

No. 834,127.

PATENTED OCT. 23, 1906.

G. M. HARROWAY & W. DIXON.

SHIP CONSTRUCTION.

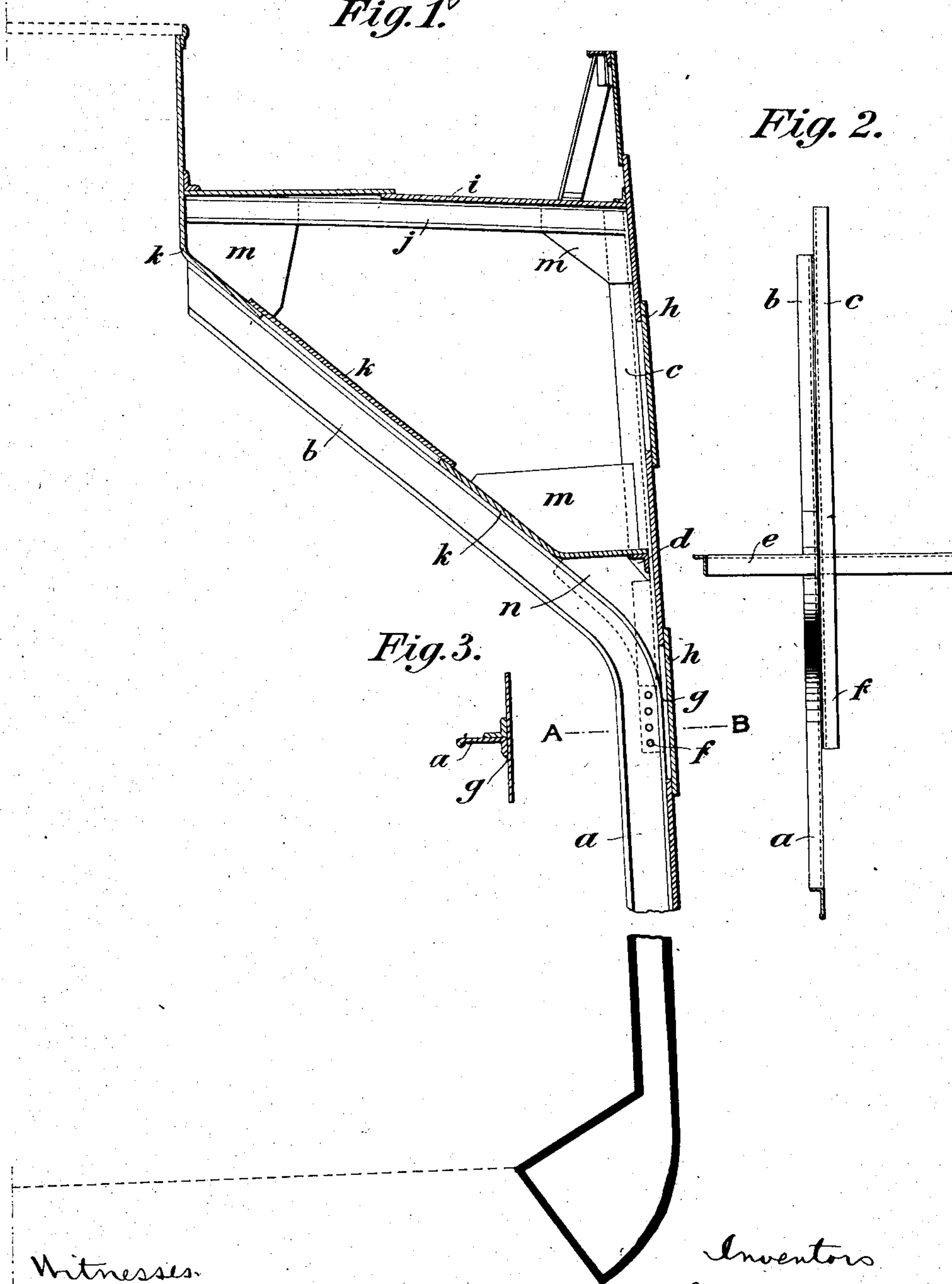
APPLICATION FILED APR. 24, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

Fig. 2.

Fig. 3.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 4

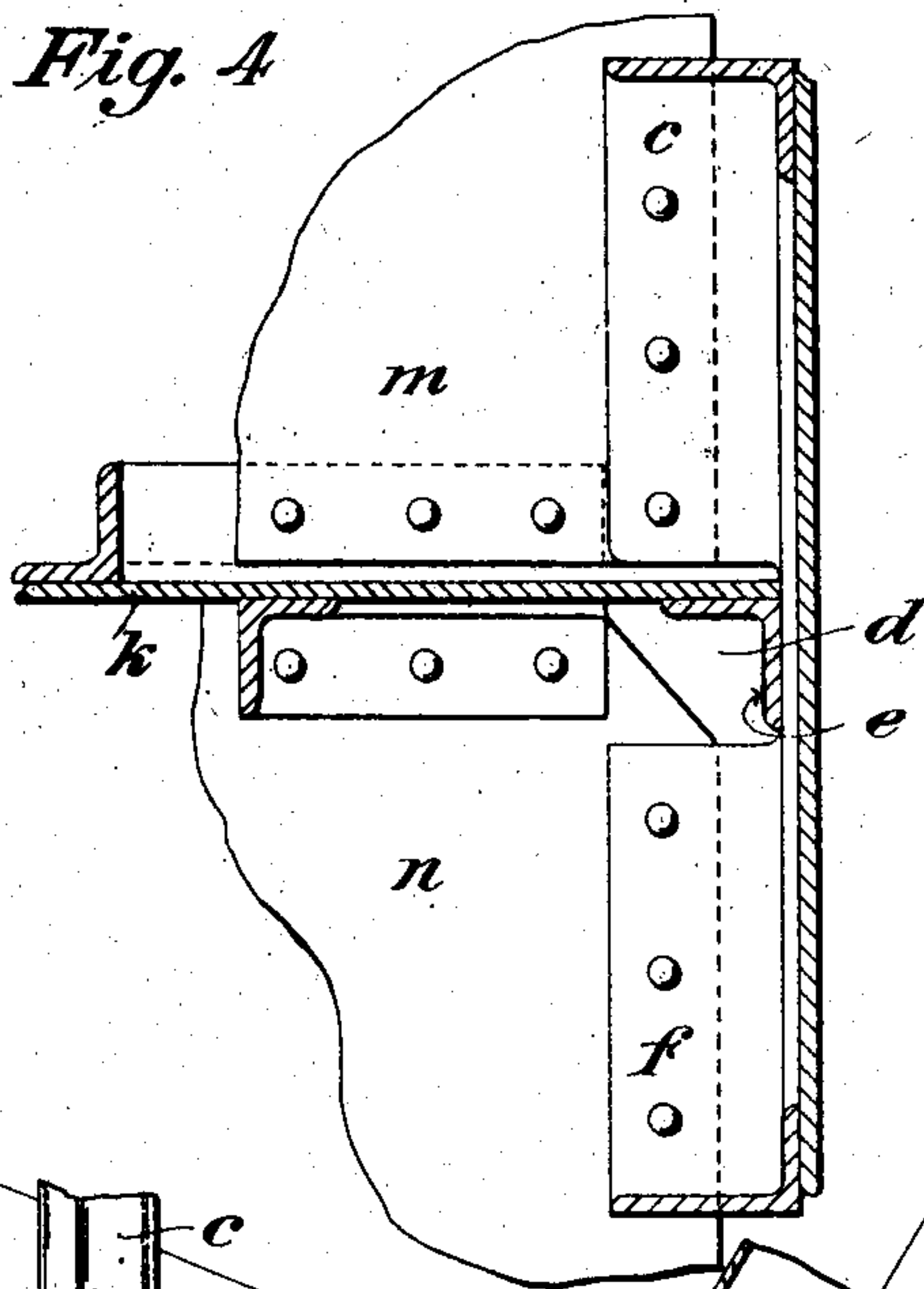


Fig. 6.

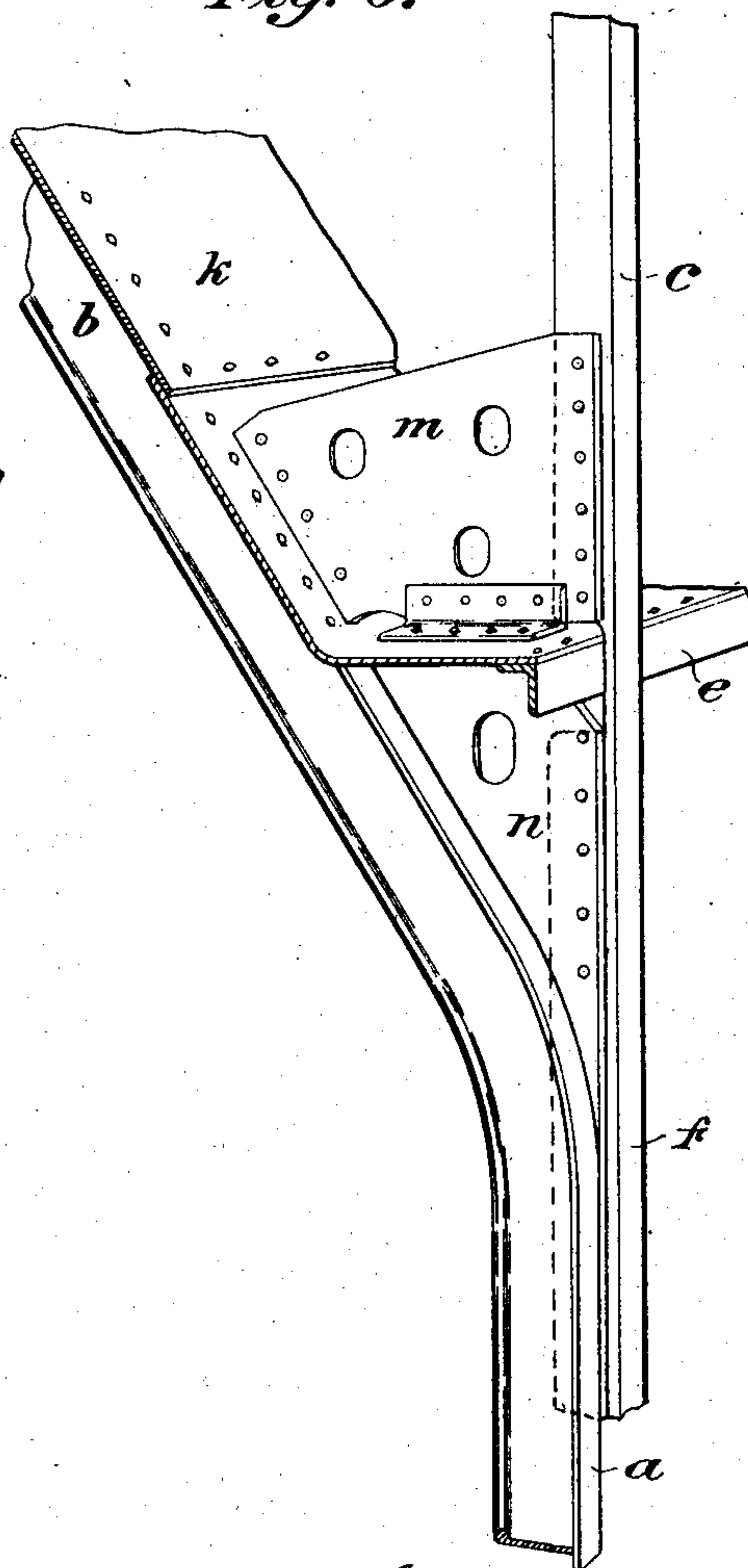
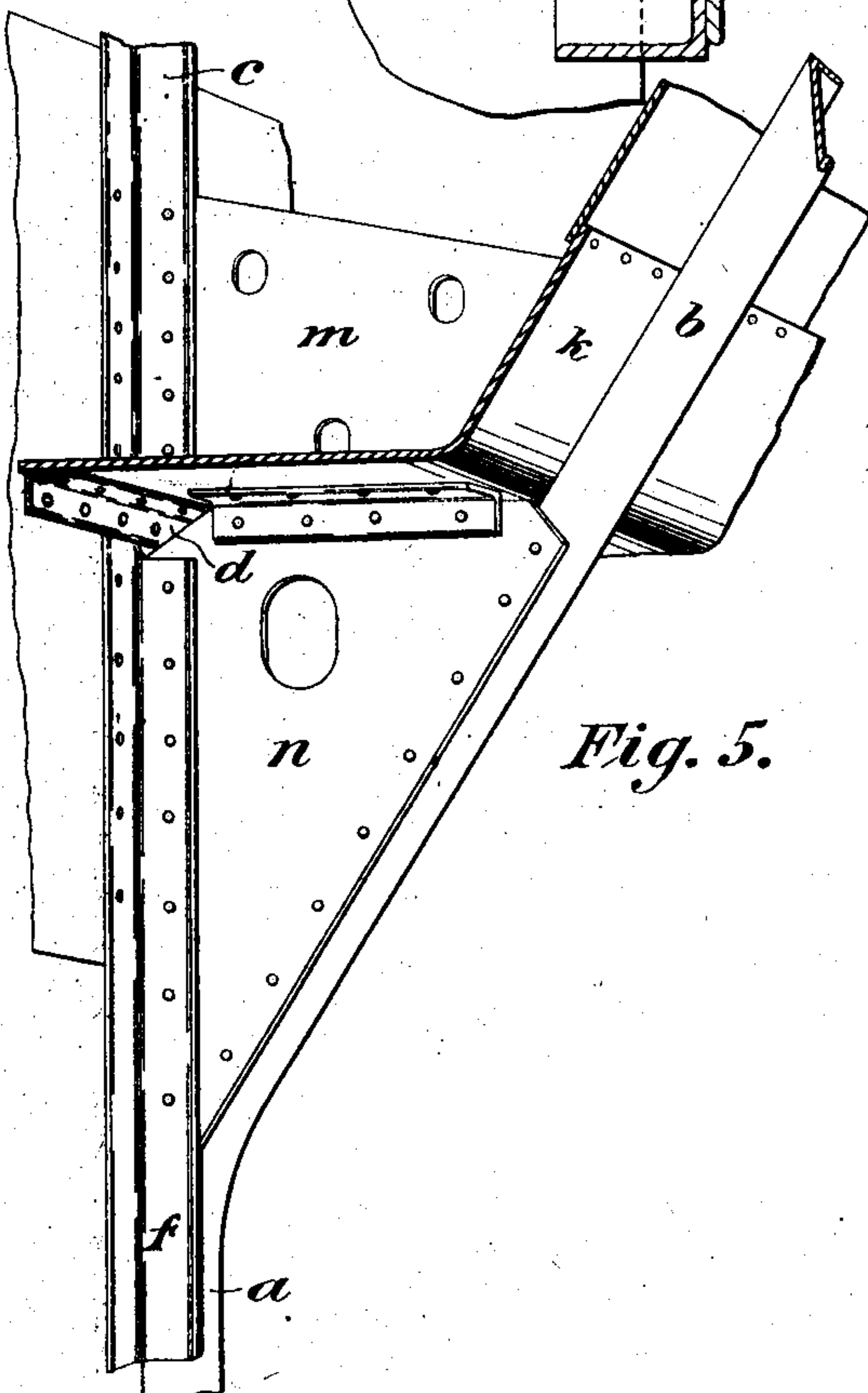


Fig. 5.



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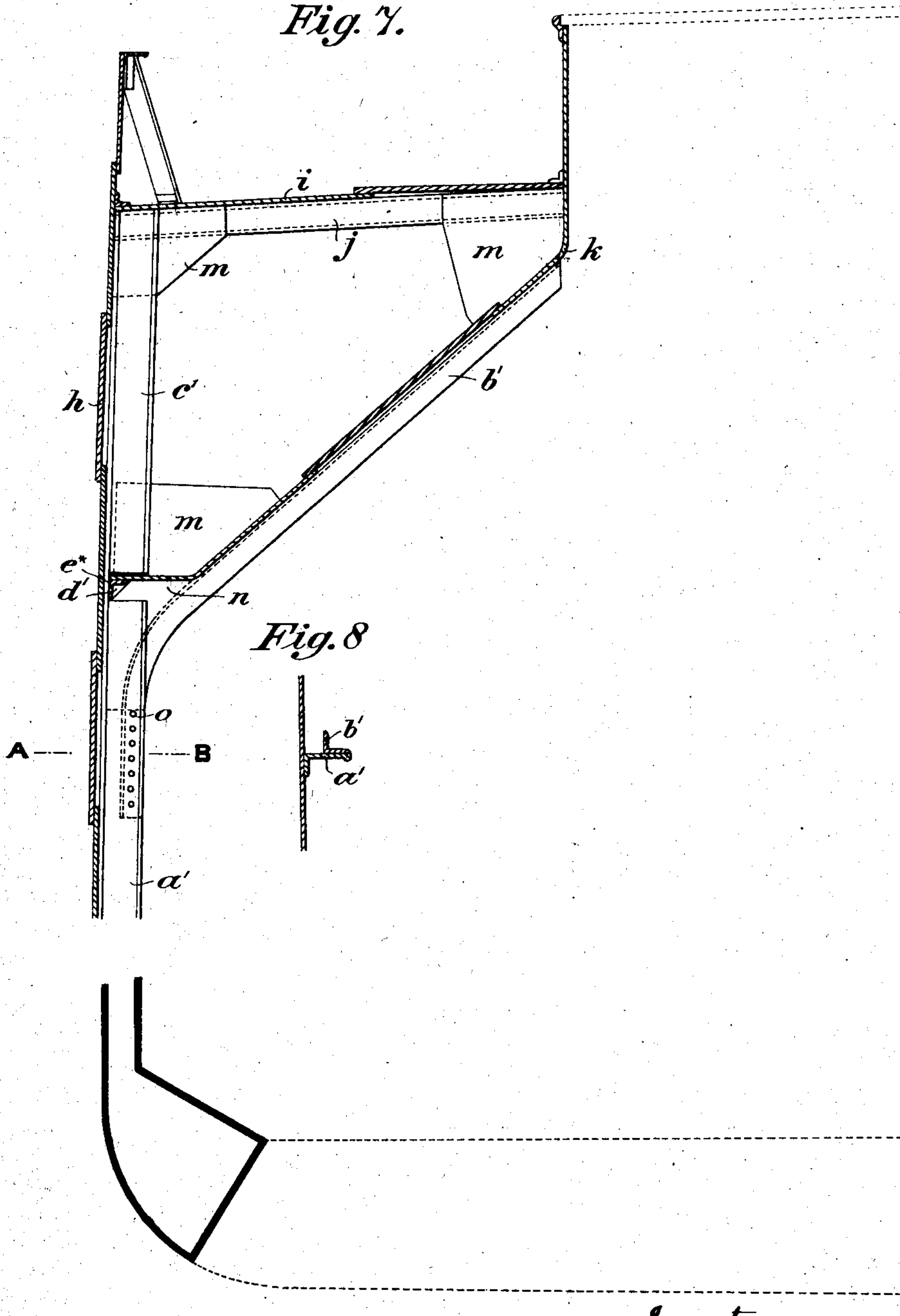
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3 SHEETS—SHEET 3.

Fig. 7.



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SHIP CONSTRUCTION.

No. 834,127.

Specification of Letters Patent.

Patented Oct. 23, 1906.

Application filed April 24, 1905. Serial No. 257,278.

To all whom it may concern:

Be it known that we, GEORGE MITCHELL HARROWAY and WAYNMAN DIXON, subjects of the King of Great Britain and Ireland, residing at Middlesbrough, in the county of York, England, have invented Improvements in Ship Construction, of which the following is a specification.

In the specification of another application for Letters Patent, filed January 13, 1905, Serial No. 240,904, we have described an improved ship construction wherein the framing comprises cantaliver-frames in each of which, to form the cantaliver, there are two upwardly-extending branches—namely, a continuous outer branch to which the skin of the vessel is riveted and the inwardly-projecting flange of which has formed in it a gap to receive a longitudinal stringer-bar riveted to the shell and a branch inclining inwardly toward the middle of the ship, to which is riveted fore-and-aft plating, which is also riveted at its bottom portion to the said stringer-bar and which, in conjunction with the portion of the shell attached to the outer branches, a suitably-supported deck portion connecting the fore-and-aft plating to the shell, and transverse plates between the branches of the several frames, forms a box-girder that gives great longitudinal strength to the ship.

Now in the building of ships of the type referred to according to the present invention the lower portion and one of the branches of each cantaliver-frame are constituted by a continuous bar, which is hereinafter called the "main bar," (which may be a bulb angle-bar or its equivalent—such as a channel-bar, Z-bar, or bulb T-bar,) and the other branch of the frame is formed by a separate bar rigidly scarfed or riveted to said lower portion of the main bar, so as to constitute an integral portion of the cantaliver-frame.

Referring to the accompanying illustrative drawings, Figure 1 is a cross-sectional view of a portion of a ship provided with cantaliver-frames according to this invention. Fig. 2 is an elevation taken at right angles to Fig. 1 of the upper portion of the frame shown. Fig. 3 is a horizontal section corresponding to the line A B of Fig. 1. Figs. 4, 5, and 6 are detail views, drawn to a larger scale than Figs. 1, 2, and 3, Fig. 4 showing in

sectional elevation the details of the construction where the stringer-bar extends through a gap in the outer branch, and Figs. 5 and 6 showing in perspective the bifurcation of the frame and adjacent parts as seen from opposite sides. Figs. 7 and 8 are views corresponding to Figs. 1 and 3, respectively, illustrating a modification.

The lower upright portion *a* and the inwardly-inclined branch *b* of the frame shown in Fig. 1 instead of being formed by a frame-bar and a reverse bar or an equivalently-formed part are formed by a main bar *a b*, which is a continuous bulb angle-bar of sufficient strength in its portion *a* to take the place of both a frame-bar and a reverse bar and is simply bent inward at the required part in order to form the inner portion of the cantaliver, and the outer branch *c* of the frame, the inwardly-projecting flange of which has a gap *d* to receive the stringer-bar *e*, is formed by a separate angle-bar, which is scarfed or riveted at *f* to the portion *a* of the main bar *a b*, so as to constitute an integral portion of the cantaliver-frame. Suitable packing material is or may be placed at *g* between the shell-plating *h* and the bars *a* and *c*.

In the frame shown in Fig. 7 the lower upright portion *a'* and the outer branch *c'* of the frame, which has the gap *d'* to receive the stringer-bar *e*, are both formed by a main bar *a' c'*, which is a continuous bulb angle-bar, which, like that shown in Fig. 1, is of sufficient strength in its portion *a'* to take the place of a frame-bar and a reverse bar, while the inner branch *b'* of the cantaliver-frame is formed by a separate angle-bar which is scarfed or riveted at *o* to the portion *a'* of the main bar *a' c'*, so as to constitute an integral portion of the cantaliver-frame, and is bent inwardly at the required part in order to form the inner portion of the cantaliver.

As in the examples described in our aforesaid specification, a fore-and-aft box-girder, which gives great longitudinal strength to the ship, is constituted partly by the portion of the shell *h*, riveted to the branches *c* or *c'* of the frames, partly by a deck portion *i*, supported by beams *j*, and partly by fore-and-aft plating *k*, which is riveted to the branches *b* or *b'* and at its bottom portion to the stringer-bar *e*, this box-girder being strengthened at the cantaliver-frames by transverse

corner bracket-plates *m* or by web-plates and also by knee-plates *n*, which support the bottom portion of the plating *k* and are riveted both to the branches *b* or *b'* and to the branches *c* or *c'*. The box-girder may be divided into lengths, as by the web-plates, and made water-tight, so as to be available for carrying water ballast, if desired.

What we claim is—

1. In a ship construction, main framing comprising cantaliver-frames in each of which there are a lower portion and two branches extending upwardly from said lower portion, namely a continuous outer branch to which the skin of the ship is riveted and which has an inwardly-projecting flange formed with a gap, and a branch inclining inwardly toward the middle of the ship, said lower portion and one of said branches being constituted by a main bar, and the other of said branches being formed by a separate bar rigidly riveted to said lower portion so as to constitute an integral portion of the cantaliver-frame, a longitudinal stringer riveted to the shell and extending through said gaps, fore-and-aft plating riveted to said inwardly-inclining branches and at its bottom portion to said stringer, deck-plating connecting said fore-and-aft plating to said shell, and transverse stiffeners between said branches of each cantaliver-frame, said fore-and-aft plating, said deck-plating, the portion of the shell attached to the outer branches of the cantaliver-frames, and said stiffeners constituting a water-tight longitudinal box-girder.

2. In a ship construction, main framing comprising cantaliver-frames in each of which there are a lower portion and two branches extending upwardly from said lower portion, namely a continuous outer branch to which the skin of the ship is riveted and which has an inwardly-projecting flange formed with a gap, and a branch inclining inwardly toward the middle of the ship, said lower portion and said inwardly-inclining branch being constituted by a main bar which is simply bent to form said inwardly-inclining branch, and said outer branch being formed by a separate bar rigidly riveted to said lower portion so as to constitute an integral portion of the cantaliver-frame, a longitudinal stringer riveted to the shell and extending through said gaps, fore-and-aft plating riveted to said inwardly-inclining branches and at its bottom portion to said stringer, deck-plating connecting said fore-and-aft plating to said shell, and transverse stiffeners between said branches of each cantaliver-frame, said fore-and-aft plating, said deck-plating, the portion of the shell attached to the outer branches of the cantaliver-frames, and said stiffeners constituting a water-tight longitudinal box-girder.

3. In a ship construction, main framing comprising cantaliver-frames in each of which there are a lower portion and two branches

extending upwardly from said lower portion, namely an outer branch and a branch inclining inwardly and upwardly toward the middle of the ship, said lower portion and one of said branches being constituted by a main bar, and the other of said branches being formed by a separate bar rigidly secured to said lower portion, plating, constituting the shell of the ship, secured to the lower portions and to the upper outer branch portions of said frames at each side of said ship, longitudinal stringers secured to the portions of the shell that are attached to the outer branch portions of the frames, fore-and-aft plating secured to the inwardly-inclined branches of the several frames at each side of the ship and also to said stringers, deck-plating connecting said fore-and-aft plating to said shell, and transverse stiffeners between the said branches of the cantaliver-frames, said fore-and-aft plating, said deck-plating, the portion of the shell attached to the outer branches of the cantaliver-frames, and said stiffeners constituting a water-tight longitudinal box-girder at each side of the ship.

4. In a ship construction, main framing comprising cantaliver-frames in each of which there are a lower portion and two branches extending upwardly from said lower portion, namely an outer branch and a branch inclining inwardly and upwardly toward the middle of the ship, said lower portion and said inwardly-inclined branch being constituted by a single bent bar and said outer branch being formed by a separate bar rigidly secured to said bent bar, plating, constituting the shell of the ship, secured to the lower portions and to the upper outer branch portions of said frames at each side of said ship, longitudinal stringers secured to the portions of the shell that are attached to the outer branch portions of the frames, fore-and-aft plating secured to the inwardly-inclined branches of the several frames at each side of the ship and also to said stringers, deck-plating connecting said fore-and-aft plating to said shell, and transverse stiffeners between the said branches of the cantaliver-frames, said fore-and-aft plating, said deck-plating, the portion of the shell attached to the outer branches of the cantaliver-frames, and said stiffeners constituting a water-tight longitudinal box-girder at each side of the ship.

5. In a ship construction, main framing comprising cantaliver-frames each of which is constituted by a main bar bent to form an upwardly-extending lower member and an inwardly-inclined upper member, an upper outer member, and transverse stiffening means rigidly connecting said upper outer member to said inwardly-inclined member, plating secured to the lower members and upper outer members of said frames to constitute the shell of said ship, longitudinal

stringers secured to the inner side of said shell at opposite sides of the ship, fore-and-aft plating secured to the inwardly-inclined portions of said frames and at its bottom to each stringer, and deck-plating connecting said fore-and-aft plating to said shell, the fore-and-aft plating, deck-plating, the portion of the shell attached to the upper outer members of the cantaliver-frames and the stringers and transverse stiffening means, constituting at each side of the ship, a water-tight longitudinal box-girder.

6. In a ship construction, main framing comprising cantaliver-frames each of which is constituted by a main bar bent to form an upwardly-extending lower member and an inwardly-inclined upper member, an upper outer member, and transverse stiffening means rigidly connecting said upper outer member to said inwardly-inclined member, plating secured to the lower members and upper outer members of said frames to constitute the shell of said ship, longitudinal stringers secured to the inner side of said shell at opposite sides of the ship and arranged above the junction of the lower and upper portions of each main bar, fore-and-aft plating comprising an upwardly and inwardly inclined portion secured to the upper sides of the upper inwardly-inclined members of the frames and a lower outwardly-extending portion secured to the stringer at the corresponding side of the ship, the fore-and-aft plating, deck-plating, the portion of the shell attached to the upper outer members of the frames, the stringers and the stiffening means, constituting, at

each side of the ship, a water-tight longitudinal box-girder.

7. In a ship construction, main framing comprising cantaliver-frames in each of which there are a lower portion and two branches extending upwardly from said lower portion, namely a continuous outer branch to which the skin of the ship is riveted and which has an inwardly-projecting flange formed with a gap, and a branch inclining inwardly toward the middle of the ship, said lower portion and said inwardly-inclining branch being constituted by an angle-bar, which is simply bent to form said inwardly-inclining branch, and said outer branch being formed by a separate bar rigidly riveted to said lower portion so as to constitute an integral portion of the cantaliver-frame, a longitudinal stringer riveted to the shell and extending through said gaps, fore-and-aft plating riveted to said inwardly-inclining branches and at its bottom portion to said stringer, deck-plating connecting said fore-and-aft plating to said shell, and transverse stiffeners between said branches of each cantaliver-frame, said fore-and-aft plating, said deck-plating, the portion of the shell attached to the outer branches of the cantaliver-frames, and said stiffeners constituting a water-tight longitudinal box-girder.

Signed at London this 14th day of April, 1905.

GEORGE MITCHELL HARROWAY.
WAYNMAN DIXON.

Witnesses:

GEORGE BABINGTON PRICE,
ALEX. RIDGWAY