

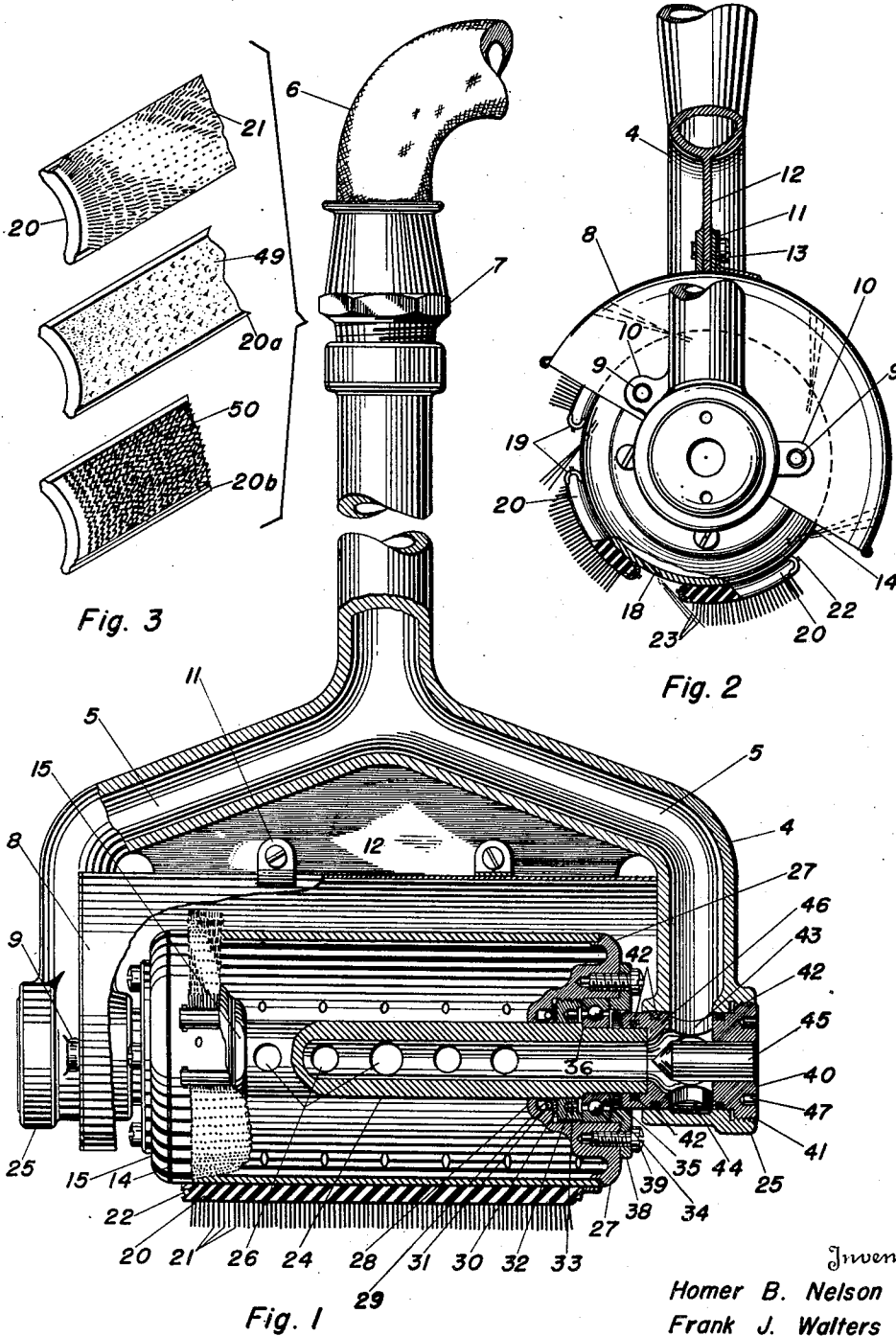
April 17, 1951

F. J. WALTERS ET AL

2,548,923

ROTARY CLEANING TOOL

Filed Aug. 20, 1945



Inventors

Homer B. Nelson

Frank J. Walters

By *Ralph H. Chappell*
Attorney

UNITED STATES PATENT OFFICE

2,548,923

ROTARY CLEANING TOOL

Frank J. Walters and Homer B. Nelson, United States Navy

Application August 20, 1945, Serial No. 611,670

2 Claims. (Cl. 15—24)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

1

This invention relates to improvements in hydraulic turbine tools for cleansing metal, wooden, or other surfaces of dirt, paint, and the like.

An object of this invention is to provide a rotary tool for cleansing surfaces that is motivated by hydraulic pressure.

A further object of this invention is to provide a turbine cleansing device that is driven by hydraulic pressure and at the same time the fluid escaping from the turbine jets furnishes a rinsing effect on the surface being cleansed.

A further object of this invention is to provide a hydraulic turbine cleansing device that combines the impact of fluid from the turbine jets with the rubbing action of the abrading elements on the turbine to cleanse, polish, or scrape the surface operated upon.

A yet further object of this invention is to provide a cleansing device that will remove paint or other surface coatings from metal, wooden, or other similar surfaces without damage to the surface itself.

A yet further object of this invention is to provide a hydraulic turbine device that is provided with detachable brushes which may be used as a scrubbing element and may be removed and substituted for an abrasive element to be used for scouring or polishing metal, wooden or other similar surfaces or may be substituted for an element carrying teeth to chip rust barnacles or the like from hulls of ships or boats.

Other objects and advantages of this invention will become apparent as the discussion proceeds and is considered in connection with the accompanying claims and drawings wherein like characters of reference designate like parts throughout and wherein:

Fig. 1 is a longitudinal section and partial plan view of the tool embodied in this invention, with a scrubbing brush attached;

Fig. 2 is an end plan view of the tool embodied in this invention; and

Fig. 3 is a perspective view of the detached brushing element, abrasive element and chipping element embodied in this invention.

Referring now to the drawings, wherein for the purpose of illustration is shown a preferred embodiment of this invention, the numeral 4 designates a forked tubular Y frame or handle having fluid passages 5 which serve the dual purpose of conveying fluid to the rotary tool, embodied in this invention, and as a handle supporting the same. A high pressure hose or other flexible fluid conducting means 6 is fitted to the handle of the Y frame by any suitable connection such as a union 7 or the like.

A cylindrical guard 8 is affixed, between the arms of the Y by screws 9 to ears 10 provided on the said frame, and by clips 11 provided on the guard, affixed with screws 13 to a resilient mem-

2

ber such as a webbing or the like 12 rigidly held inside the frame 5, as shown. A cylindrical high pressure drum 14 is rotatably carried upon the end portions of the Y frame 5, as shown. At spaced intervals around and along the drum are reaction jet nozzles 18 having the openings disposed at an angle substantially as shown. Affixed to the outer surface of the drum, in any suitable manner as by welding, riveting, or the like, and spaced longitudinally between the rows of jets, are retaining U-shaped lips or channels 19, adapted to slidably receive a curved plate 20 carrying suitable brush bristles 21 of some wear-resisting waterproof material such as a phenolic resin brush, of a scrubbing element. When it is desired to use the tool as an abradant the curved plates 20 carrying the brushes 21 are removed from the drum and a plate 20a carrying an abrasive 49 such as a waterproof Carborundum is inserted into the U-shaped channel 19. When the tool is to be used as a chipper or scraper, plates 20b carrying high carbon steel lugs or teeth 50 are substituted for the brushes. The backs 20, 20a, and 20b are held in place by means of pins or screws 22. When the tool is used as a scrubbing element the tips 23 of the bristles 21, adjacent the jets 18, and in line with the spray therefrom, are tapered off at 23, as shown, so that water from the said jets will not impinge and dissipate itself upon the said bristles.

A tubular shaft 24, rigidly supported by end portions 25 of the Y 4, and communicating with the fluid passages 5, supports a bearing housing 15. At spaced intervals in the said shaft 24 are fluid openings 26 which permit passage of fluid into the drum 14. The sum of the cross sectional areas of the openings 26 is equal to the sum of the cross sectional areas of the passages 5 in both arms of the Y 4. This specific size of the openings 26 is to permit unrestricted flow of fluid into the drum 14 from the tubular passages 5.

The bearing housing 15, rotatably supports the said drum at each end, and consists of a circular plate 27 fitting into the ends of the drum 14, as shown. An inner depending flange 28 of the said drum rotates around but spaced away from the shaft 24 and forms an annular recess 29, as shown, which carries a fluid pressure sealing ring consisting of a leather or fabric washer 30 held against the said shaft 24 by a retaining spring 31. The washer 30 is held in the circular plate 27 by a nut 32 having spanner sockets 33 for tightening the nut, as shown. A ball, roller, or other anti-friction bearing 34 rotatably supports the end plate 27 on the shaft 24. An outside bearing seal 35 prevents the entrance of foreign matter into the bearing 34. The said bearing 34 is slidably or press fitted into the plate 27, as shown, and faces on its inner circumference against an

annular offset or shoulder 36 in the shaft 24, as shown. This arrangement holds the bearing and drum in proper position between the arms of the Y. A second plate 38, held in place by screw 39, holds the bearing 34 in the plate 27.

In order to permit assembly of the shaft 24 into the Y and to hold the same rigidly in place while at the same time permitting passage of fluid from the tubular channel 5 into the said shaft, it is necessary that some form of removable fluid connection such as a shaft support 40 be provided. The said support 40 carries threads 41 and screws into the end 25 of the Y 4. Adjacent the end of the support opposite the threads is a depending lip 46 adapted to firmly receive the end of the shaft 24. Pressure seals 42, such as O rings, are provided, as shown, between the support and the Y and the shaft to prevent fluid leakage. The center of the said support is formed into a hollow cylinder and is in open communication with the fluid passage 5 by means of holes 43, and a channel 44 provided within the end 25 of the said Y communicating likewise with the fluid passage 5. The said channel 44 is such that regardless of the radial position of the holes 43 the volume of fluid passing through the holes will be the maximum furnished by the said passage 5. An insert plug 45, carried in the end of the support 40 extending into the hollow cylinder, as shown, restricts turbulence and maintains a uniform cross sectional area in the fluid passage as direction of flow changes. This arrangement permits the drum and bearing to be assembled complete and then inserted into the Y. The shaft support 49 is then screwed into place by means of a spanner wrench (not shown) adapted to fit the spanner sockets 47 and when tightened locks the shaft 24 firmly in place.

It is to be understood that the bearing housing and shaft support bearing described in detail is but one of several forms that could be used without departing from the spirit of this invention.

In operation fluid such as water is carried under high pressure through the hose 6 through the Y 4 into the drum 14 thence out the jets 18. Reaction of the fluid through the said jets causes the drum to rotate. The tool is then applied manually to the surface to be cleansed, polished, scraped, or chipped. The rotary action of the brush, abradant, scraper, or chipper loosens the foreign matter from the surface operated upon. The impact of the fluid from the jets, also acting on the surface operated on, assists in loosening the foreign matter from the surface. When the tool is used as a brush the bristles 21 aided by the fluid from the jets have a sufficiently strong scrubbing action to loosen foreign matter such as dirt, grease, and even paints but will not damage the surface acted upon. It is to be noted that this tool is particularly valuable for cleansing boats and the like, as it will remove the surface material but will not destroy the caulking. When it is desired to use this tool as a polisher or the like the backs 20 and the brushes 21 are removed from the U channel 19 and the backs 20a carrying water proof Carborundum polishers 49 or the like are inserted into the said channel and the tool is then manually applied to the surface to be polished; the impact from the jets (as when the tool is used for a brush) washes the surface and at the same time also aids in loosening any foreign material present due to the impact of the fluid. When the tool is to be used as a scraper

or chipper backs 20b provided with high carbon steel teeth or other similarly hard teeth 50 are fitted into each of the channels 19 and the tool is then manually applied to the surface operated upon as in the other cases.

It is to be understood that the form of the invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention, or the scope of the sub-joined claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What we claim is:

1. In a device of the character described the combination of a hollow tubular handle with a Y-shaped end having a pair of fluid outlets, said hollow handle being adapted to be connected to a source of fluid under pressure, a support having a removable bearing threaded into the end of each outlet, each support having a passageway communicating with the associated outlet, a drum rotatably mounted on the bearings, means for substantially preventing turbulence in said drum including a fixed hollow liquid delivery tube extending through the drum between the bearings, said tube being provided with a plurality of openings whose total cross sectional area is equal to the sum of the cross sectional area of the fluid passages in the Y-shaped end, a plurality of axial rows of tangential jet orifices in said drum, and removable scrubbing members secured to the surface of said drum between said rows of jet orifices said members having beveled edges adjacent the downstream end of the jets so as to substantially prevent any impingement of said jets on said edges whereby a surface to be cleaned may be subjected alternately to the friction of each scrubbing member and to the impinging action of each row of jets successively.

2. A device as characterized in claim 1 having further turbulence preventing members including a conically-ended fluid flow diverting plug fixed to each of said supports axially in said passageways, said passageways with said plugs therein also having a cross-sectional area equal to the sum of the cross-sectional area of the fluid passages in the Y-shaped end.

FRANK J. WALTERS.
HOMER B. NELSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
673,960	Looker	May 14, 1901
1,471,748	Miller	Oct. 23, 1923
1,597,644	Wiener	Aug. 24, 1926
2,205,249	Fitzgerald et al.	June 18, 1940
2,281,773	Kollmann	May 5, 1942

FOREIGN PATENTS

Number	Country	Date
383,631	Germany	Oct. 15, 1923
572,750	France	June 12, 1924
193,300	Switzerland	Dec. 16, 1937