Feb. 19, 1924. 1,484,480

A. DONAGGIO

SCAFFOLDING

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Fig. 1.

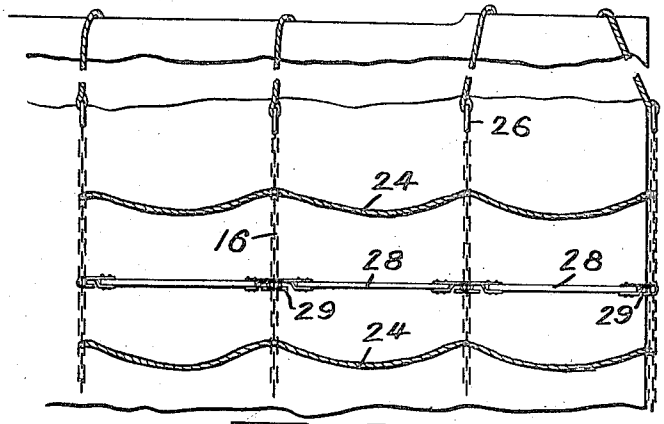
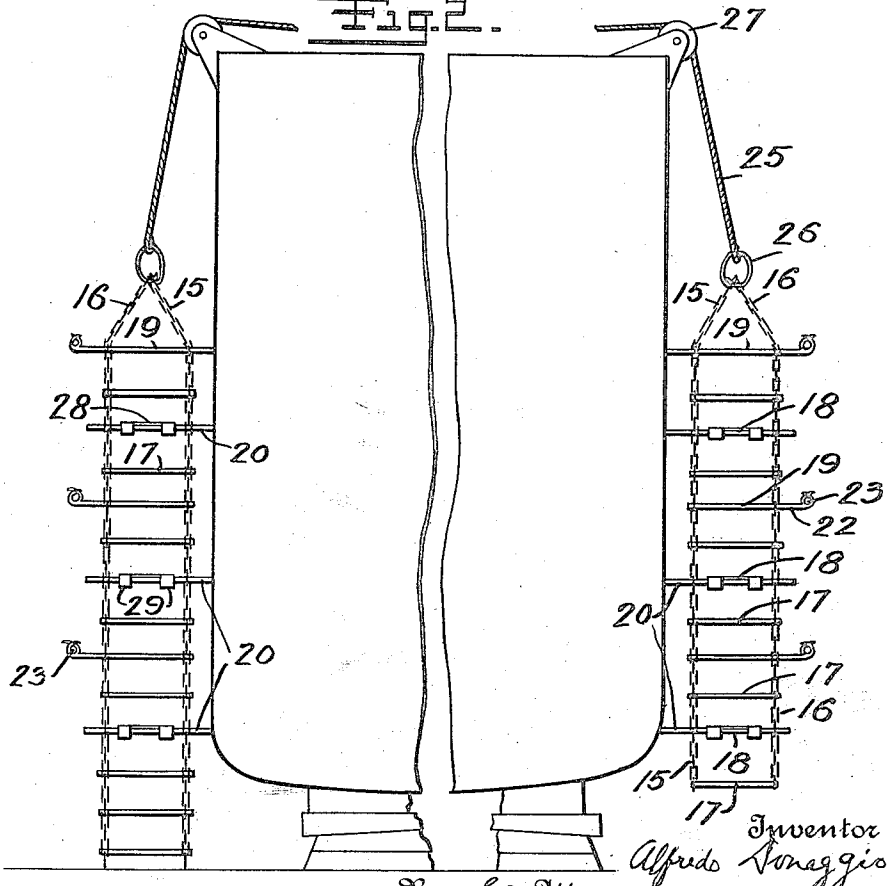


Fig. 2.



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Fig. 5.

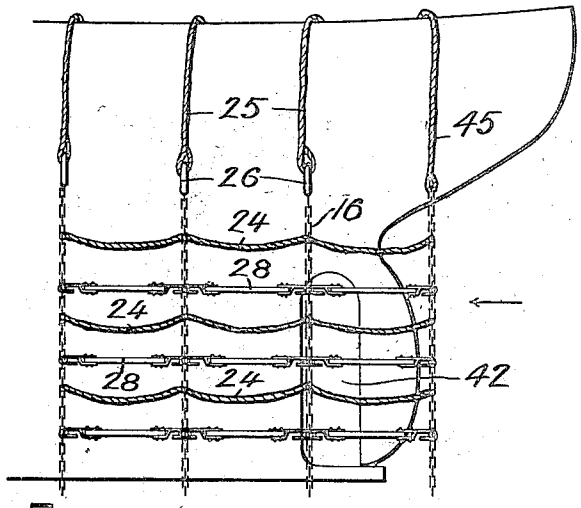


Fig. 3.

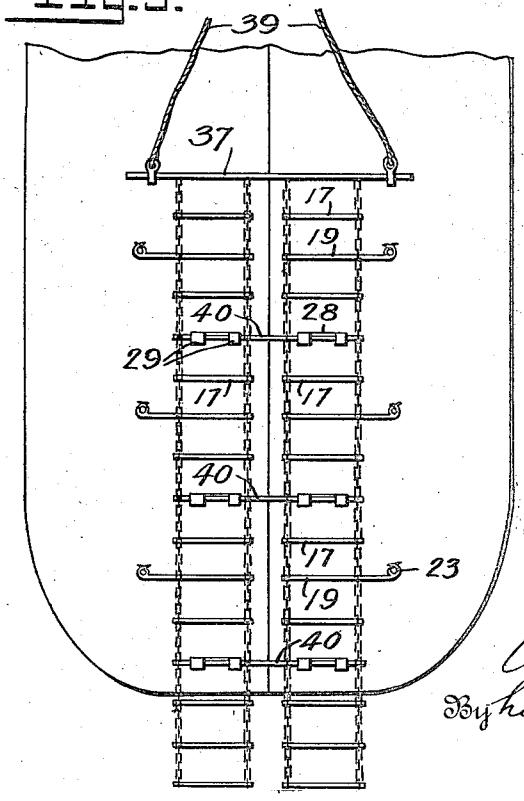
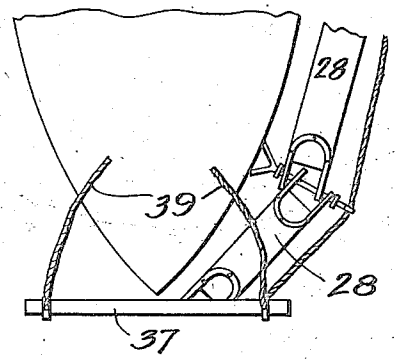


Fig. 4.



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Fig. 7.

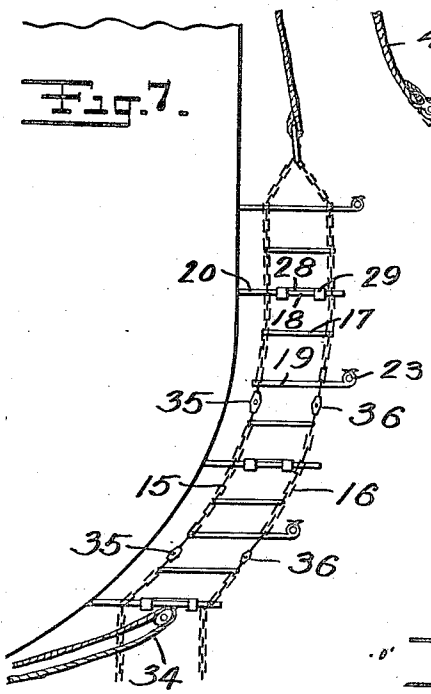


Fig. 6.

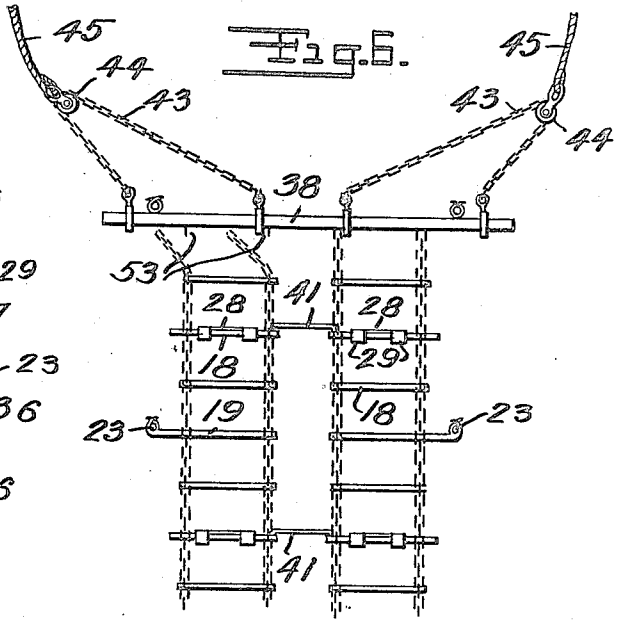


Fig. 9.

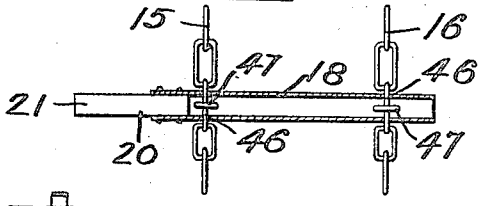


Fig. 8.

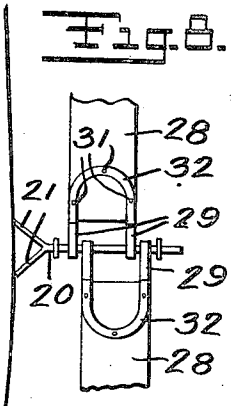


Fig. 10.

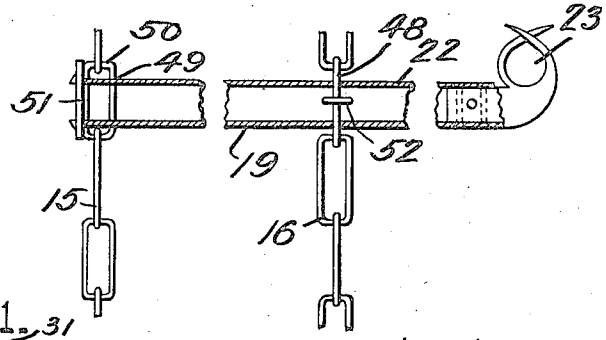


Fig. 11.

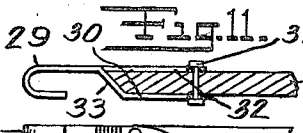
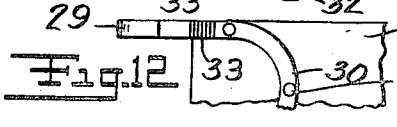


Fig. 12.



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Patented Feb. 19, 1924. 1,484,480

UNITED STATES PATENT OFFICE.

ALFREDO DONAGGIO, OF WINFIELD, LONG ISLAND, NEW YORK.

SCAFFOLDING.

Application filed February 24, 1920. Serial No. 360,681.

To all whom it may concern:

Be it known that I, ALFREDO DONAGGIO, a citizen of the United States, residing at Winfield, Long Island, in the county of Queens and State of New York, have invented certain new and useful Improvements in Scaffolding, of which the following is a specification.

This invention relates particularly to scaffolding or staging, such as is used in the cleaning and painting of ships' hulls when in dry dock.

The objects of the invention are to provide a relatively simple but practical construction of this character which can be quickly rigged and can be readily adapted to different sizes and types of hulls.

Briefly, the invention resides in the combination of a plurality of flexible ladders which are suspended in outstanding or edgewise relation to the hull and which form supports for the staging sections which are hooked over the rungs of such ladders.

Other special features of the invention will appear as the specification proceeds.

In the accompanying drawings I have illustrated the invention embodied in but one of its practical forms and would have it understood that the structure may be modified to suit various requirements, without departure from the true spirit and scope of the invention as defined in the appended claims.

In the drawings referred to Figure 1 is a broken side view illustrating the scaffolding applied to the bow portion of a ship's hull.

Figure 2 is a broken end view illustrating the application of the staging to opposite sides of the hull.

Figure 3 is an end view of the bow section of the staging.

Figure 4 is a plan view of the same.

Figure 5 is a broken side view of the stern section of the staging.

Figure 6 is an end view of this stern section.

Figure 7 is an end view illustrating the manner in which the staging is adjusted and held to the contour of the ship.

Figure 8 is a detail plan view showing two adjacent ends of staging engaged with a supporting rung of one of the ladders.

Figures 9 and 10 are detail sectional views illustrating two of the special rungs, the first for holding the ladder spaced away from the ship's side and the second provided with means for carrying a guard line.

Figure 11 is an end and partly sectional view of one of the staging sections showing the hook construction.

Figure 12 is a bottom plan view of the same.

The ladders which I refer to are of novel construction particularly in that they are flexible laterally or edgewise so that when supported in outstanding relation they may be conformed to the contour of a ship's hull. For this reason I prefer to construct the ladders with side members 15 and 16 of chain, said side chains being connected in spaced relation at suitable intervals by rungs 17, 18 and 19. The rungs 17 are illustrated simply as spacing and supporting members, while the rungs 18 are illustrated as of special construction in that they are provided with extensions 20 at the inward sides of the ladders for engagement with the ship's hull to space the ladders away from the side of the hull. These spacing projections are provided with suitable base portions for engagement with the side of the ship, such base portions being provided in the illustration by making the inner ends of the projections forked as indicated at 21 to provide a relatively wide and firm base for engagement with the hull.

The rungs 19 also are of special construction in that they are extended outward beyond the outer side 16 of the ladder as indicated at 22 and carry at their outer ends eyes 23 to receive a guard line or guard lines 24. These eyes are shown as of split construction and open in the plane of the rungs carrying the same so that the guard line may be entered therein by twisting it at an angle to the plane in which it will ordinarily stand.

The ladders may be supported over the side of the hull by any suitable means. A practical and simple means for this purpose is illustrated particularly in Figures 1 and 2 in the form of ropes or cables 25, carrying "sister" hooks 26 at their lower ends with which the upper ends of the side chains 15 and 16 are engaged, said cables being led over pulleys or other abrasion preventing

means 27 and suitably made fast on the deck of the vessel, for instance.

The staging is made in sections 28 of a suitable length or lengths and these sections are connected between the rungs of the ladders as by providing them at the ends with hooks 29 engaged over the rungs of the adjacent ladders, said hooks being preferably constructed as illustrated in Figures 11 and 12, where it will be seen that they are made of U-shaped pieces 30 having the ends thereof bent over to form parallel hooks and the loop or body portion thereof secured by bolts or suitable fastenings 31 to the end portion of the plank. To reinforce the ends and to provide a suitable hold for the bolts or other fastenings, washer members 32 of corresponding U-shape may be secured on the upper face of the planks directly overlying the body portion of the hooks. With this construction the end of the plank is clamped between the two U-shaped elements so that splitting of the plank is avoided and the parts reinforce one another. Preferably, also, the hooks are offset as indicated at 33 to bring the hooks into substantially the plane of the plank so that the overall thickness of the plank sections is kept practically uniform and these offsets 33 also operate as shoulders to prevent the hooks from slipping out of engagement with the rungs.

The staging sections are connected between the ladders at suitable levels and may be arranged in tiers as illustrated in the different figures. The guard lines 24 are disposed between these tiers at a convenient height above each level of staging to afford convenient handholds and provide safety for the workmen.

The ladders are drawn closely against the ship's hull, for instance, by means of suitable block and tackle 34, shown in Figure 7, as attached to the lower ends of the ladders. Where the ladders are curved against the ship's side, as shown in this view, it may be necessary to relatively lengthen or shorten the inner and outer sides of the ladders to maintain the rungs substantially parallel. This I have provided for, as indicated in this view, by interposing adjustable turnbuckles 35 and 36 in the inner and outer side chains of each ladder and intermediate the ends thereof. It will be evident that by adjusting these turnbuckles the parts may be relatively adjusted to maintain the rungs substantially horizontal.

The bow and stern of the ship may be bridged by providing double ladders as indicated in Figures 3, 4, 5 and 6 suspended from suitably supported cross beams 37 and 38. In Figure 3 the beam 37 is shown as supported transversely by cables 39 at the stem of the ship, two ladders being suspended from said beam, disposed one at each side of the stem and each supporting the forward ends of staging sections whose rear ends are supported by the rungs of the side ladders next in rear thereof. These two ladders are shown as secured together at intervals by means of the connections 40 which in fact may form part of, or be coupled to the ends of adjoining rungs of the two ladders.

At the stern the same double arrangement of ladders may be employed, the ladders in this instance being joined at intervals by couplings 41 which may be detachable, as indicated in Figure 6 for the purpose of enabling the ladders to be coupled together through the propeller well 42 (Figure 5).

The rigging for supporting the beam 38 carrying the stern ladders is shown as of special construction embodying flexible loops 43 connected with opposite end portions of the beam and in the bights of which are engaged the pulleys 44 supported under the counter of the ship by cables 45.

In Figures 9 and 10 I have shown how the holding-out rungs and the guard line rungs may be attached to the side chains. These rungs are shown as of tubular construction in the form of pipe sections. In Figure 9 the pipe rung 18 is shown as slipped through links 46 of the opposed chains and as made fast by staples 47 to hold the two chains in properly spaced relation.

In Figure 10 the tubular rung is shown passed through one of the links 48 in the outer chain and as bifurcated at its inner end at 49 to engage edgewise over one of the links 50 of the inner chain where it is held by a key 51 engaged across such bifurcated ends. A staple 52 is shown provided for holding the outer link 48 at a properly spaced point on the rung.

The means just described furnishes a simple and secure method of fastening the rungs to the chains and of holding the chains properly spaced apart.

The invention, it will be seen, is readily adaptable to various types of hulls and may be used wherever it is desired to operate on the hull of a ship. The invention finds its most useful application at the present time in the scraping, cleaning and painting of ships' hulls when in dry dock.

The apparatus is easily rigged and in fact can be set up so that work can be started before the hull is entirely out of the water. Also, the apparatus is in such form that a greater or less number of units may be used according to the size of the hull, it being simply necessary to keep an average number of ladders and staging sections in stock. In rigging the twin ladders at the stern, as shown in Figure 6, one of the ladders, the one illustrated at the left in that view, may be detachably connected with the supporting beam 38 as by providing said beam with

suitable spaced hooks 53 to which the upper links of the detachable ladder may be connected. This is particularly useful in setting up the staging about the rudder and propeller.

What I claim is:

1. Scaffolding for ships' hulls comprising ladders made up of flexible side members and rungs connecting the same in spaced relation, means for supporting said ladders over the side of a ship with the rungs standing out from the hull and staging sections extending between the ladders and having hook elements engaged with the rungs of such ladders, certain of the rungs having eyes at the outward sides of the ladders to receive a guard line.

2. Scaffolding for ships' hulls comprising ladders made up of flexible side members and rungs connecting the same in spaced relation, means for supporting said ladders over the side of a ship with the rungs standing out from the hull and staging sections extending between the ladders and having hook elements engaged with the rungs of such ladders, certain of the rungs having split eyes at the outward sides of the ladders open in the plane of the rungs to enable a guard line to be twisted therein.

3. Scaffolding for ships' hulls comprising ladders made up of flexible side members and rungs connecting the same in spaced relation, means for supporting said ladders over the side of a ship with the rungs standing out from the hull and staging sections extending between the ladders and having hook elements engaged with the rungs of such ladders, certain of the rungs projecting inward beyond the inward sides of the ladders and others projecting outward beyond the outward sides of the ladders.

4. Scaffolding for ships' hulls comprising ladders made up of flexible side members and rungs connecting the same in spaced relation, means for supporting said ladders over the side of a ship with the rungs standing out from the hull and staging sections extending between the ladders and having hook elements engaged with the rungs of such ladders, certain of the rungs projecting inward beyond the inward sides of the ladders and others projecting outward beyond the outward sides of the ladders, base members on the inwardly projecting rungs for engagement with a ship's hull and eyes for a guard line carried by the outwardly projecting rungs.

5. Scaffolding for ships' hulls comprising ladders made up of flexible side members and rungs connecting the same in spaced relation, means for supporting said ladders over the side of a ship with the rungs standing out edgewise from the hull, staging sections arranged substantially parallel to the hull of the ship extending between the ladders and having hook elements engaged with the rungs of such ladders and means for conforming the outstanding ladders to curvatures of a ship's hull.

6. Scaffolding for ships' hulls comprising ladders made up of flexible inner and outer side members conformable to the curves of a ship's hull and rungs connecting the same in spaced relation, means for relatively lengthening and shortening the side members of the ladder to maintain the rungs in edgewise and substantially horizontal position with respect to the hull while conforming the ladder to a curve in the hull, and staging sections engageable between rungs of different ladders.

7. Scaffolding for ships' hulls comprising ladders made up of flexible inner and outer side members conformable to the curves of a ship's hull and rungs connecting the same in spaced relation, means for relatively lengthening and shortening the side members of the ladder to maintain the rungs in edgewise and substantially horizontal position with respect to the hull while conforming the ladder to a curve in the hull and staging sections engageable between rungs of different ladders, the lengthening and shortening means described consisting of turnbuckles interposed in the flexible side members intermediate the ends of the same.

8. Scaffolding for ships' hulls comprising substantially parallel chains, rungs connecting said chains at intervals, means for supporting the ladders thus formed with the rungs standing out edgewise from the hull of a ship, planks having hooks at the ends thereof engageable over the rungs to form a staging substantially parallel to the hull of the ship between the outstanding ladders and turn-buckles interposed in the chains of said ladders.

9. Scaffolding for ships' hulls comprising substantially parallel chains, rungs connecting the chains at intervals in spaced relation to form ladders, means for supporting said ladders outstanding edgewise from the hull of a ship, lengthening and shortening means interposed in the side chains of said ladders, means for drawing the ladders toward the hull, means for holding the inner sides of the ladders spaced away from the hull and staging sections engageable with the rungs of different ladders.

10. Scaffolding for ships' hulls comprising substantially parallel chains, rungs connecting the chains at intervals in spaced relation to form ladders, means for supporting said ladders outstanding edgewise from the hull of a ship, lengthening and shortening means interposed in the side chains of said ladders, means for drawing the ladders toward the hull, means for holding the inner sides of the ladders spaced away from the hull, staging sections engageable with

the rungs of different ladders, eyes carried by certain of the rungs at the outward ends thereof and guard lines engaged in said eyes.

11. Scaffolding for ships' hulls comprising substantially parallel chains, rungs connecting the chains at intervals in spaced relation to form ladders, means for supporting said ladders outstanding edgewise from the hull of a ship, lengthening and shortening means interposed in the side chains of said ladders, means for drawing the ladders toward the hull and certain of the rungs having portions extending inward beyond the inward sides of the ladders and having extended base portions engaging the ship's hull to hold the ladders spaced away from the hull.

12. Scaffolding for ships' hulls comprising ladders flexible edgewise to conform to the contour of a ship's hull, means for suspending said ladders over the side of a ship's hull and standing out edgewise from the hull, said ladders having rungs projecting beyond the inward sides of the ladders and provided with divergent end portions to space the ladders away from the hull, means for holding the spacing rungs against the hull and staging sections having hooks engaged with the rungs of different ladders.

13. Scaffolding for ships' hulls comprising ladders flexible edgewise to conform to the contour of a ship's hull, means for suspending said ladders over the side of a ship's hull and standing out edgewise from the hull, said ladders having rungs projecting beyond the inward sides of the ladders to space them away from the hull, means for holding the ladders against the hull, staging sections having hooks engaged with the rungs of different ladders, said ladders having eyes at the outward sides thereof and guard lines engaged in said eyes.

14. In apparatus of the character described, staging sections having hooks at the ends thereof, said hooks comprising U-shaped members having the body portions secured to the staging sections and the side arms thereof projecting and turned over to form substantially parallel hooks.

15. In apparatus of the character described, a staging section comprising a plank, a U-shaped member having the side arms thereof projecting beyond the end of the plank and the looped body portion thereof secured to one face of the plank, said projecting ends of the member being turned over to form hooks, a substantially U-shaped washer member applied to the opposite face of the plank and fastenings extending through the plank and through said washer member and the body portion of the hook member.

16. In apparatus of the character described, a staging section comprising a plank, a U-shaped member having the body portion thereof secured to the under face of the plank and the side arms thereof projecting beyond the end of the plank and offset toward the upper side of the plank and turned over to form projecting hooks.

17. In apparatus of the character described, a staging section comprising a plank, a U-shaped member having the body portion thereof secured to the under face of the plank, the side arms thereof projecting beyond the end of the plank offset toward the upper side of the plank and turned over to form projecting hooks and a substantially U-shaped member applied to the upper face of the plank and overlying the looped body portion of the hook member.

18. Scaffolding for ships' hulls comprising substantially parallel flexible side members, rungs connecting said flexible side members in spaced relation to form ladders and means for supporting said ladders outstanding edgewise from the hull, certain of said rungs having forked ends projecting beyond the inward sides of the ladders to form bases engaging the hull for holding the ladders spaced away therefrom.

19. In scaffolding for ships' hulls, flexible ladders having supporting rungs, means supporting said ladders outstanding edgewise from the sides of a ship's hull, supports disposed transversely at the bow and stern of the hull, ladders suspended from said supports at opposite sides of the bow and stern portions of the hull and staging sections engaged with the rungs of the several ladders.

20. In apparatus of the character described, a beam, means for supporting the same transversely at the bow or stern of a ship's hull, ladders suspended from said beam one at each side of the bow or stern portion of the hull and staging sections connected with the rungs of said ladders.

21. In apparatus of the character described, a beam, means for supporting the same transversely at the bow or stern of a ship's hull, ladders suspended from said beam one at each side of the bow or stern portion of the hull, staging sections connected with the rungs of said ladders and compensating connections engaged with the opposite end portions of said beam.

22. In apparatus of the character described, a beam, means for supporting the same transversely at the bow or stern of a ship's hull, ladders suspended from said beam one at each side of the bow or stern portion of the hull, staging sections connected with the rungs of said ladders, compensating connections engaged with the opposite end portions of said beam and comprising flexi-

ble loops secured to opposite end portions of the beam and supporting pulleys operating in the bights of said loops.

23. In scaffolding for ships' hulls, flexible ladders having supporting rungs, means supporting said ladders outstanding edgewise from the sides of a ship's hull, supports disposed transversely at the bow and stern of the hull, ladders suspended from said supports at opposite sides of the bow and stern portions of the hull, couplings between the ladders suspended from said supports, and staging sections supported between the rungs of adjacent ladders.

24. In scaffolding for ships' hulls, a beam supported transversely at one end of the hull, ladders suspended from said beam at opposite sides of the hull and couplings detachably connecting said ladders.

In testimony whereof I affix my signature.

ALFREDO DONAGGIO.