

Feb. 27, 1951

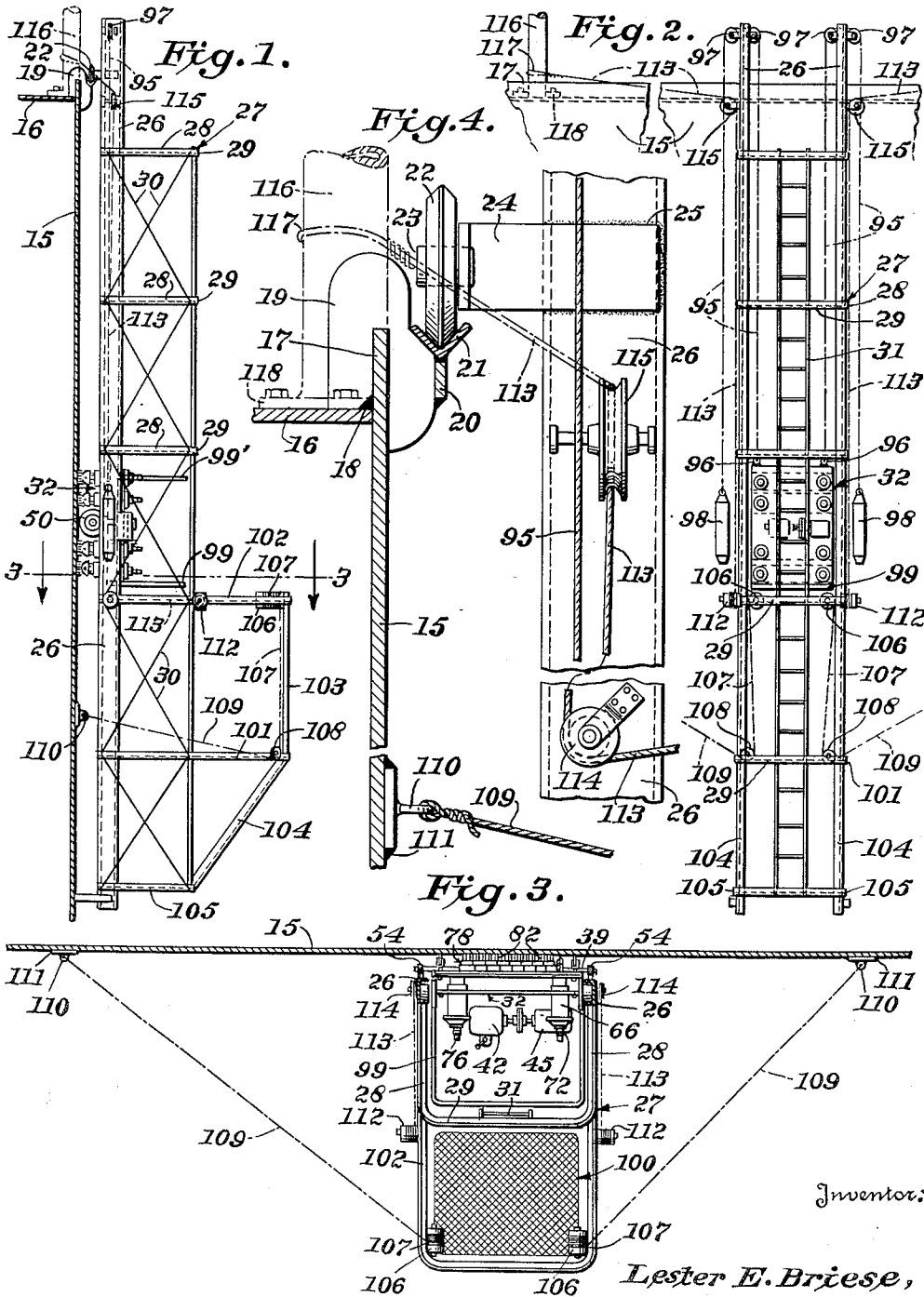
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2,543,348

SCALING MACHINE FOR CLEANING THE SIDES OF SHIPS

Filed Dec. 21, 1948

5 Sheets-Sheet 1



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SCALING MACHINE FOR CLEANING THE SIDES OF SHIPS

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Fig. 11.

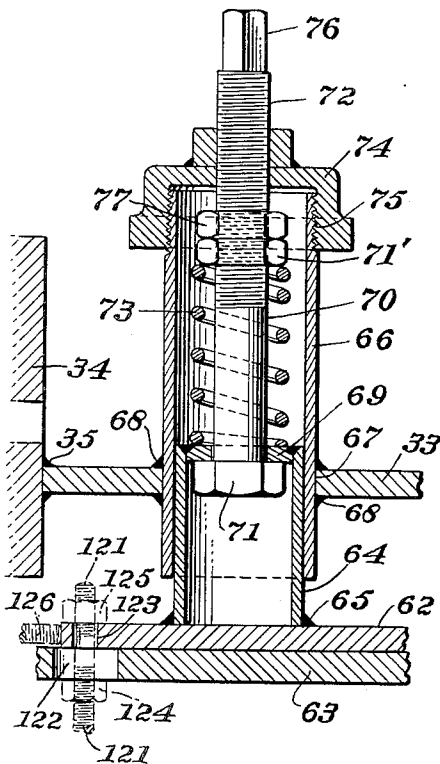
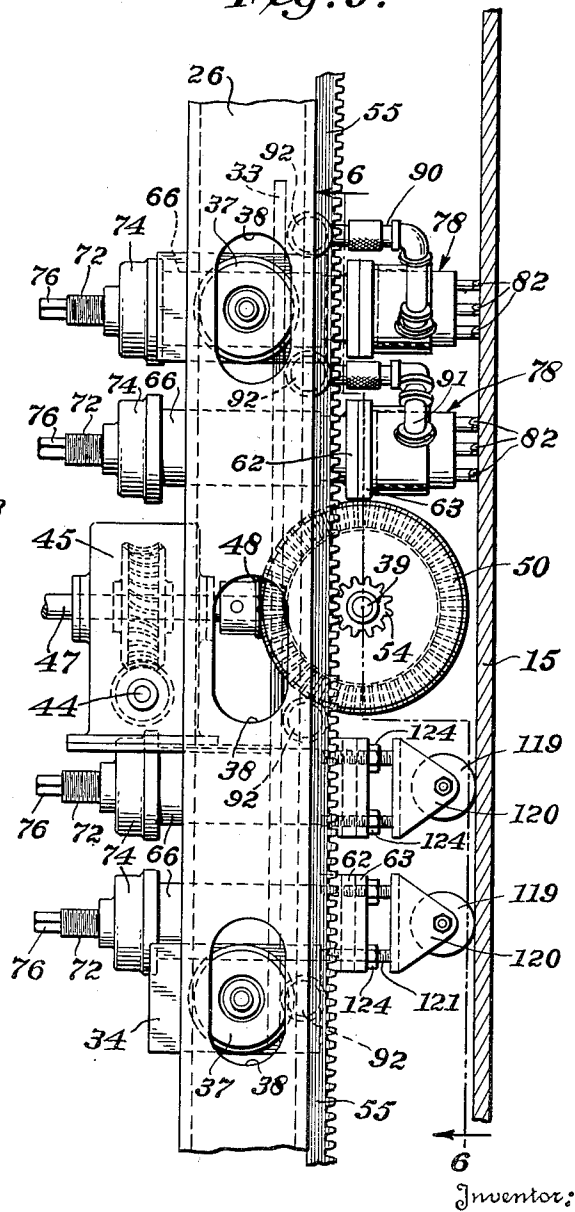


Fig. 5.



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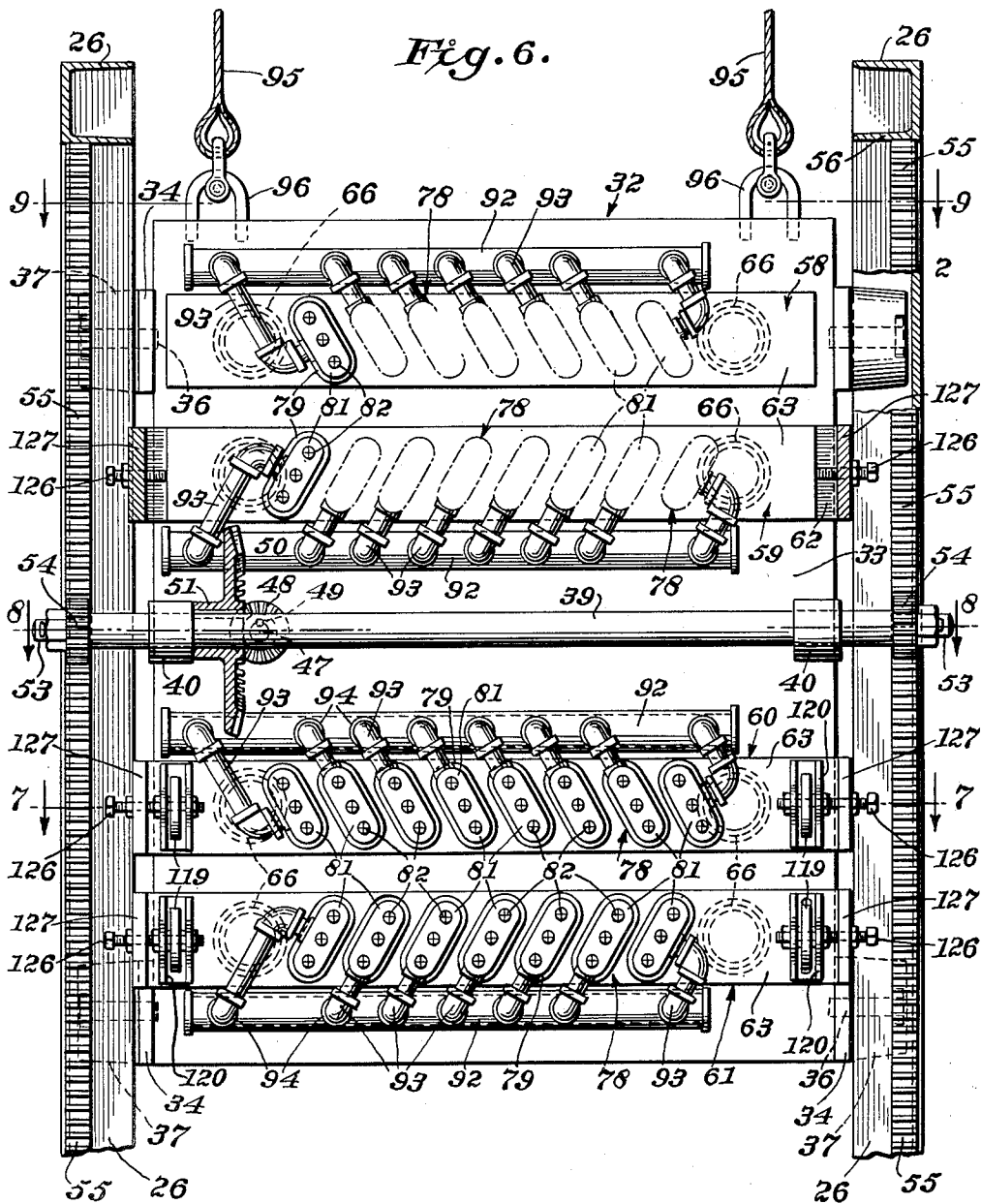
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SCALING MACHINE FOR CLEANING THE SIDES OF SHIPS

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5 Sheets-Sheet 3



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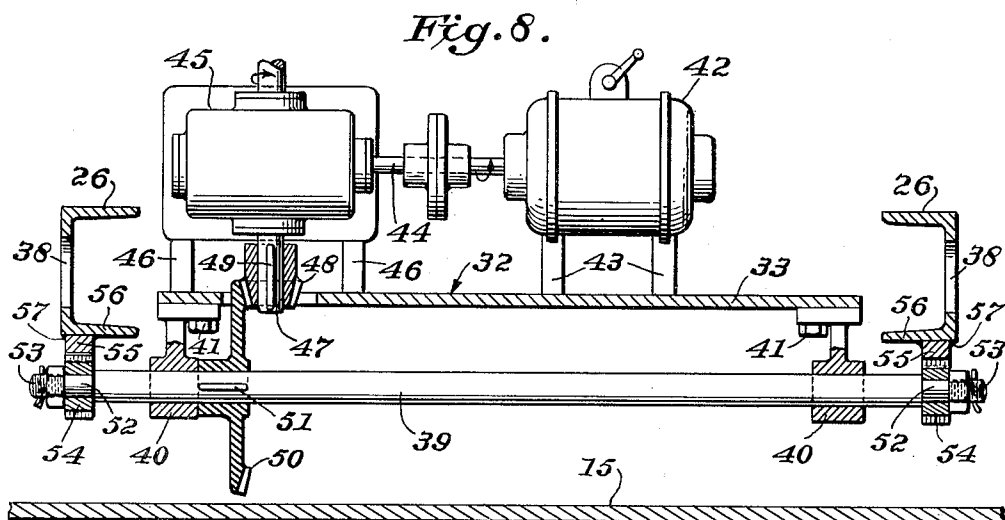
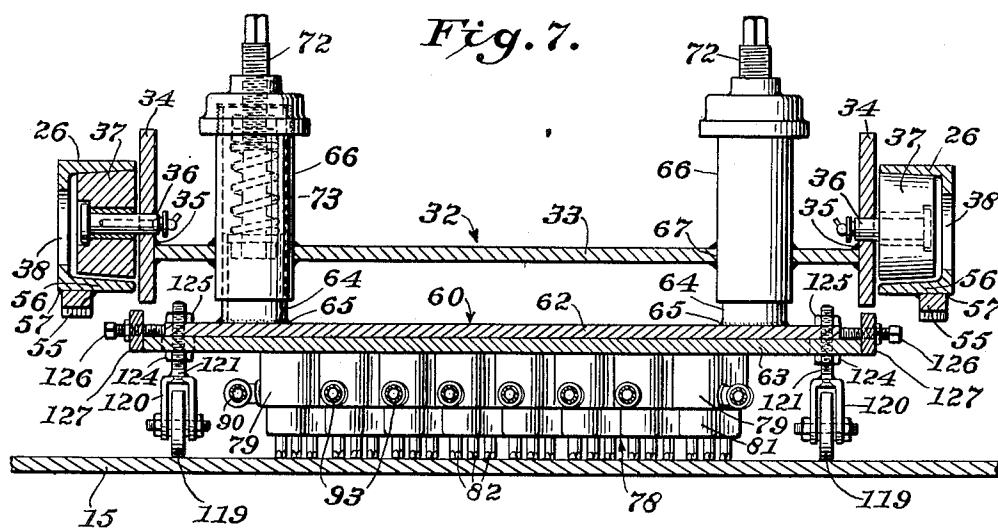
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SCALING MACHINE FOR CLEANING THE SIDES OF SHIPS

Filed Dec. 21, 1948

5 Sheets-Sheet 4



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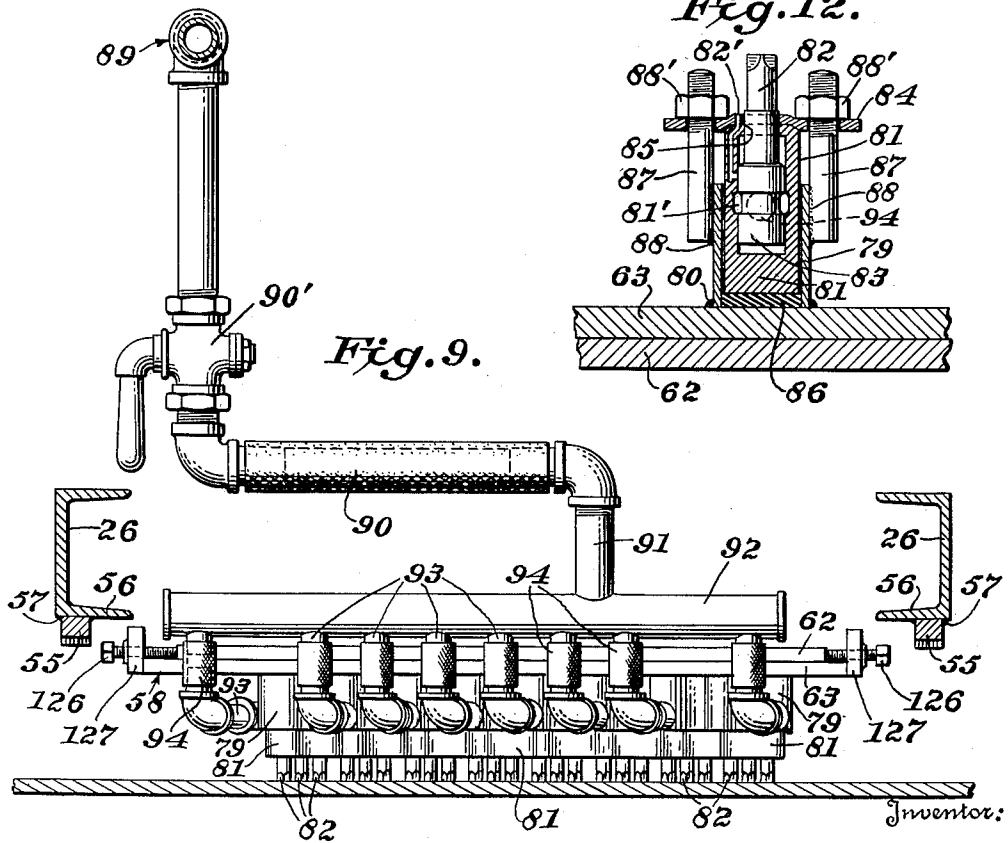
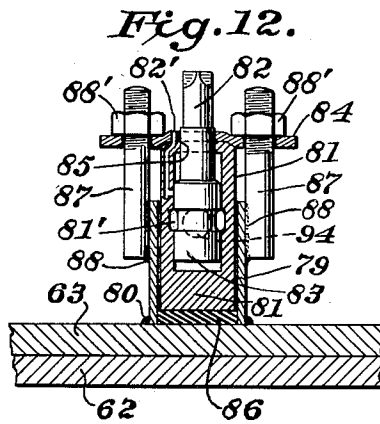
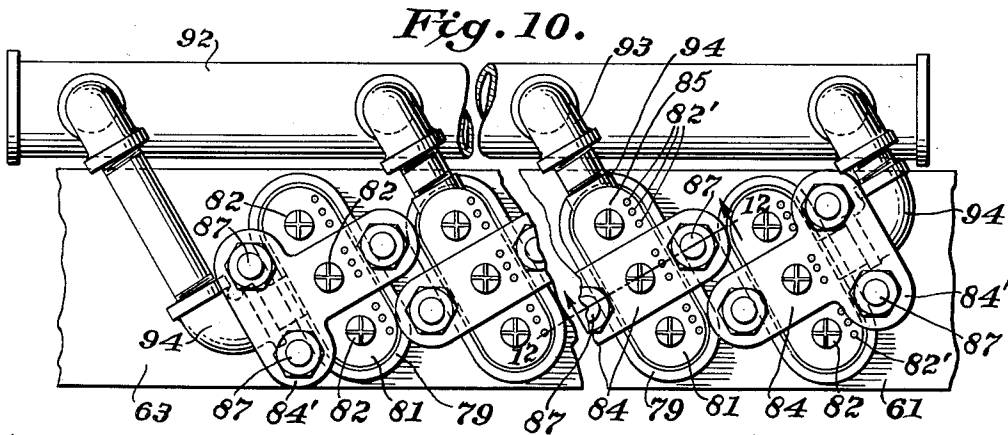
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SCALING MACHINE FOR CLEANING THE SIDES OF SHIPS

Filed Dec. 21, 1948

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,543,348

SCALING MACHINE FOR CLEANING THE
SIDES OF A SHIP

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Application December 21, 1948, Serial No. 66,488

16 Claims. (Cl. 114—222)

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The present invention relates to a scaling machine for cleaning the sides of a ship and the like.

An important object of the invention is to provide a simple, efficient, compact scaling machine arranged to be connected to the side of a ship so as to be movable longitudinally and vertically over the surface to be treated, and which is provided with means for thoroughly and effectively removing scale, paint, rust and barnacles so as to obtain a clean, unstreaked scale surface at a minimum expenditure of time and cost.

A further object comprehends the provision of a portable scaler attachment including a guide frame suspended from the side of a ship and with which is associated a vertically movable carrier that is guided by the frame. Driving means mounted on the carrier is operatively connected to the suspension frame to impart vertical movement to the carrier relative to the frame. Extending outwardly from the carrier and preferably on opposite sides of the driving means are batteries of scalers or cleaning tools arranged in transverse rows and provided with scaling tools or guns that engage the side of the ship and are movable over a wide vertical and longitudinal area in a continuous operation.

A further object is to provide a suspension frame movably connected to the outer side of a ship to be cleaned, and which supports a movable scaler having tools arranged to be moved into engagement with the side of the ship during the cleaning operation. The scaler is provided with a platform movable therewith and on which a workman stands to control the operation of the scaler tools. Additionally, the frame has a fixed auxiliary platform at the lower end thereof for a second workman and which is provided with manually operable means connected to the sides of the ship to maintain the frame and carrier in a fixed position. The auxiliary frame also carries means connected to the ship and operable for moving the suspension frame and carrier longitudinally relative to the ship. The second workman stands on the auxiliary platform and controls the movement of the suspension frame and its associated parts relative to the ship.

Another object consists in forming the movable carrier with a vertically disposed base plate having outwardly spaced therefrom vertically disposed spaced rows of slat members, each of which rows includes a pair of inner and outer overlapping plates. To the outer plates are connected transverse rows of scalers arranged to be moved into operative engagement with the side of the ship during the cleaning operation. The outer

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plate is wider than the inner plate and associated with the ends of the inner and outer plates are means for adjusting the outer plate laterally relative to the inner plate, so that the rows of scalers may be longitudinally adjusted when operating conditions require slight lateral movement of the scalers relative to the work. Additionally, yieldable means are provided for moving and maintaining the inner and outer plates and the scalers in engagement with the work.

Other objects and advantages of the invention will become apparent from the following description when taken in conjunction with the accompanying claims and drawings.

Referring to the drawings in which is shown a preferred embodiment of the invention:

Figure 1 is a side elevation of a ship showing the scaling machine associated therewith.

Figure 2 is a front view of Figure 1.

Figure 3 is a sectional view taken substantially along the line 3—3 of Figure 1.

Figure 4 is an enlarged detail sectional view of the upper portion of Figure 1 with the side of the suspension frame broken away to show a portion of the lower end thereof.

Figure 5 is an enlarged detailed sectional view of one side of the scaling machine shown in Figure 1.

Figure 6 is a sectional view taken substantially along the line 6—6 of Figure 5.

Figure 7 is an enlarged detail sectional view of one of the plungers connected to the carrier and its associated parts.

Figure 8 is a sectional view taken substantially along the line 8—8 of Figure 6.

Figure 9 is a sectional view taken substantially along the line 9—9 of Figure 6.

Figure 10 is a fragmentary enlarged detail front view of a transverse row of scalers shown in Figure 6.

Figure 11 is an enlarged detail sectional view showing the yieldable means connected to the carrier for urging the scaler in engagement with the shell of the ship, and

Figure 12 is a sectional view taken substantially along the line 12—12 of Figure 10.

Referring to the drawings in which like numerals indicate like parts in the several figures, 15 (Fig. 1) designates the side shell of a ship to which the upper deck 16 may be connected at the gunwale 17 by a weld 18 (Fig. 4). A fixed support 19 is secured to the gunwale 17 and may be coextensive in length therewith. A guide rail 20 is welded or otherwise connected to the outer side of the support 19 and has a V-shaped longi-

tudinal groove 21 that receives similar shaped spaced wheels or rollers 22, each of which rollers is journaled at 23 to a laterally extending arm or strap 24 welded or otherwise connected as at 25 to one of a pair of spaced vertically disposed guide channel members 26. The channel members 26 are connected together by vertically spaced U-shaped bars 27 (Fig. 3) that have parallel arms 28 extending outwardly from the channel members and are connected together by a transverse rail portion 29. The adjacent vertically spaced side arms 28 may be connected by cross braces 30, and a vertical ladder 31 may be secured to the transverse portions 29 of the U-shaped members so as to extend from the top to the bottom of the channel members 26.

The channel members 26, together with the bars 27 and braces 30, constitute a suspension or guide frame that is movable by the rollers 22 along the guide track 21, and associated with the suspension frame is a vertically movable carrier generally indicated by the numeral 32 (Fig. 6). The carrier 32 preferably comprises an elongated vertically disposed base plate 33 positioned between the channel members 26 and having parallel side bearing members 34 welded as at 35 to the opposite sides thereof (Fig. 7) adjacent its upper and lower ends, and to which are connected the outwardly extending axes or shafts 36 that carry the rollers 37 which extend into the channel members 26 between the arms thereof so as to guide and control the vertical movement of the carrier 32 relative the suspension frame and the shell 15. The outer face of each of the channel members 26 may be provided with spaced elongated openings 38 to reduce their weight.

A transverse drive shaft 39 (Fig. 8) is positioned in front of the base plate 33 and is connected thereto by the spaced bearing members 40 and the bolts 41. A reversing motor or the like 42 is connected to the rear of the plate 33 by the spaced brackets 43 and is operatively connected through a transverse shaft 44 to a gear reducing mechanism 45 secured to the rear of the plate 33 by the spaced brackets 46. A shaft 47 extends outwardly and forwardly from the reducing gear mechanism 45 and has keyed thereon a bevel pinion 48 as at 49. The pinion 48 meshes with a gear 50 keyed as at 51 to the transverse drive shaft 39. The ends of the shaft 39 are reduced as at 52 and terminate in threaded portions 53. Keyed or otherwise non-rotatably secured to the reduced portions 52 are pinions 54 which mesh with rack bars 55 that are secured to the outer arms 56 of the channel members 26 by welding or the like as at 57. The rack bars 55 are substantially coextensive in length with the channel members 26, and it will be seen that rotation of the shaft 39 through the motor 42 and reducing gear mechanism 45 will cause vertical movement of the carrier 32 and its associated parts relative to the channel members 26.

Positioned in front of plate 33 and spaced therefrom are vertically spaced transverse rows of flat slat members or straps 58, 59, 60 and 61 (Fig. 6), preferably having the slat members 58 and 59 positioned above the drive shaft 39 and the slat members 60 and 61 below the same. Manifestly, the number and arrangement of the slat members may be varied as operating conditions require. Each horizontal row of slats 58, 59, 60 and 61 comprises a back plate 62 (Fig. 7)

and an overlapping laterally displaceable front plate 63 of the same width as the back plate but of slightly longer length, as best shown in Figures 7 and 9. To the rear of each of the back plates 62 are connected outwardly spaced tubular members 64 as at 65 (Fig. 7), each of which telescopically receives a cylinder 66 that extends through an opening 67 in the wall of the base plate 33 (Fig. 11) and is welded thereto as at 68. To the inner end of the tubular member 64 is connected an annular stop member or ring 69 through which extends a threaded bolt or plunger 70 having its head 71 normally abutting the lower side of the stop member 69. Surrounding the bolt 70 and confined between the stop 69 and an adjusting nut 71' on the threaded portion 72 of the bolt, is a coil spring 73 which tends yieldably to urge the inner and outer plates 62 and 63 outwardly away from the base plate 33. A closure cap 74 is threaded as at 75 to the sleeve 66 and has a central opening through which the plunger 70 extends and the outer end of the plunger may be of polygonal shape as at 76 to receive a suitable tool for controlling or adjusting the tension of the spring 73. A locking nut 77 may be connected to the threaded portion 72 for retaining the nut 71' in a fixed position. To each of the front plates 63 is connected a transverse row or battery of scale removers or cleaners 78 of any conventional type, such as "Oldham" scalars. Each scalar 78 may include an elongated outer casing 79 welded at 80 to its associated front plate 63 (Fig. 12) and an inner casing or housing 81 within the outer casing 79 and extending outwardly therefrom and of substantially the same configuration. Reciprocally mounted within the inner casing 81 are preferably three spaced scalar tools or guns 82, each of which tools has an enlarged inner end portion or piston 83 slidable within the casing 81. The outer reduced ends of the tools 82 extend through three spaced openings in the top of the inner casing 81, and a hold-down clamp 84 extends across the top of each casing 81 intermediate its ends. Each of the clamps 84 has a central opening 85 through which projects the center tool 82 of each casing. A rubber cushion 86 within the outer casing 79 is positioned between the bottom of the inner casing 81 and the outer surface of the plate 63, so as to provide shock absorbing means during the operation of the scalars 78. Each of the clamps 84 is also formed with spaced side openings through which the threaded studs 87 extend, and these studs are welded or otherwise connected at their lower ends as at 88 to the outer wall of the casing 79 so as to maintain the inner casing 81 and its associated parts firmly within the outer casing 79. The clamps 84 for the end scalars (Fig. 10) have their outer ends enlarged as at 84' and are connected by spaced pairs of studs 87 to the casings in the same manner as the intermediate scalars.

The scalar tools 82 are operable by any suitable fluid, such as compressed air, which is conducted from a main supply line 89 (Fig. 9) through a flexible connection, such as a rubber hose or the like 90, to an inlet pipe 91 of the manifold 92 that is provided with longitudinally spaced outlet pipes 93 connected by the flexible conduits 94 to chambers 81' (Fig. 12) in each of the casings 81 of the scalars, so as to impart reciprocating movement to the tools 82 when the machine is in operation. The top 85 of the inner

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casing 81 (Fig. 10) is provided with spaced longitudinally disposed rows of outlet openings 82' through which the fluid may discharge from the chamber 81' during the operation of the reciprocating tools 22. Preferably, the transverse rows of scalers are inclined alternately in opposite directions with respect to each other (Fig. 6), and the end scalers 78 of each row have the conduits 94 delivering to the side thereof while the intermediate scalers have the conduits communicating with their ends (Fig. 10). A manually operable valve 90' may be provided for controlling the flow of the pressure fluid through the supply line 90.

To the upper end of the carriage 32 (Fig. 6) are connected spaced cables 95 as at 96. Each of the cables 95 extends upwardly and over a pair of sheaves 97 (Fig. 2) connected to the upper end of each channel member 26, and then downwardly along the side thereof, and is connected at its lower end to a weight 98 so as to provide counterbalancing means for maintaining the carrier 32 and its associated parts in a relatively fixed position during the scaling operation. Extending outwardly from the lower end of the carrier 32 so as to be movable therewith, is a platform 99 on which the operator of the scaler stands to raise or lower the carrier during the scaling operation. A protective rail 99' may be connected to the carrier above the platform. The lower end of the suspension frame is provided with an auxiliary fixed platform 100 (Fig. 3) connected to the sides of the channel members 26 by vertically spaced U-shaped bars 101 and 102 that extend outwardly beyond the bars 27, and which may be connected by the vertical arms or strips 103 (Fig. 1). Extending downwardly from the bar 101 are spaced inclined arms 104 that are connected to the channel members 26 by horizontal arms 105. To the inner sides of the arms of the upper U-shaped bar 102 are journaled hand winches or drums 106 (Fig. 3), on each of which is wound one end of a cable 107 that extends downwardly past a guide pulley 108 (Fig. 1) and then inwardly as at 109 so as to be connected at its opposite end to a pad eye 110 that may be welded as at 111 to the side shell of the vessel at a spaced distance from the carrier 32, in order to provide means for maintaining the scraper attachment in a fixed position adjacent the side of the ship during the scaling operation. The upper U-shaped arm 102 of the auxiliary platform may also be provided with spaced hand winches 112 to each of which is connected one end of a cable 113 so as to be wound thereon. The cable 113 extends inwardly and passes up under a sheave 114 (Fig. 4) and over a sheave 115 journaled in the upper end of an adjacent channel member 26, and then extends longitudinally of the gunwale 17 (Fig. 2) so as to be connected to a stanchion or a fixed member 116 as at 117. The stanchions 116 are laterally spaced from the carrier 32 so that upon operation of the winches 112, the suspension frame and the carrier 32 may be moved longitudinally along the side of the ship.

Each of the spaced stanchions or posts 116 may be connected to the deck 16 in any suitable manner as at 118 (Fig. 2). Spaced guide wheels 119 extend outwardly from the carrier 32 so as to engage the shell 15 in order to maintain the scalers in proper operative position and facilitate the vertical movement of the carrier. Each of the rollers 119 is journaled in a yoke 120

(Fig. 7) having a threaded shank 121 that extends through a transverse elongated slot 122 in the front plate 63 (Fig. 11) of the slot members, and a circular opening 123 in the rear plate 62.

A nut 124 on the shank 121 bears against the plate 63 adjacent the slot 122, and a nut 125 on the shank 121 engages the plate 62 so as not only to secure the wheels 119 to the carrier but also clamp the front plate 63 to the rear plate 62 and allow the front plate to be moved laterally relative to the rear plate when slight adjustment of the scaler tools is desired. Each of the outer plates 63 is laterally adjustable relative to its inner plate 62 within predetermined limits, by set screws 126 that extend through members 127 that abut the ends of the front plate 63 (Fig. 7) and are spaced from the ends of the rear plate 62 so that the inner ends of the screws engage the adjacent sides of the plate 62 in order that upon rotation of the screws, the plates 63 and the scalers 78 may be adjusted laterally during the operation of the device, when such adjustment is required due to obstructions or protuberances on the outer side of the shell 15.

Preferably, two men operate the scaler. One operator stands on the platform 99 to control the operation of the scaling tools or guns 81 and the vertical movement of the carrier 32 relative to the guide members or suspension frame, so as to advance the tools over the surface being treated. The other operator will stand on the platform 100 so that by rotating the winches 106 to maintain the cables 109 taut to insure the scaler being firmly held in proper operative position during the cleaning operation. When it is desired to move the machine longitudinally after a vertical surface of the ship has been cleaned, the operator on the platform 100 loosens the cables 109 by operation of the winches 106, and then rotates the winches 112 in the desired direction so that the suspension frame and the carrier 32 may be moved as a unit to position the scaler tools 81 adjacent the area to be cleaned. Thus, it will be seen that if the left-hand winch in Figure 2 is rotated so as to tighten its associated cable 113 and the right-hand winch 112 is actuated to slacken its adjacent cable 113, that the pressure developed will cause the suspension frame and carriage to be moved bodily toward the left, assuming, of course, that the winches 107 have been previously actuated to slacken the cables 109. The platforms 99 and 100 are conveniently accessible by the ladder 31. The scaling device may efficiently and expeditiously be operated by two men, one on the platform 99 for controlling the operation of the scaler tools and the vertical movement of the carriage, and the other workman who stands on the platform 100 so as to operate the pairs of winches in order that the machine may be maintained in proper operative position relative to the side of the ship and for moving the suspension frame longitudinally during the scaling operation. The outward pressure exerted by the springs 75 within the cylinders 66 against the inner plate 62 provides means for yieldably maintaining the tools 81 in proper operative position during the scaling operation. The vertically spaced rows of scaling tools are staggered relative to each other in a vertical plane to insure the entire area over which the machine passes being thoroughly scaled during its operation.

Thus, it will be seen that a simple, efficient and compact scaler attachment is arranged to be associated with the side of the ship so as to

be easily and conveniently moved across the surface to be treated and is so arranged as to cover a wide cleaning area in a continuous operation and at a minimum expenditure of time and labor. The scaler device is intended to clean the vertical portion or straight-away surface of the shell, and the curved portions of the bow and stern are cleaned by hand.

It is to be understood that the form of the invention shown is merely illustrative of a preferred embodiment, and that such changes may be made as come within the scope of the following claims.

I claim:

1. In combination with a ship, a scaling apparatus arranged to be suspended from the side of the ship, said apparatus including a guide frame adapted to be moved longitudinally relative to the ship, means movably connecting the frame to the side of the ship, a movable carriage, means connecting the carriage to the frame so that the carriage is movable vertically relative thereto, means operatively connected to the carriage and in movable engagement with said frame for imparting vertical movement to the carriage, scaler tools mounted on the carriage and extending outwardly and laterally therefrom to engage the side of the ship, means for operating said tools, said frame having a fixed platform for receiving an operator, manually adjustable means on the frame adjacent the platform and connected to the ship on opposite sides of the carriage to maintain the frame and carriage against the side of the ship during the scaling operation, and cable means on the frame adjacent the platform and having a fixed connection with the ship for moving the frame and carriage longitudinally relative to the side of the ship, said adjustable means and said cable means being operable by the operator on said platform.

2. In combination with a ship, a cleaning apparatus arranged to be suspended from the side of the ship, said apparatus including a guide frame adapted to be moved longitudinally relative to the ship and having spaced vertically disposed parallel channel members provided with vertically extending rack bars on the outer arms thereof, means movably connecting the frame to the side of the ship, a vertically movable carriage between the channel members, said carriage including a vertically disposed base plate having guide rollers extending outwardly from opposite sides thereof and rotatably engaging said channel members, a drive shaft extending transversely of the base plate and having pinions engaging said rack bars, means for rotatably mounting the drive shaft on said base plate, a motor mounted on the base plate and operatively connected to said drive shaft for moving the base plate relative to the frame, scaling tools connected to said base plate and extending outwardly and laterally therefrom to engage the side of the ship, and means connected to said tools for operating the same.

3. In combination with a ship, a cleaning apparatus arranged to be suspended from the side of the ship, said apparatus including a guide frame adapted to be moved longitudinally relative to the ship and having spaced vertically disposed parallel channel members provided with vertically extending rack bars on the outer arms thereof, means movably connecting the frame to the side of the ship, a vertically movable carriage between the channel members, said carriage including a vertically disposed base plate having

guide rollers extending outwardly from opposite sides thereof and rotatably engaging said channel members, a drive shaft extending transversely of the base plate and having pinions engaging said rack bars, means for rotatably mounting the drive shaft on said base plate, a motor mounted on the base plate and operatively connected to said drive shaft for moving the base plate relative to the frame, a battery of scaling tools connected to said base plate on opposite sides of the driving shaft and extending outwardly and laterally therefrom to engage the side of the ship, and means operatively connected to said scaling tools for operating the same.

4. In combination with a ship, a cleaning apparatus arranged to be suspended from the side of the ship, said apparatus including a guide frame adapted to be moved longitudinally relative to the ship and having spaced vertically disposed parallel channel members provided with vertically extending rack bars on the outer arms thereof, means movably connecting the frame to the side of the ship, a vertically movable carriage between the channel members, said carriage including a vertically disposed base plate having guide rollers extending outwardly from opposite sides thereof and rotatably engaging said channel members, a drive shaft extending transversely of the base plate and having pinions engaging said rack bars, means for rotatably mounting the drive shaft on said base plate, a motor mounted on the base plate and operatively connected to said drive shaft for moving the base plate relative to the frame, scaling tools connected to said base plate and extending outwardly and laterally therefrom to engage the side of the ship, and said carriage having a platform movable therewith for receiving an operator who controls the vertical movement of the carrier.

5. In combination with a ship, a cleaning apparatus arranged to be suspended from the side of the ship, said apparatus including a guide frame adapted to be moved longitudinally relative to the ship and having spaced vertically disposed parallel channel members provided with vertically extending rack bars on the outer arms thereof, means movably connecting the frame to the side of the ship, a vertically movable carriage between the channel members, said carriage including a vertically disposed base plate having guide rollers extending outwardly from opposite sides thereof and rotatably engaging said channel members, a drive shaft extending transversely of the base plate and having pinions engaging said rack bars, means for rotatably mounting the drive shaft on said base plate, a motor mounted on the base plate and operatively connected to said drive shaft for moving the base plate relative to the frame, said frame having a platform adjacent the lower end thereof for receiving a workman, a pair of spaced winches rotatably mounted on the frame above said platform, flexible members wound on said winches and extending outwardly therefrom in opposite directions, and fixed means connecting the outer ends of said flexible members to the ship on opposite sides of the guide frame for maintaining the same against the side of the ship during the scaling operation.

6. In combination with a ship, a cleaning apparatus arranged to be suspended from the side of the ship, said apparatus including a guide frame adapted to be moved longitudinally relative to the ship and having spaced vertically dis-

posed parallel channel members provided with vertically extending rack bars on the outer arms thereof, means movably connecting the frame to the side of the ship, a vertically movable carriage between the channel members, said carriage including a vertically disposed base plate having guide rollers extending outwardly from opposite sides thereof and rotatably engaging said channel members, a drive shaft extending transversely of the base plate and having pinions engaging said rack bars, means for rotatably mounting the drive shaft on said base plate, a motor mounted on the base plate and operatively connected to said drive shaft for moving the base plate relative to the frame, said frame having a platform adjacent the lower end thereof for receiving a workman, a pair of spaced winches rotatably mounted on the frame above said platform, flexible members wound on said winches and extending inwardly and upwardly therefrom, and said ship on opposite sides of said frame having spaced stanchions, the outer ends of said flexible members being detachably connected to said stanchions so that upon operation of said winches for moving the frame and carrier longitudinally relative to the ship.

7. In combination with a ship, a cleaning apparatus arranged to be suspended from the side of the ship, said apparatus including a guide frame adapted to be moved longitudinally relative to the ship and having spaced vertically disposed parallel channel members provided with vertically extending rack bars on the outer arms thereof, means movably connecting the frame to the side of the ship, a vertically movable carriage between the channel members, said carriage including a vertically disposed base plate having guide rollers extending outwardly from opposite sides thereof and rotatably engaging said channel members, a drive shaft extending transversely of the base plate and having pinions engaging said rack bars, means for rotatably mounting the drive shaft on said base plate, a motor mounted on the base plate and operatively connected to said drive shaft for moving the base plate relative to the frame, said frame having a platform adjacent the lower end thereof for receiving a workman, a pair of spaced winches rotatably mounted on the frame above said platform, flexible members wound on said winches and extending outwardly therefrom in opposite directions, fixed means connecting the outer ends of said flexible members to the ship to maintain the frame against the side of the ship during the scaling operation, a second pair of spaced winches rotatably mounted on the frame above the platform and spaced from said first mentioned winches, flexible members wrapped on said second pair of winches and extending inwardly and upwardly therefrom, and spaced stanchions on the ship, the outer ends of said second pair of flexible members being connected to said stanchions so that upon loosening of the said first mentioned pair of flexible members and operation of the second pair of winches for moving the frame and carrier longitudinally relative to the side of the ship.

8. A scaler attachment for ships including a suspension frame having spaced vertically disposed guide channel members provided with rack bars extending lengthwise thereof, means connecting the frame to the side of a ship, a carrier between said channel members, means movably connecting the carrier to said channel members, a transverse rotary drive shaft connected to the

carrier and having pinions at the ends thereof meshing with said rack bars for moving the carrier vertically relative to the frame, means on the carrier operatively connected to said drive shaft to rotate the same, scaling means connected to the carrier and extending outwardly and laterally therefrom, and means for operating said scaling means.

9. A scaler attachment for ships including a suspension frame having spaced vertically disposed guide channel members provided with rack bars extending lengthwise thereof, means connecting the frame to the side of a ship, a carrier between said channel members, means movably connecting the carrier to said channel members, a transverse rotary drive shaft connected to the carrier and having pinions at the ends thereof meshing with said rack bars for moving the carrier vertically relative to the frame, a motor mounted on the carrier and operatively connected to said drive shaft, transverse rows of scaling tools connected to the carrier and disposed on opposite sides of the drive shaft, and means for operating said tools.

10. A scaler attachment for ships including a suspension frame having spaced vertically disposed guide channel members provided with rack bars extending lengthwise thereof, means movably connecting the frame to the side of the ship, a vertically disposed carrier plate between said channel members, said plate having guide rollers extending outwardly from opposite sides thereof and engaging said channel members, a transverse drive shaft mounted on the carrier intermediate the ends thereof and provided with spaced pinions engaging said rack bars, means on the carrier for operating said drive shaft, transversely disposed rows of scaling tools extending outwardly and laterally from the carrier and above and below the drive shaft, and means for operating said tools.

11. A scaler attachment for ships as called for in claim 10 in which the carrier has a platform movable therewith for supporting the operator who controls the operation of the scaling tools and the vertical movement of the carrier relative to the suspension frame.

12. A scaler attachment for ships including a suspension frame, a vertically disposed carrier plate having means movably connecting the same to the frame, means for moving the carrier plate vertically relative to the frame, vertically spaced transverse slat members in front of the carrier plate, each of said slat members including a vertically disposed rear plate and an overlapping front plate, means connecting the front and rear plates, means connecting the rear plate to the carrier plate, scaler tools connected to the front plate and extending outwardly thereof, and means for operating said tools.

13. A scaler attachment for ships including a suspension frame, a vertically disposed carrier plate having means movably connecting the same to the frame, means for moving the carrier plate vertically relative to the frame, vertically spaced transverse slat members in front of the carrier plate, each of said slat members including a rear plate and an overlapping front plate of substantially the same width as the rear plate but of longer length than the rear plate, means connecting the front and rear plates so that the front plate is longitudinally movable relative to the rear plate, yieldable means connecting the rear plate to the carrier plate, scaler tools connected to the front plate and extending outwardly thereof,

means for operating said tools, and means for longitudinally adjusting the front plate relative to the rear plate.

14. A scaler attachment for ships including a suspension frame, a vertically disposed carrier plate having means movably connecting the same to the frame, means for moving the carrier plate vertically relative to the frame, vertically spaced transverse slat members in front of the carrier plate, each of said slat members including a rear plate and an overlapping front plate of substantially the same width as the rear plate but of longer length than the rear plate, means connecting the front and rear plates so that the front plate is longitudinally movable relative to the rear plate, spaced means connected to the carrier plate and yieldably engaging said rear plate for urging the same away from the carrier plate, scaler tools mounted on the front plates in oppositely inclined rows, and means for operating said tools.

15. A scaler attachment for ships including a suspension frame having spaced vertically disposed guide channel members provided with rack bars extending lengthwise thereof, means movably connecting the frame to the side of the ship, a vertically disposed carrier plate between said channel members, said plate having guide rollers extending outwardly from opposite sides thereof and engaging said channel members, a transverse drive shaft mounted on the carrier intermediate the ends thereof and provided with spaced pinions engaging said rack bars, means on the carrier for operating said drive shaft, vertically spaced transverse slat members in front of the carrier plate, each of said slat members including a rear plate and an overlapping front plate of substantially the same width as the rear plate but of longer length than the rear plate, means connecting the front and rear plates so that the front plate is longitudinally movable relative to the rear plate, means for longitudinally adjust-

ing the front plate relative to the rear plate, spaced means connected to the carrier plate and yieldably engaging the rear plate for urging the same away from the carrier plate, transverse rows of casings mounted on the front plates and inclined in opposite directions, spaced inclined scraper tools movably mounted in each of said casings, and means for operating said tools.

16. A scaler attachment for ships including a suspension frame, a vertically disposed carrier plate having means movably connecting the same to the frame, means for moving the carrier plate vertically relative to the frame, vertically spaced transverse slat members in front of the carrier plate, spaced guide rollers extending outwardly from each front plate and having shanks extending through said plates, means connecting the shanks to the front and rear plates so that each front plate is longitudinally displaceable relative to its rear plate, means for longitudinally adjusting the front plate relative to its rear plate, spaced means connected to the carrier plate and yieldably engaging the rear plate for urging the same away from the carrier plate, transverse rows of scaler tools mounted on the front plates, and means for operating said tools.

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