

M. A. BOURGEOIS.  
 APPARATUS FOR PRESSING PARTS OF LARGE DIMENSIONS FROM METAL PLATES.

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Fig.2.

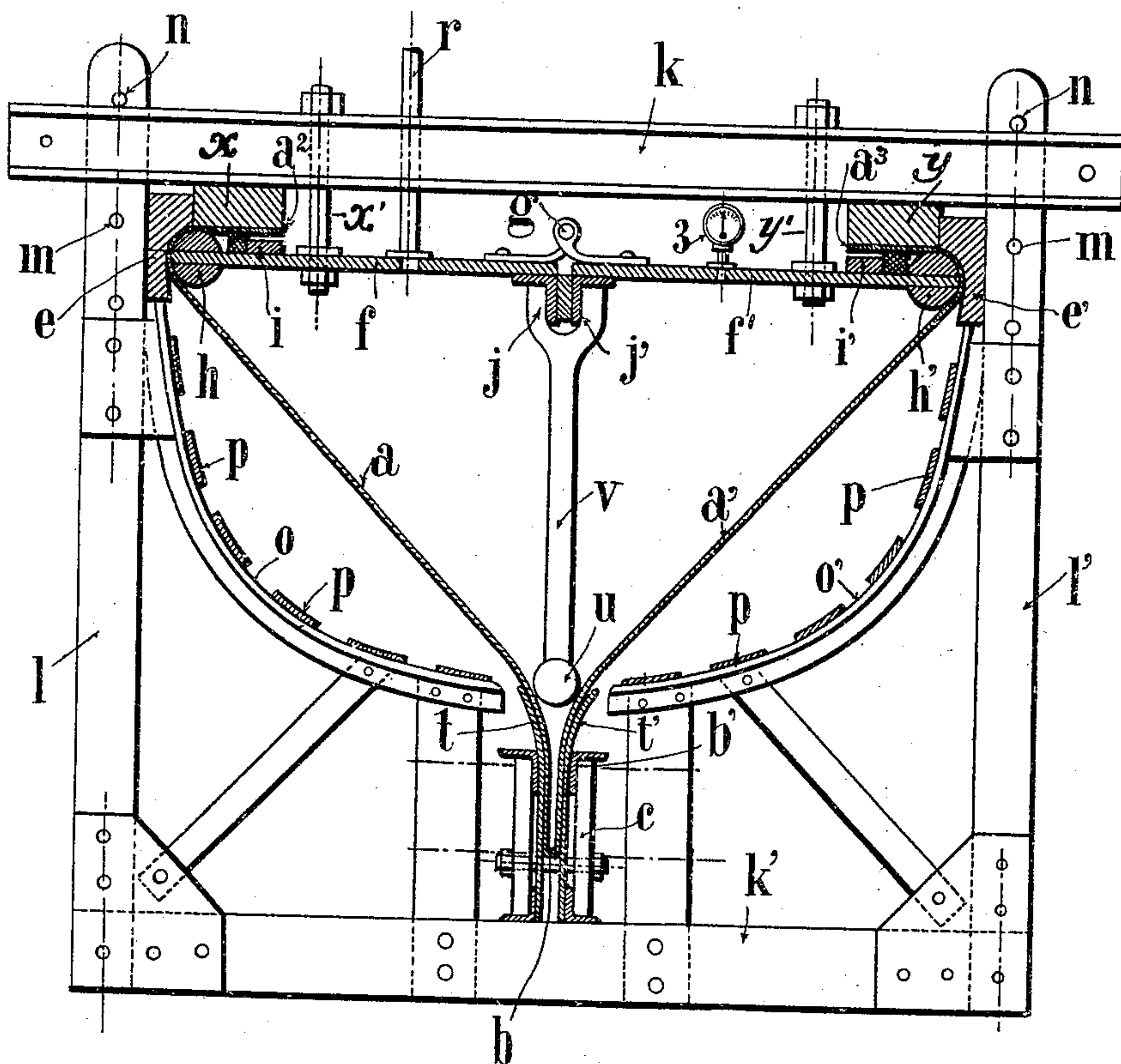
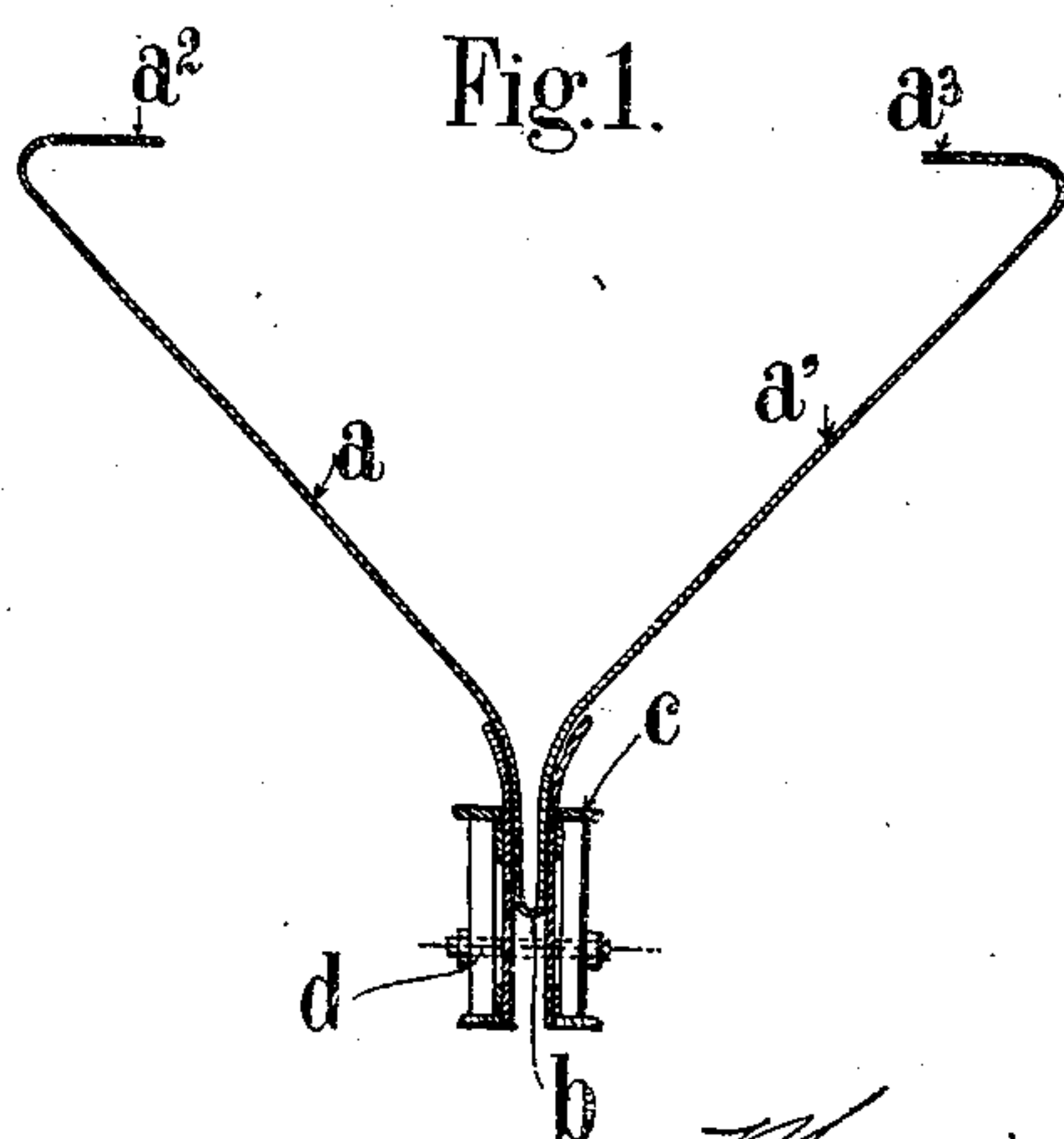


Fig.1.



WITNESSES:

Frank N. Forrest  
 Robt. M. Morgan

INVENTOR,

Maurice A. Bourgeois,

BY

Albert J. Bourgeois,  
 ATTORNEY.



# UNITED STATES PATENT OFFICE.

MAURICE ALBERT BOURGEOIS, OF LIZY-SUR-OURCQ, FRANCE.

APPARATUS FOR PRESSING PARTS OF LARGE DIMENSIONS FROM METAL PLATES.

938,816.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, MAURICE ALBERT BOURGEOIS, a citizen of the Republic of France, and resident of Lizy-sur-Ourcq, Seine et Marne, France, have invented a new and useful Apparatus for Pressing Parts of Large Dimensions from Plates of All Metals, which is fully set forth in the following specification.

The present invention has for its object the provision of means for pressing parts of large size from plates of any kind of metal into forms which have hitherto been difficult or practically impossible to obtain by means of male and female dies.

This process consists broadly in placing one of the faces of the part to be pressed opposite a mold previously formed and constituted either by a series of metal or other templets, or by a cavity of masonry, reinforced concrete, etc., and in applying upon the other face, by means of any convenient fluid, such as water, steam, compressed air, etc. introduced into a fluid-proof compartment one of the faces of which is closed by the plate, the pressure required for applying the plate to the mold. The edges of the plate being adapted to slide, a relatively weak pressure, which in all cases is proportionate to the thickness of the metal, forces said plate against the mold, the contours of which are imparted to it.

This process is applicable even to cases in which welded plates are to be pressed. The fact that the edges of the plates are able to slide facilitates the application of the surface of the plates to the mold, no prejudicial strains being produced at the welds.

The apparatus by means of which this process may be carried into practice is illustrated by way of example in the accompanying drawing.

The apparatus here illustrated is adapted for obtaining in a single operation the hull of a boat provided with a keel, but it will of course be understood that without modifying anything other than the mold, it may be used for pressing any part of large size, the shape or the selling price of which does not permit of using the means heretofore employed, that is to say pressing by means of dies.

Figure 1 is a diagrammatic view showing the plates at the beginning of the operation.

Fig. 2 is a cross section showing the device as a whole.

The hull of the boat having been designed by the ordinary method, the plates  $a$   $a'$  (Fig. 1) are given the form shown in this figure. The two plates are welded at  $b$  at the lower part which is held in a frame  $c$ , maintained at the proper distance by bolts  $d$  which nevertheless enable the part of the plates thus held to slide. The upper part of each of the plates, the edge  $a^2$  or  $a^3$  of which has been turned down as shown in Fig. 1, is pressed against an iron  $e$  or  $e'$  presenting the outer contour that it is desired to give to the boat. The part between  $a^2$  and  $a^3$  which has remained open, is closed by means of a cover formed in two parts  $f$   $f'$  (Fig. 2) which, in order to facilitate its arrangement in position and its removal, open on an external hinge  $g$  in the median plane of the apparatus. This cover is provided on its outer contour at  $h$  or  $h'$  with a round edging which fits into the channel in the irons  $e$   $e'$ , the plates being interposed. Flat irons  $i$  or  $i'$  secured to the cover, maintain a tight joint respectively with the adjacent strap of india rubber, cotton or other suitable material, enabling a tight joint to be formed at the upper contour of the apparatus.

The median portion of the cover is stiffened by two angle irons  $j$   $j'$  riveted below at a small distance from the edges of the parts  $f$   $f'$ , in such a manner as to provide room for a band of india rubber, cotton or other appropriate material, forming a joint at the hinge of the cover. It will be understood that owing to the arrangement of the hinge  $g$ , the efficacy of the joint which has just been described can only increase when pressure exists inside the compartment formed by the two plates and the cover.

In order to prevent the cover from being lifted, a series of bars  $k$  or  $k'$  of U-shaped iron connected with angle irons are provided; the bars  $k$  are arranged on the cover and the bars  $k'$  beneath the pressure beam  $c$  at the lower part and they are connected by means of vertical uprights  $l$   $l'$  provided with holes for the reception of tightening wedges  $n$ .

In order to reinforce the hinged cover during the period of expansion, there are interposed between the bar  $k$  and the cover  $f$   $f'$ , suitable means, as spacing-parts  $x$   $y$ , which



in association with the bolts  $x'$   $y'$ , serve to hold the cover securely in place.

In order to obtain the desired form of hull, a series of iron templets  $o$ ,  $o'$  are fixed to each of the vertical uprights  $l$ ,  $l'$  and connected one with the other by flat iron bands  $p$ . The mold may, however, be formed in a different way. Instead of templets connected by flat iron bands, a trough of masonry, reinforced concrete etc. presenting the shape of the hull might be employed.

When the assemblage has been completed and the joints are well secured, the compartment formed by the plates and the cover is filled with water, then by forcing the water, by means of a compression pump connected with a nozzle  $r$  on the cover, a certain pressure is produced inside the apparatus. This pressure is indicated by a pressure gage.

According to the thickness of the plate, from the beginning of the operation and later on, owing to the pressure produced, the plates have a tendency to be applied to the outer mold. In order to enable the plates to bend and fit exactly against the templets, care should be taken to leave at the lower part a reserve of metal represented by the double area of metal which is withdrawn from the lower beam  $c$  in proportion as the operation progresses. When the pressing is finished, the seam or joint  $b$  will be located at  $b'$  for example.

In order to force the plates to follow the contour  $t$  or  $t'$  of the lower beam  $c$  without buckling, it is only necessary to arrange inside the apparatus a round iron  $u$  held in place by stays  $V$  wedged beneath the cover. This round iron is arranged in position prior to the filling, the interior being entered through a man-hole formed in a suitable part of the cover.

The pressing operation may be still further facilitated by using water heated by any convenient means for supplying the pressure. Any other appropriate fluids such as steam, compressed air and the like may also be substituted for water.

Having now described the features of my

invention with some detail, I desire to claim and secure by these Letters Patent, the following:—

1. In apparatus of the class described, the combination with a suitable mold conforming in shape to the article to be produced, of a communicating narrowly-recessed member extending exteriorly and longitudinally of said mold, and adapted to receive and support a folded portion of surplus metal, means for effecting a tight closure at the upper periphery of the mold, and additional means for supplying a fluid under pressure to the interior thereof, substantially as set forth.

2. In apparatus for shaping the hulls of vessels, the combination with a mold conforming in shape to the hull desired, of a bottom member affording a narrow longitudinal recess for receiving a fold of surplus metal adapted to form the keel, a closure member for maintaining a tight joint with the upper edges of said mold, an inner support or mandrel adjacent to the longitudinally recessed member, adapted to maintain the shape of the hull adjacent to the keel, and means for supplying a fluid under pressure to the interior of the mold, substantially as set forth.

3. In apparatus for shaping hulls of boats or vessels, the combination with a mold conforming in outline to the shape of the desired hull, of an adjacent bottom member affording a narrowly recessed longitudinal opening adapted to receive a fold of surplus metal from which it may be partially withdrawn to form the keel, a closure member for maintaining a tight joint with the upper edges of said mold, and means for supplying a fluid under pressure to the interior of said mold, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

MAURICE ALBERT BOURGEOIS.

Witnesses:

EMILE LEDRET,

H. V. COXE.