

H. WIMMER.
 ROTARY CUTTER AND PAINT REMOVER.
 APPLICATION FILED OCT. 18, 1920.

1,377,537.

Patented May 10, 1921.

Fig. 1.

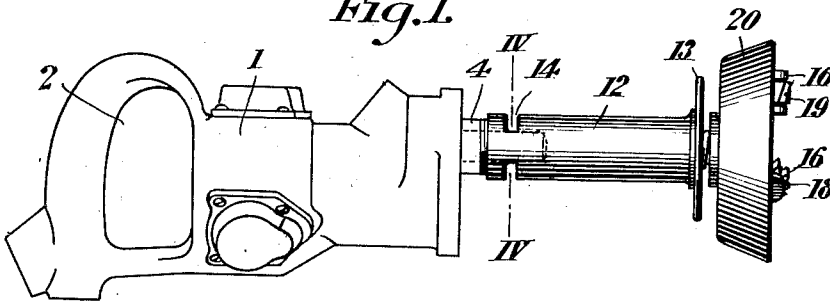


Fig. 2.

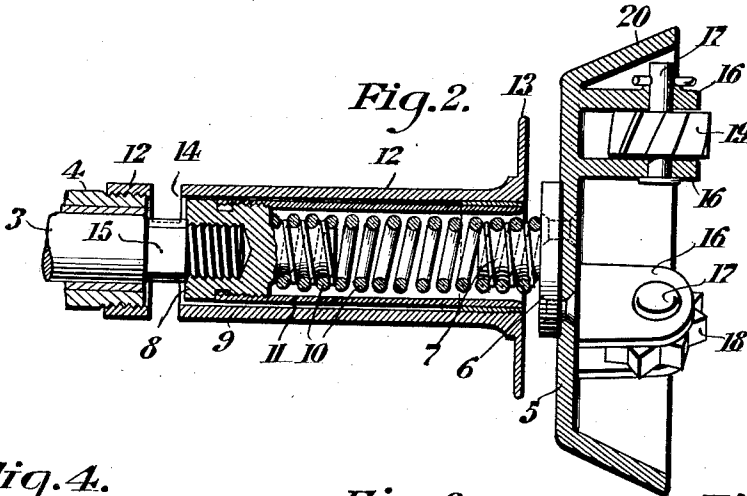


Fig. 4.

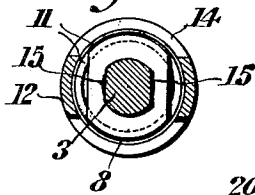


Fig. 3.

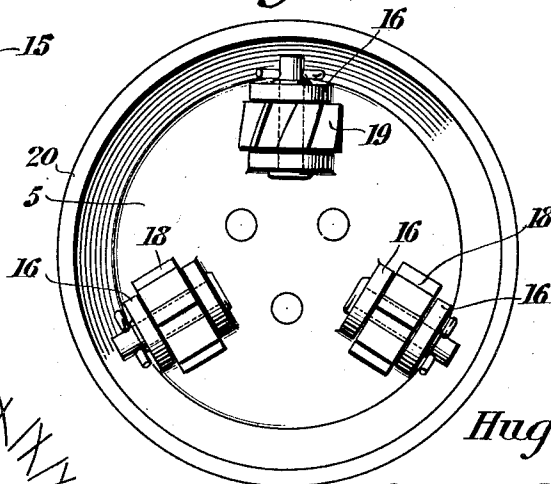


Fig. 5.

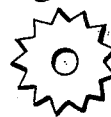


Fig. 6.



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UNITED STATES PATENT OFFICE.

HUGO WIMMER, OF BATH, MAINE.

ROTARY CUTTER AND PAINT-REMOVER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HUGO WIMMER, a citizen of the United States, and resident of Bath, in the county of Sagadahoc and State of Maine, have invented certain new and useful Improvements in Rotary Cutters and Paint-Removers, of which the following is a specification.

The object of this invention is to provide a rotatable cleaning tool. The form of the device shown in the drawing and described herein is especially for cutting and removing paint, rust, and barnacles from ships, so designed that it may be held by the operator and readily moved over the surface to be cleaned.

In the drawing:

Figure 1 is a side elevation of the device complete;

Fig. 2 a longitudinal central sectional view of the rotary cutter;

Fig. 3 a face view of the cutter;

Fig. 4 a transverse sectional view on the line IV—IV of Fig. 1;

Fig. 5 a detail side elevation of one of the cutting wheels; and

Fig. 6 a diagrammatic view showing the lines of the cuts made by the cutters.

Referring to the various parts by numerals, 1 designates a motor preferably of the pneumatic type and provided with a hand grip 2 by which it may be held and manipulated by the operator. This motor may be of any suitable type, either electric or pneumatic, but is preferably of convenient size for manipulation by the operator. The rotary cutting tool is connected directly to the shaft 3 of the motor, said shaft projecting outwardly through a rigid nipple 4 forming a part of the motor casing. The motor 1 is shown merely in outline in Fig. 1 and it is thought unnecessary to completely illustrate its details of construction in this case. These motors are well known and any suitable and desirable type may be used in connection with this invention.

The cleaning and cutting tool consists of a circular head 5 provided at the center of its outer face with a central attaching plug 6, said plug being formed with a central coarsely threaded stud 7. Threaded on the end of the shaft 3 is a coupling 8, said coupling being formed with a threaded outwardly extending axial threaded stud 9. Interposed between the studs 7 and 9 and

threaded on both of said studs is a coiled spring 10. The ends of this spring are connected to the studs by screwing the coils thereof into the threads of the studs, as clearly shown in Fig. 2. By this means, head 5 is flexibly and yieldingly connected to the shaft 3 and rotates with it. The coils of the spring 10 are separated slightly to permit a limited longitudinal compression of the spring during the operation of the cutting and cleaning tool, as will be more fully hereinafter described. Threaded on the coupling 8 is a sleeve 11 which incloses the spring 10 and is of sufficient length to bridge the space between the studs 7 and 9, so that the unsupported part of the spring 10 is inclosed within the sleeve 11. This sleeve protects the spring and limits the lateral vibration of the cutter head.

A cylindrical tubular grip 12 is screwed on the end of the nipple 4 and extends outwardly over the sleeve 11 and incloses the said sleeve and the outer end of the spring 10. This grip is stationary with the motor frame and serves as a holding device adapted to be gripped by the operator when manipulating the tool. The outer end of this grip is provided with a radial guard flange 13 which is arranged close to the cutter head, as shown clearly in Figs. 1 and 2. In manipulating the device the operator will grasp the handle part 2 of the motor frame with one hand and the grip 12 with the other. The flexible connecting shaft formed by the spring 10 is short, so that the cutter head is close to the motor frame and the tool as a whole is of convenient size for manipulation by the operator. This spring need be only sufficiently long to permit the use of a grip 12 of convenient size. The grip 12 is slotted transversely near its inner end, that is to say, the end which is connected to the rigid nipple 4, as shown at 14, to permit the shaft 3 to be reached by a spanner or other device when connecting or disconnecting the coupling from the shaft 3. The shaft is flattened, as shown at 15, at points which register with the slots 14, so that said flattened portions may be reached by the spanner and the shaft held from rotation during the manipulation of the coupling, both in attaching the cutter to and detaching it from the shaft. The sleeve 12 is provided with a bearing bushing 12^a in which turns the outer end of the sleeve 11.

The outer face of the cutter head is provided with forwardly or outwardly projecting bearing lugs 16 in the outer ends of which are mounted short shafts 17, which carry, between the bearing lugs, toothed cutting and cleaning wheels 18 and 19. The shafts of these wheels are radial with respect to the center of the cutter head. They are all in the same plane and are perpendicular to the axis of the drive shaft. The cutting wheels are all of the same diameter, but the cutting edges of the teeth of the cutters 18 are parallel with the axis of their supporting shafts while the cutting edges of the wheel 19 are spiral or at an angle to the axis of its supporting shaft. This arrangement of teeth is clearly shown in Fig. 3. As shown in the drawings, three cutting wheels are arranged around the cutting head equal distances apart and equal distances from the center of said head. It is manifest, however, that the number of cutters may be varied as desired. The cutters are formed with very coarse V-shape teeth. The cutter 19 is also formed with very coarse V-shape teeth, the cutting edges of which are spirally arranged, as hereinbefore indicated. Formed around the edge of the cutter head is a forwardly or outwardly extending guard flange 20 which, to a great extent, incloses the cutters, thereby protecting the operator and preventing the flying about of the material that is removed by the cutter.

In Fig. 5 is shown a cutter having teeth of smaller dimensions than those shown in Figs. 2 and 3. It is manifest that cutters may be used having any desired size teeth and the cutters may be of any suitable diameter.

To clean a surface, for instance, a ship's bottom, of paint, rust, barnacles and the like, the operator places the cutter head in position with the cutting wheels bearing on the surface to be cleaned. The cutter head is rapidly rotated. The operator forces the cutters against the surface of which he is operating with the desired force, the spring 10 yielding slightly under this axial pressure. As the cutter head is rotated, the sharp edges of the teeth of the cutter wheels 18 and 19 are forced sharply against the surface and the cutter wheels are rotated. The effect is that the cutter head is given a rapid vibrating motion. As the cutter wheels rotate, the cutter head will have a back and forth oscillating motion due to the rotation of the cutter wheels, and the extent of this oscillation will depend upon the size and number of teeth in the cutter wheels. With cutters having coarse teeth, as shown in Figs. 2 and 3, the endwise oscillation of the cutter during its rotation will be considerable. With cutters having smaller teeth, as indicated in Fig. 5, the end-

wise oscillation of the cutter head will be slight. This endwise oscillation of the cutter head results in a multiplicity of rapid blows which cause the sharp edges of the cutter wheels to bite into and disintegrate the material that is to be removed. The spiral teeth of the cutter 19 cut in substantially the same paths as the cutters 18 but the spiral teeth cut on lines at an angle to the lines cut by the radial edges of the teeth of the cutters 18. The purpose of this is to insure the disintegration and removal of paint or other material. The teeth of the cutter 19 in a sense cross-cut the cuts made by the teeth of the cutters 18. The operator moves the cutter over the surface to be cleaned and presses the cutter to the work with sufficient pressure to insure the removal of the foreign matter.

Fig. 6 is a diagrammatic view showing approximately the lines of the cuts made by the cutters 18 and 19. This view merely shows an approximation of the cuts because the position and relative arrangement of the cuts will depend upon the size of the cutters, the pitch of the cutting teeth and the relative positions of the cutters with respect to each other during the operation of the machine.

What I claim is:

1. A cutting and cleaning tool comprising a motor, a shaft adapted to be operated by said motor, a cutter head connected to said shaft, and a series of toothed cutters mounted in said cutter head, the shafts of said cutters being radial with respect to the center of the cutter head, all of said cutters being mounted an equal distance from the center of the cutter head, the cutting teeth of one of said cutters being radial with respect to the center of the cutter head and the cutting teeth of one of said cutters being spirally arranged, whereby said spirally arranged teeth will cross-cut the cuts made by the radial teeth of the other cutter.
2. A cutting and cleaning tool comprising a motor, a shaft adapted to be rotated by said motor, a flexible compressible coil spring shaft connected to the outer end of said motor shaft, a cutter head mounted on the end of said spring shaft, a series of freely rotatable toothed cutters mounted in said cutter head and adapted to be placed in contact with the surface to be cleaned, and a non-rotatable tubular grip connected to the motor casing and inclosing the spring shaft, said grip carrying at its outer end a radial guard flange.
3. A cutting and cleaning tool comprising a motor, a shaft adapted to be rotated by said motor, a flexible compressible coil spring shaft connected to the outer end of said motor shaft, a cutter head mounted on the end of said spring shaft, a series of freely rotatable toothed cutters mounted in said

cutter head and adapted to be placed in contact with the surface to be cleaned, a non-rotatable tubular grip connected to the motor casing and inclosing the spring shaft, said grip carrying at its outer end a radial guard flange, and a forwardly extending annular guard flange carried by the cutter head and inclosing the cutters.

4. A cutting and cleaning tool comprising a motor formed with a hand grip, a shaft adapted to be rotated by said motor, a flexible longitudinally compressible coil spring shaft connected to the outer end of said motor shaft, a cutter head mounted on the end of said spring shaft, a series of freely rotatable toothed cutters mounted in said cutter head and adapted to be placed in contact with the surface to be cleaned, and a non-rotatable tubular grip rigidly connected to the motor casing and inclosing the spring shaft, said grip carrying at its outer end a guard flange close to the cutter head.

5. A cutting and cleaning tool comprising a motor, a shaft adapted to be rotated by said motor, a flexible compressible shaft connected to the outer end of said motor shaft, a cutter head mounted on the end of said flexible shaft and having an outer face perpendicular to the axis of the compressible shaft, and a series of freely rotatable toothed cutters mounted on the outer face of said cutter head and adapted to be placed directly in contact with the surface to be cleaned whereby the flexible shaft may be compressed by forcing the cutter against the surface to be cleaned, the shafts of said cutters being radial with respect to the shaft of the cutter head and lying in a plane transverse to the axis of the cutter head, the cutting teeth of one of said cutters being radial with respect to the cutter head and the cutting teeth of one of said cutters being spirally arranged

whereby the spirally arranged teeth will cross-cut the cuts made by the radial teeth.

6. A cutting and cleaning tool comprising a flexible compressible coil-spring shaft, a coupling secured to one end of said spring shaft and adapted to be connected to a driving shaft, a cutter head mounted on the outer end of said spring shaft and having an outer face perpendicular to the axis of the spring shaft, and a series of freely rotatable toothed cutters mounted on the outer face of said cutter head and adapted to be placed directly in contact with the surface to be cleaned, the shafts of said cutters being radial with respect to the shaft of the cutter head and lying in a plane transverse to the axis of the cutter head, all of said cutters being mounted an equal distance from the center of the cutter head, the teeth of one of said cutters being radial with respect to the center of the cutter head and the cutting teeth of one of said cutters being spirally arranged.

7. A cutting and cleaning tool comprising a flexible compressible coil-spring shaft, a coupling secured to one end of said spring shaft and adapted to be connected to a driving shaft, a cutter head mounted on the outer end of said spring shaft and having an outer face perpendicular to the axis of the spring shaft, and a series of freely rotatable toothed cutters mounted on the outer face of said cutter head and adapted to be placed directly in contact with the surface to be cleaned, the shafts of said cutters being radial with respect to the shaft of the cutter head and lying in a plane transverse to the axis of the cutter head, all of said cutters being mounted an equal distance from the center of the cutter head.

In testimony whereof I hereunto affix my signature.

HUGO WIMMER.