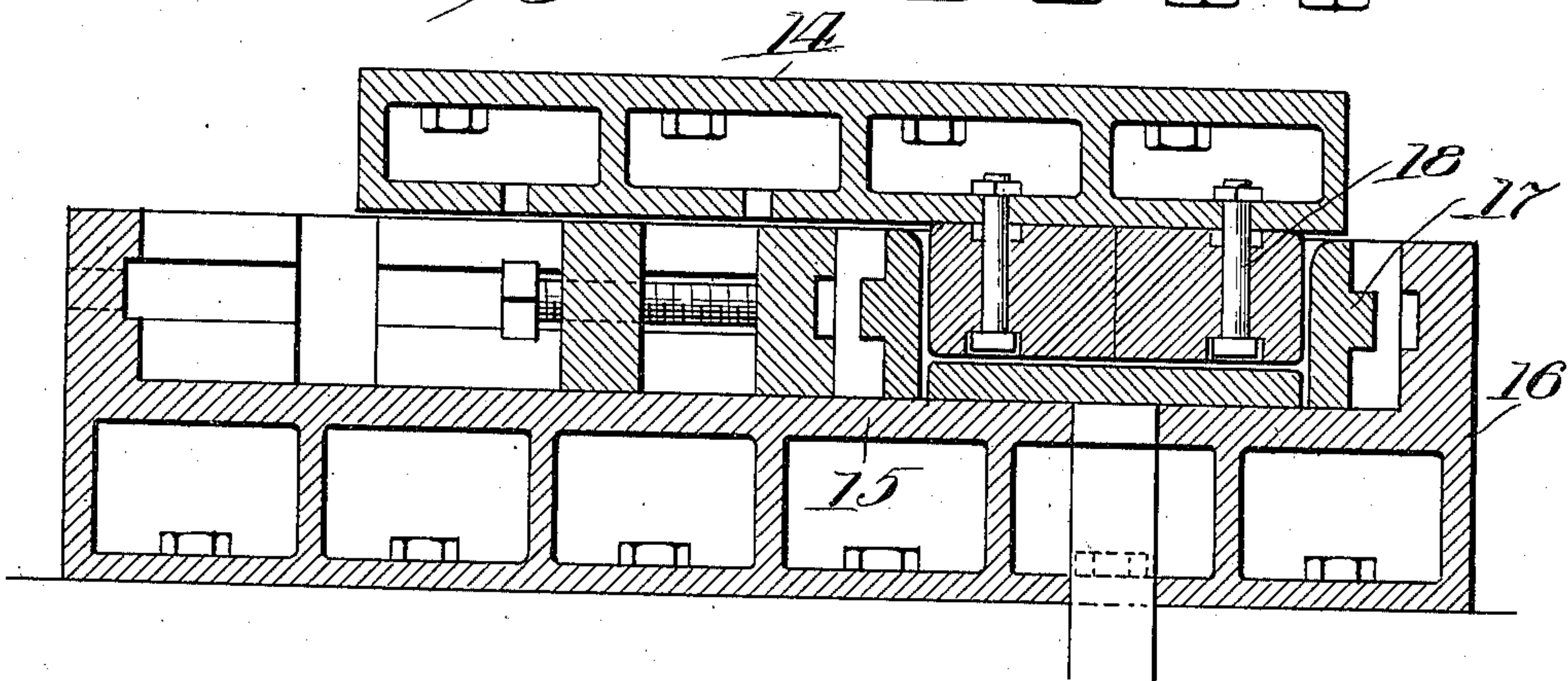
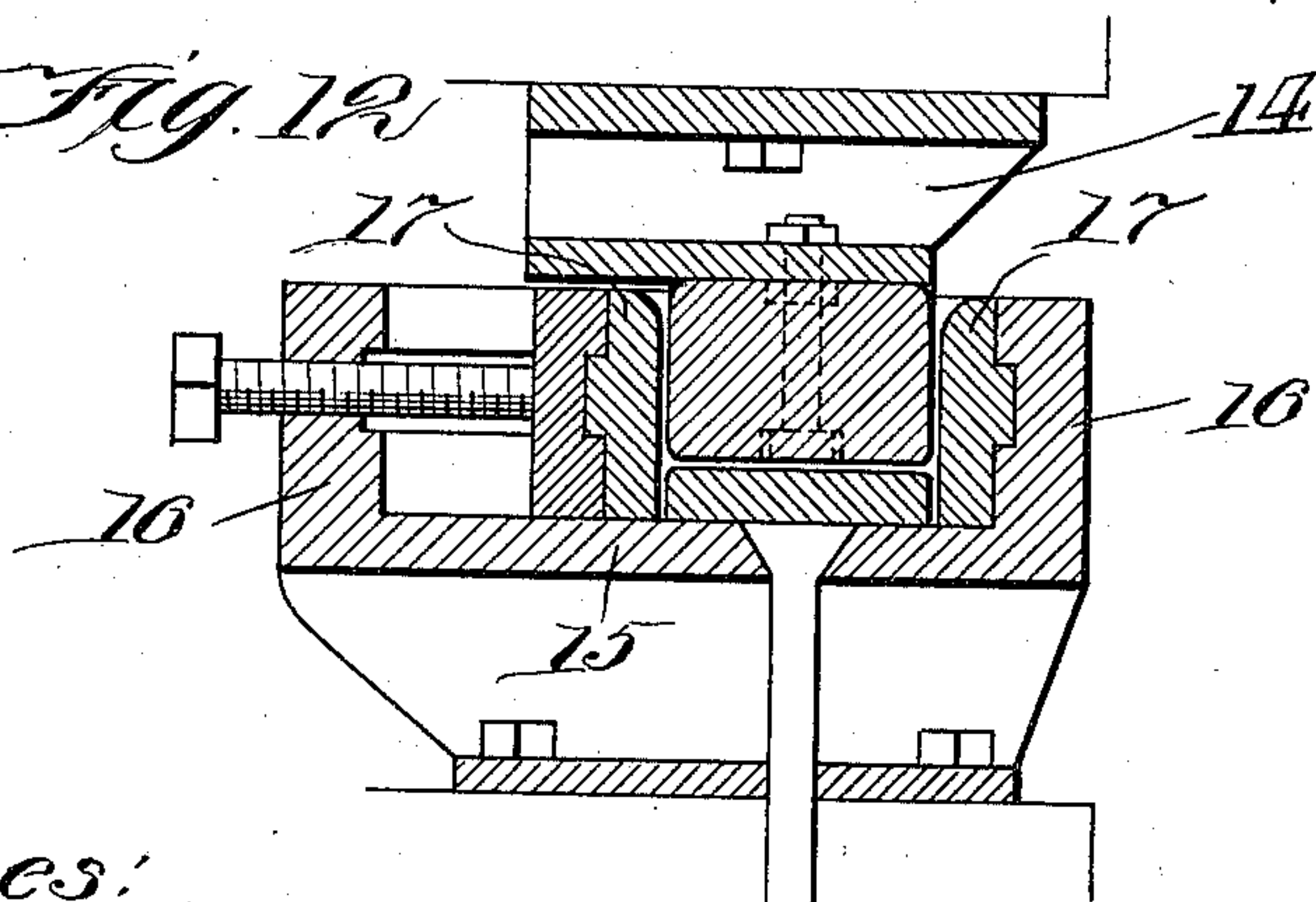


Fig. 12.



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UNITED STATES PATENT OFFICE.

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BUILT-UP MALE DIE.

996,601.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH H. AMES, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Built-Up Male Dies, of which the following is a specification.

In the manufacture of pressed steel cars and in other similar processes it is necessary to press out sheet metal into proper forms and with considerable speed and cheapness. Such pressing operations are called swaging operations. When necessary to use a male and female die in connection with a pressing machine it is customary to support the female die immovably while the male die is carried by the press head and acts to force the sheet metal into proper form between the two dies. It is found that these swaging operations may be carried on more satisfactorily and cheaply if all of the parts are properly standardized so as to be interchangeable and not limited to use in forming one particular shape of product. The same pressing machine including a bed plate and press head may be used for all of the operations it being only necessary to insert properly formed male and female dies within the pressing machine.

The object of this invention is to provide a male die built up from a number of pieces of standard shape and size, and to provide means for holding them rigidly together so that they will properly act as a unit during the swaging operations.

Other objects and uses will appear from a detail description of the invention which consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings Figures 1, 2, 3, and 4 are perspective views of a number of different male dies embodying the features of the present invention: Fig. 5 is a cross sectional view of the die of Fig. 1: Figs. 6, 7, 8 and 9 are perspective views of sheets of metal pressed out by means of male dies of the shapes of Figs. 1, 2, 3 and 4 respectively: Fig. 10 is a plan view of the stationary member of the press machine showing a built up female die corresponding to the male die of Fig. 3 inserted therein: Fig. 11 is a longitudinal section of the pressing machine showing how the stationary and

moving members are related: and Fig. 12 is a cross section similar to Fig. 11.

In this application I do not concern myself particularly with the form of the female die as it is evident this may be either a permanent structure or a built up die as desired.

Referring to Fig. 1 the die as a whole comprises an elongated rectangular center block 6 which may be extended by the addition of one or more end blocks 7 of equal width and thickness. These center and end blocks are supplemented by a plurality of side blocks 8 and 8^a, the former of which are true rectangular and the latter of which is provided with an offset or shoulder 8^b on its outer side face. Evidently such a die when used in conjunction with the proper female die, would stamp the material into the form shown in Fig. 6.

Fig. 2 shows a die comprising two center blocks 6^a placed side by side and each provided at its center on one side with a square projection 6^b, the outer face of which is flush with and forms a part of the outer side face of the die. The two center pieces are laid together face to face to afford a cross shaped member which is extended at one end by the end blocks 7^a and 7^b laid face to face and at the other end by an end block 7^c which is offset in its top and bottom faces to afford shoulders 7^d. The corners of the die are formed at one end by rectangular blocks 8 of the style shown in Fig. 1: and the corners at the other end are filled in by a block 8^e offset to afford upper and lower shoulders 8^a on the top and bottom faces, and by a block 8^e having upper and lower shoulders 8^f and a side shoulder 8^g. This die when used in conjunction with the proper female die and in the position shown in Fig. 2 will stamp the material into the form shown in Fig. 7. If the die were used the other side up then the offset in the side wall of the product would be on the opposite side from that shown in Fig. 7.

Fig. 3 illustrates a die having a rectangular center block 6 which is extended at one end by a rectangular end block 7 of the style shown in Fig. 1; these center blocks are supplemented by the blocks 6^a having the square projections 6^b of the style shown in Fig. 2. This arrangement gives a cross shaped member of greater width than that illustrated in Fig. 2. The corners of the

die on one side are furnished by rectangular corner blocks 8 of the style shown in Fig. 2, and on the other side by corner blocks 8^h beveled on the outer face. This die will be used in conjunction with the proper female die for pressing the sheet metal into the form shown in Fig. 8.

Fig. 4 illustrates a die similar to Fig. 3 with the exception that the center blocks 6 and 7 are omitted and all of the corner blocks are rectangular. This die will serve to press the sheet metal into the form shown in Fig. 9.

The above described and illustrated male dies serve merely for purposes of illustration since it is obvious that with a limited number of center, end, intermediate and corner blocks a great variety of dies can be built up.

The sections of the dies are held together by means of tap bolts 9 which are entered through the blocks comprising the outer side faces of the die and are threaded into tubular sleeves 13 as illustrated in Fig. 5. The outer blocks are properly countersunk to receive washers 11 against which the heads 12 of the bolts abut. Each of the sleeves 13 pass through the center blocks and extend some distance into the side blocks, fitting closely into all of them so as to hold them securely in line. Each sleeve is threaded to receive the tap bolts so that it serves also as a tension member when drawing the blocks together. The sleeve should also be of sufficient length to permit the bolts to be screwed into it a greater or less amount depending upon the thickness of the outer blocks or sections through which the bolts are entered. When thus formed the same sleeve may be used for holding side blocks and intermediate blocks of different thicknesses together.

In each of the built up dies it will be noted that the center blocks or sections are of sufficient length to overlap the adjacent outer blocks or sections so that the center section or sections furnish a frame or support upon which the corners and outer blocks are solidly supported. The center section can be lengthened at one or both ends by the provision of end blocks equal in width and thickness which end blocks need not be attached directly to the center section but may be held in register therewith by the bolts which are entered through the corner blocks. The corner blocks are of irregular shape but preferably made symmetrical on top and

bottom so that by reversing they may be used as right or left.

Referring to Figs. 10, 11 and 12 I show the manner in which the male die of the present application is used in a pressing machine in combination with any suitable form of female die. A press head 14 moves up and down adjacent a stationary bed 15; the latter is provided with walls 16 within which any suitable female die 17 is clamped.

Certain of the blocks from which the male die is built up are provided with holes 10^a which are counter-sunk so that bolts 18 may be passed through them into the press head 14 for holding the male die solidly against the latter. By counter-sinking these holes 10^a on both ends the blocks which compose the die may be used either side up as has been heretofore explained.

It is seen that a built up die of the type herein illustrated will be very rigidly held together by the sleeves 13 and by solidly bolting the blocks to the press head. This die is found to be well adapted for very heavy metal swaging operations in which large sheets of thick metal are handled.

I claim:

1. In a built-up male die the combination of a main inner section, a plurality of removable sections abutting the faces of the same to provide a continuous outer working die surface and periphery, and means for rigidly securing the removable sections to the inner section to provide therewith a solid die member, substantially as described.

2. In a built-up male die the combination of a main inner section provided with a plurality of transverse sleeve holes, a sleeve entered into each hole and protruding out therefrom past the side face of the section and being threaded on its inner surface, and a plurality of removable sections abutting the faces of the inner section and serving therewith to provide a working periphery and surface of suitable contour, and each provided with transverse sleeve holes in position to engage the protruding ends of the sleeves of the inner section, and countersunk on their outer ends to receive tap bolts entered through them and threaded into the sleeves for the purpose of drawing and holding the outer sections to the inner section, substantially as described.

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