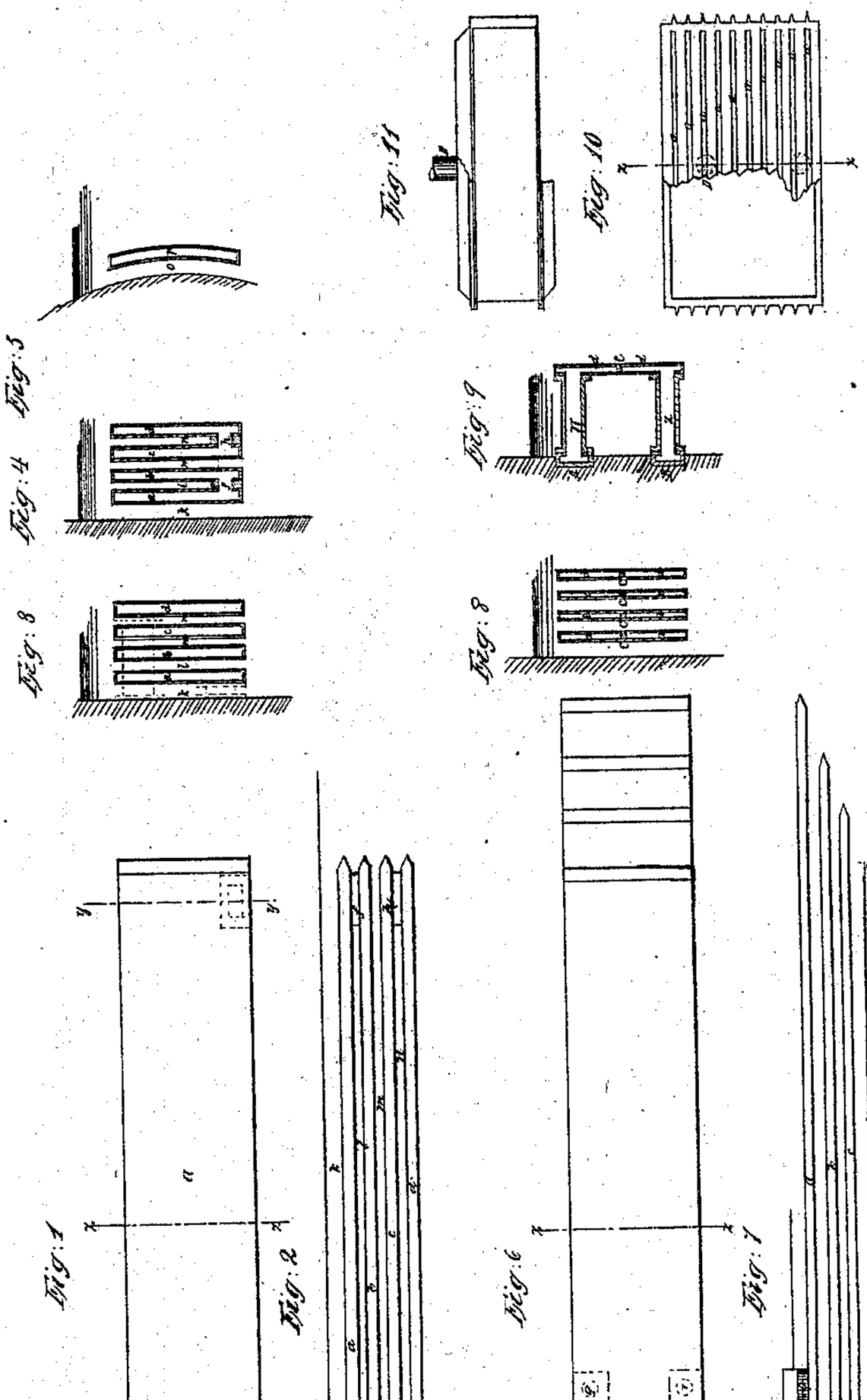
F. B. STEVENS.

SURPACE CONDENSER.

No. 36,810. Patented Oct. 28, 1862.

Fig: 12



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IMPROVEMENT IN SURFACE-CONDENSERS.

Specification forming part of Letters Patent No. **36,810,** dated October 28, 1862.

To all whom it may concern:

Be it known that I, FRANCIS B. STEVENS, of the city, county, and State of New York, have invented a new and Improved Surface Condenser or Cooler for Steamers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

It has often been proposed to place a surface-condenser for condensing the steam or a cooler for cooling the injection-water outside of a steamer, so that the surfaces to be cooled may be surrounded by the water in which the steamer floats.

The object of my invention is to improve a condenser or cooler so placed.

I form my surface condenser or cooler by placing on the outside of the submerged surface of the steamer one or more thin and flat passages with parallel sides containing the steam to be condensed or water to be cooled, a lamina of the water in which the steamer floats being interposed between the passages. By this means I get a form of condenser or cooler that will offer but very little obstruction to the passage of the steamer through the water. I propose to use these flat passages placed in laminæ and having the water in which the vessel floats between them either as a surface-condenser for condensing the steam that leaves the cylinder or as a cooler for cooling the injection-water on its passage between the air-pump and condenser.

Figure I represents a longitudinal elevation of my improved surface condenser or cooler attached to the side of a steamer. Fig. II represents a horizontal view of the same. Fig. III represents a cross-section of the same, taken through the dotted line *x x* of Fig. I. Fig. IV represents a cross-section of the same, taken through the dotted line *y y* of Fig. I. *a b c d* each represent a thin flat passage with parallel sides, through which the steam to be condensed or water to be cooled passes, entering at the port *e* in the narrow passage *a*, and passing through this narrow passage *a* and through the port *f* into the passage *b*, and through this passage *b* and through the port *g* into the passage *c*, and through this passage *c* and port *h* into the passage *d*, and through this passage *d* to the port *i*—the port of exit from the surface condenser or cooler—the steam to be condensed or water to be cooled and the water in which the vessel floats thus lying in alternate laminæ. *k* represents an interval between the flat passage *a* and the side of the steamer. *l*, *m*, and *n* represent intervals between the other flat passages, so that a lamina of the water in which the steamer floats may flow between each of them. Each end of these passages is sharpened, so that the obstruction to the passage of the steamer through the water, caused by placing them outside the steamer, may be lessened. When used for a surface-condenser, the cross-section of each of the flat passages *a*, *b*, *c*, and *d* must be equal, or nearly equal, in area to the opening of the eduction-pipe, and when used for a cooler the section must be sufficiently great to pass the injection-water from the hot well back again to the condenser. The flat passages should of course be arranged symmetrically on both sides of the steamer. The flat passages can be bent to conform to the shape of the steamer.

Fig. V shows a cross-section of a portion of a steamer's side with a section of a flat passage bent to correspond to it. *p* shows the flat passage. *o* shows the interval between the flat passage and steamer. If many flat passages were placed side by side and connected as shown in Figs. I, II, III and IV, they might make too great an obstruction to the motion of the steamer through the water.

Fig. VI represents a longitudinal elevation of another application of my invention, with the passages so arranged that the steam to be condensed or water to be cooled passes through each of the passages *a*, *b*, *c*, and *d* separately, and not from one to the other, as shown in Figs. I, II, III, and IV. Fig. VII is a horizontal view of the same. Fig. VIII is a cross-section of the same, taken through the dotted lines *x x* of Fig. VI. Fig. IX is a cross-section of the same, taken through the dotted line *y y* of Fig. VI. *q* is a pipe forming the port of entrance for the passage *a*, and *r* is a pipe forming the port of exit for the same passage. *s* and *t* are the ports for the passage *b*. *u* and *v* are the ports for the passage *c*. *w* and *z* are the ports for the passage *d*. A is a pipe to which the ports of entrance of *s*, *u*, and *w* are connected. B is a pipe, to which the ports of exit *r*, *t*, *v*, and *z* are connected. C shows a bar dividing the flat passages, so that the steam to be condensed or water to be cooled is re-

turned to the same end that it entered, and that thus both the ports of entrance and of exit are attached to the vessel at the same end, so that the flat passage has liberty to expand.

As in this arrangement only one-fourth of the steam passes through each of the flat passages, they need each be only one-quarter of the thickness of those used in the arrangement represented in Figs. I, II, III, and IV, and consequently they will cause less obstruction to the motion of the steamer. The flat passages, instead of being placed vertically, as shown in all the above figures, may be placed horizontally.

Fig. X represents a longitudinal elevation of an application of my improvement with the flat passages placed horizontally. Fig. XI represents a horizontal view of the same. Fig. XII represents a cross-section taken through the dotted lines *x x* of Fig. X. *a a* show the flat passages. *b b* show the water-spaces between them. D is the port of entry, and E is the port of exit.

What I claim as my invention is—

1. Forming a surface condenser or cooler on the outside submerged surface of a steamer by placing there one or more thin and flat passages containing the steam to be condensed or water to be cooled, and having a lamina of the water in which the steamer floats interposed between them.

2. The passages so arranged that each passage has its own separate port of entry and of exit.

New York, September 20, 1862.

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Witnesses:

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