R. M. Griffith.

# Pier.

No. 65,484. Patented Jun. 4, 1867.

Fig. 2.

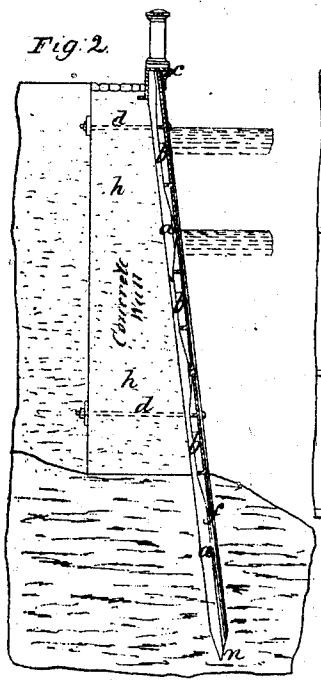



Fig. 1

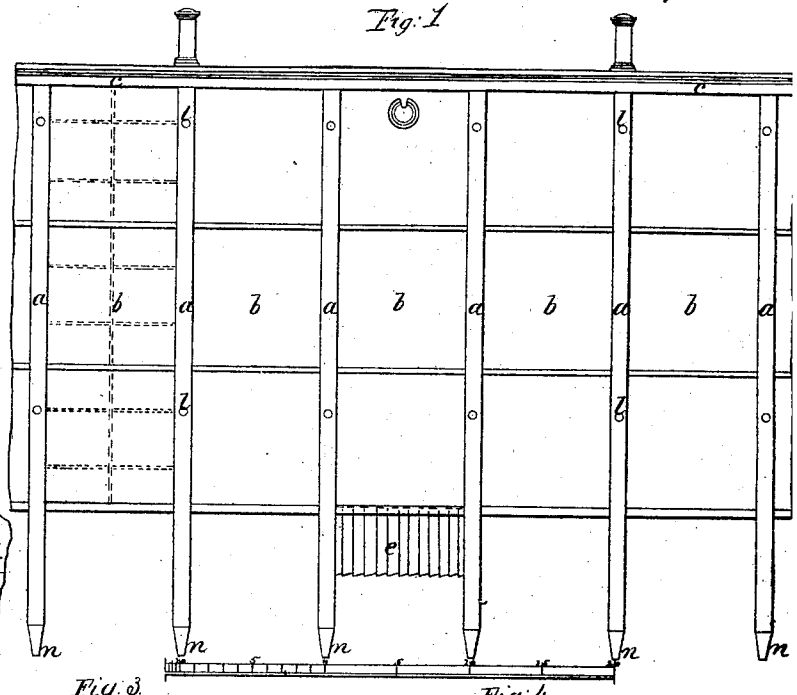



Fig. 3.

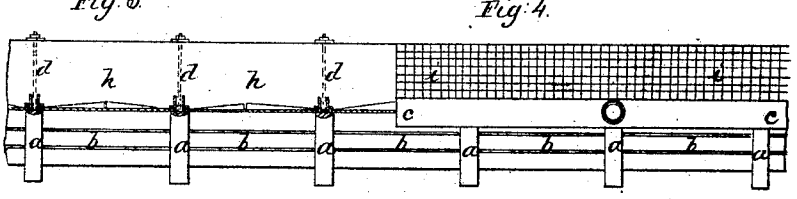



Fig. 4.

Fig. 5.

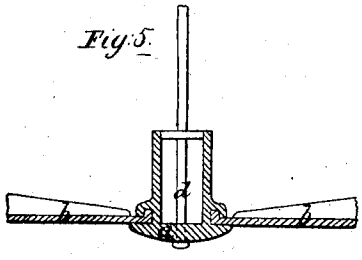



Fig. 7.




Fig. 9.

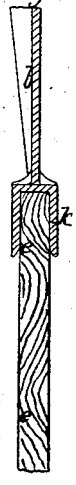



Fig. 10.

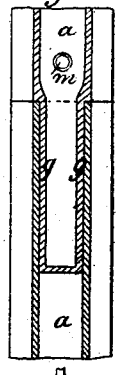



Fig. 8.

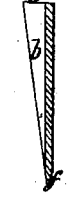



Fig. 6

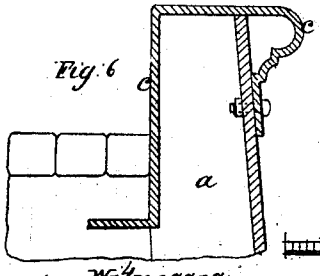
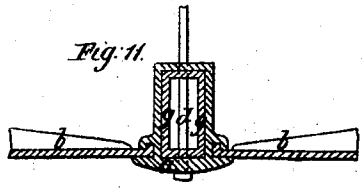



Fig. 11.




Witnesses;

R. M. Griffith

Inventor;

Richard M. Griffith

# United States Patent Office.

RICHARD A. GILPIN, OF CHESTER COUNTY, PENNSYLVANIA.

*Letters Patent No.* 65,484, *dated June* 4, 1867.

## IMPROVEMENT IN CONSTRUCTION OF PIERS, DOCKS, AND WHARVES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, RICHARD A. GILPIN, of Chester county, Pennsylvania, have invented a new and improved Construction of Wharves, Piers, and Docks, applicable also to the piers and abutments of bridges, sea-walls, harbors, and other hydraulic works of a like character; 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.

Figure 1 represents the front elevation or face of the wharf, pier, &c., as it would appear when completed. It is of cast iron, and consists of main piles, *a a*, at convenient distances apart, and driven deep into the solid foundation. These piles are of the form shown in the horizontal section, Figure 5, *a*. They are cast with return grooves on the sides, and are secured by land ties, *d d*, the heads of which are shown at *l l*, fig. 1. The spaces between the main piles are filled by cast-iron plates, *b b*, with return flanges on the edges, which fit into the grooves of the main piles, as shown in fig. 5, *b b*. These plates are strengthened by projecting flanges on the back, as shown by the dotted lines, fig. 1. The lower edge of the lower plate is cast to a sharp point and chilled, as shown at *f*, Figure 8. This plate is driven well into the solid foundation. In cases where it is thought advisable to use wooden sheet piling in the foundation between the main piles, as shown at *e*, fig. 1, the lower edge of the lower plate is cast with a box-socket, as shown at *k*, Figure 9. This is driven down on the heads of the sheet piling and secures them. The horizontal joints of the plates are made as shown at *j*, Figure 7. The lower edge of the upper plate is cast with a lip inside and outside, forming a groove or socket which fits down upon the upper edge of the lower plate and secures it. When it is thought advisable to have the main piles in more than one casting, the pieces or sections are joined, as shown in Figures 10 and 11, when the upper end of the lower section is cast with a socket, and the lower end of the upper section with a tongue which fits into the socket, and the joint is steadied and secured by a land tie, as shown at *m*, fig. 10. The points of the main piles are formed, as shown at *n n*, fig. 1, and the lower edge chilled. The top of the wharf pier *k* is finished with a combing, moulded in front, as shown at *c c*, fig. 1, and enlarged in Figure 6. The combing or cap is bolted in front to the main pipes and plates, and on the inside is secured under the paving or solid backing of the wharf, pier, &c.

Figure 2 shows a vertical cross-section of the wharf, pier, &c. It shows the main piles, plates, combing, and land ties in position, and also a wall of concrete or rubble resting on the solid foundation and forming the solid backing to the iron front of the wharf, pier, &c. The concrete forming the backing is made of clean gravel and sand, and hydraulic lime when used below water, and quick-lime when used above, in the proportion of from three to seven parts of gravel and sand to one part of lime. These materials are intimately mixed together with a slight addition of water, and are projected from a considerable height into the place where they are to form the wall or solid backing.

Figure 3 shows a horizontal section of the wharf, pier, &c., with the main piles, plates, land ties in place, and the concrete wall behind.

Figure 4 shows the ground plan or top of the wharf, pier, &c., with the cap or combing of iron and the paving.

From the above description of and references to the accompanying drawings, the construction of wharves, piers, &c., which I claim as new and my invention, will be readily understood. The main piles are placed accurately in the line of the face of the wharf, and are driven deep into the solid foundation at the proper distances apart. The lower plates are then placed with their return flanges in the grooves on the sides of the main piles, dropped to their places, and driven some two or three feet into the solid foundation. The upper plates are then dropped into their places, the combing or cap is bolted in its place, and the front or face of the wharf, pier, &c., is complete. The earth is then excavated behind and dredged out down to the solid foundation, the land ties are fixed in their position, and the concrete is then projected into the excavation until it reaches the surface, forming a solid and homogeneous backing to the iron-work of the front.

What I claim as my invention, and desire to secure by Letters Patent, is—

The construction, arrangement, and combination of the piles *a a*, plates *b b*, ties *d d*, and wall *h h*, in the manner and for the purpose herein described.

RICHARD A. GILPIN.

Witnesses:

SAMUEL MONAGHAN,

WM. WHITEHEAD.