

C. H. FRANKLIN.
 ROTARY TOOL.
 APPLICATION FILED NOV. 24, 1916.

1,270,808.

Patented July 2, 1918.

Fig. 1.

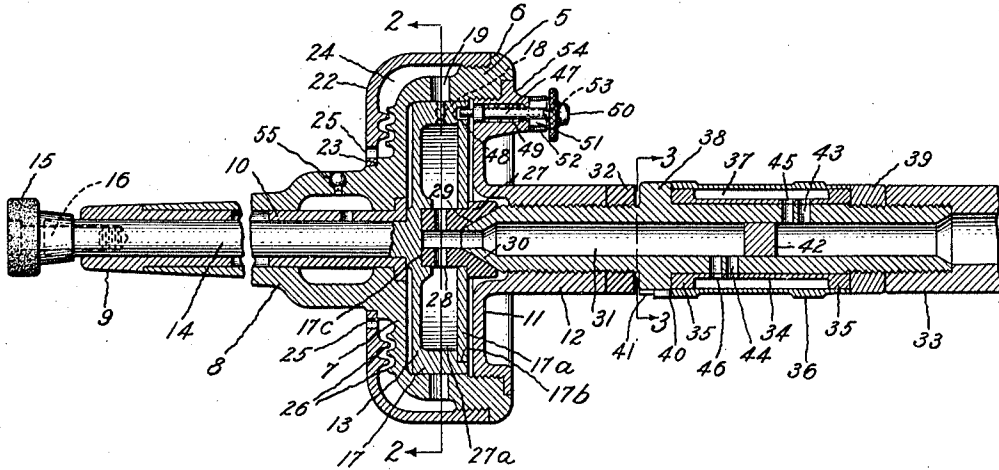


Fig. 4.

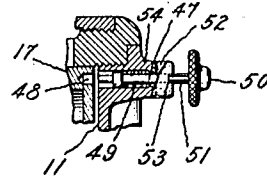


Fig. 2.

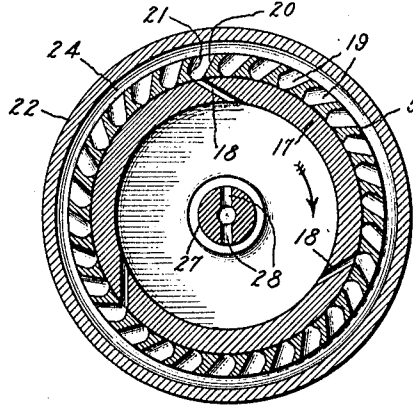
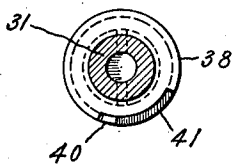


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ROTARY TOOL.

1,270,808.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES H. FRANKLIN, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Rotary Tools, of which the following is a specification.

The present invention relates to rotary tools such as are designed to be operated by compressed fluid, as air, and has for its object to provide an improved structure in a tool of this character.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying specification and the claims appended thereto.

In the accompanying drawing, Figure 1 is a longitudinal sectional view of a tool embodying my invention; Fig. 2 is a section taken on line 2—2, Fig. 1, looking in the direction of the arrows; Fig. 3 is a section taken on line 3—3, Fig. 1, looking toward the right, and Fig. 4 is a detail of a locking device.

Referring to the drawing, 5 indicates an annular wall having a flange 6 on its rear edge. Formed integral with the front edge of the wall 5 is a front wall 7 from the central portion of which projects a sleeve 8. The middle portion of this sleeve is broken away in the drawing, but it is made quite long so as to form a handle, and also so as to permit the tool to be used for inside work. In the outer end of the sleeve 8 is a front bearing 9 and in the inner end thereof is a rear bearing 10. In threaded engagement with the annular wall 5 is a rear wall 11 provided with a central projecting sleeve 12 threaded on its inner surface. The three walls 5, 7 and 11 form a housing or casing for a turbine wheel 13 supported on one end of a shaft 14 carried in the bearings 9 and 10. On the outer end of the shaft 14 is a tool 15 held in place by a screw 16. In the present instance a small grinding tool is shown, but it will be understood that any desired rotary tool may be used, as, for example, a cutting tool or a polishing tool. The turbine wheel 13 is overhung on the end of the shaft 14 and has a flange 17 through which are formed a series of tangential openings 18, three such openings being shown in the present instance. The rear side of the wheel is closed by a disk 17^a which engages a seat 17^b on the flange 17. The wheel 13 rotates in the direction of the ar-

row, Fig. 2, with the flange 17 in close proximity to the inner surface of the casing wall 5. In the wall 5 are a series of tangential openings 19 which are in the same vertical plane as the openings 18, but slope in the opposite direction, as shown in Fig. 2. The sides 20 of the openings 19 are straight, while the sides 21 are curved as shown. The openings 19 form the exhaust openings for the escape of operating fluid from the wheel 13. As will be clear, the operating fluid escaping from the tangential openings 18 strikes against the curved walls 21 of the openings 19 and is directed in a smooth curved path outward. Threaded over the annular wall 5 with its edge engaging the shoulder 6 is an outer casing 22. This casing extends down in front of the wall 7, being slightly spaced therefrom, and engages an annular shoulder 23 on the sleeve 8. Between the casing 22 and wall 5 is an annular chamber 24 which forms an exhaust chamber into which the operating fluid escapes from the openings 19. On the front and adjacent the sleeve 8, the casing 22 is provided with a series of exhaust openings 25 through which the operating fluid escapes to atmosphere. In the space between the casing 22 and the front wall 7 is arranged a series of interleaving projections 26 through which the operating fluid must pass on its way from the exhaust chamber 24 to the openings 25. These form a muffler or silencer for the tool and suppress the noise of the escaping fluid. Carried by the center of the wheel 13 is a thrust bushing 27 having one or more radial openings 28 for the passage of operating fluid. This bushing is supported in an opening in disk 17^a and in a recess 17^b in wheel 13. Surrounding the bushing 27 within the wheel is the annular chamber 27^a. In the rear end of the bushing 27 is a cone-shaped bearing surface 29 which takes against the cone-shaped end 30 of a tube 31 threaded into the sleeve 12 and held in place by a lock nut 32. The outer end of the tube 31 is threaded to receive a hose coupling 33. The sleeve 12 and tube 31 form together another handle for the tool and in this handle is arranged a valve for turning on and off the motive fluid. The valve comprises a sleeve 34 on tube 31 having flanges 35 at its ends against which fits a shell 36, thus providing an annular space 37 between them. The sleeve 34 and shell 36 are held between a collar 38 and a nut 39

and are adapted to turn on the tube 31, the turning movement being limited by a finger 40 projecting from shell 36 into an arcuate slot 41 in collar 38 (see Fig. 3). Inside tube 31 is a plug 42 and in tube 31 on opposite sides of the plug, and preferably diametrically opposite each other, are holes 43 and 44. The sleeve 34 is provided with holes 45 and 46 adapted to be brought into and out of registry with holes 43 and 44 by a turning movement of sleeve 34 and shell 36. In Fig. 1 the holes are shown in registry. A locking device is provided for the turbine wheel so that it may be held stationary when desired, as, for example, when the tool at the end of the shaft is being changed. It comprises a spindle 47 which extends through the wall 11 and is adapted to engage a recess 48 in the flange 17. The spindle is normally pressed toward the wheel flange 17 by a spring 49. 50 is a button on the end of the spindle 47, and 51 is a web projecting from the spindle just beneath the button 50. The web is adapted to slide in notches 52 and 53 in a flange 54 which surrounds it. The notches 52 are deep so that when the web is in them the end of spindle 47 may engage recess 48 (Fig. 1). The notches 53 are shallow and when the web rests in them the spindle is out of engagement with the recess 48 (Fig. 4). As will be obvious, the web may be moved from the one position to the other by pulling out on the button and turning it. 55 indicates an oil hole through which lubricant may be introduced to bearings 9 and 10.

In operation the tool is connected to a source of fluid supply, as compressed air, by a suitable flexible conduit. The motive fluid entering through the end of tube 31 passes through holes 43 and 45 in to the annular space 37, thence through holes 46 and 44 to the tube 31 on the other side of plug 42. From here it passes through the center opening of bushing 27, out through radial openings 28 to the chamber 27^a, and from chamber 27^a it passes through tangential openings 18 in the flange 17, and tangential openings 19 in the wall 5 to the exhaust chamber 24. From the exhaust chamber it passes through the muffler formed by projections 26 and openings 25 to atmosphere. It will be noted that the motive fluid in passing through the openings 25 to atmosphere is directed along the axis of the shaft 14 toward the working tool 15. By this means the exhaust fluid, which escapes with considerable velocity, is utilized to blow the chips or particles being removed away from the tool 15 and the part being worked upon so as to keep the surface clean. The operator can thus see exactly the work which the tool is doing. The motive fluid acts on the turbine wheel by reaction causing it to rotate as is well understood. The motive fluid may be quickly turned on and off by turn-

ing the shell 36 and sleeve 34 to bring the openings 43, 45, and 44, 46 into and out of registry.

Owing to the arrangement whereby there is a handle on each side of the turbine wheel casing, the tool is extremely convenient to handle. The operator holds it with both hands, one on each handle. This gives him one hand hold down close to the tool so that it can be carefully and accurately applied and moved over the work. The tool may also with advantage be clamped in a lathe, suitable clamps or holders being placed on either one or both sides of the turbine wheel casing.

The arrangement of the rotating parts whereby the turbine wheel is overhung on one end of the shaft and the working tool is on the other end is advantageous in that it provides for a long bearing for the shaft, while at the same time it enables the shaft to be comparatively short in over-all length and hence light. The long bearings, all on one side of the turbine casing, spaces the working tool quite some distance from the turbine casing so that the tool can be used very advantageously for reaching into the inside of a piece of work. The turbine wheel is practically balanced as to end pressure. Any end thrust in one direction is taken up by the cone-shaped end 30, and in the other direction by the end of the bearing sleeve 10.

The structure as a whole is very small and light. In fact, it need weigh not more than two or three pounds. It is simple in design and comparatively cheap to build. It can be very quickly and easily disassembled for repair or other purposes by turning off the rear wall 11. The turbine wheel and shaft can then be pulled out longitudinally, the working tool 15 having been first removed of course.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In an apparatus of the character described, the combination of a casing, a sleeve projecting from the front wall of the casing, a shaft journaled in said sleeve, a tool on the outer end of said shaft, a turbine wheel in the casing carried by said shaft, said turbine wheel having a flange with openings therein for the passage of motive fluid, said casing having openings which cooperate therewith, and a sleeve projecting from the rear wall of the casing

through which motive fluid is led to the central portion of the turbine wheel from which it flows radially outward, said two sleeves serving as handles for the apparatus.

5 2. In an apparatus of the character described, the combination of a casing having a front wall and a detachable rear wall, a sleeve projecting from the front wall, a shaft journaled therein, a tool on the outer
10 end of said shaft, a turbine wheel in the casing and overhung on the other end of the shaft, a thrust bearing for the turbine wheel carried by the rear casing wall, and a sleeve projecting from the rear casing
15 wall through which motive fluid is led to the turbine wheel, said two projecting sleeves serving as handles for the apparatus.

3. In an apparatus of the character described, the combination of a casing having
20 a front wall and a detachable rear wall, a sleeve projecting from the front wall, a shaft journaled therein, a tool on the outer end of said shaft, a turbine wheel in the casing and overhung on the other end of
25 the shaft, a thrust bearing for the turbine wheel carried by the rear casing wall, a sleeve projecting from the rear casing wall through which motive fluid is led to the turbine wheel, said two projecting sleeves
30 serving as handles for the apparatus, and a valve in the sleeve which projects from the rear casing for controlling the motive fluid supply.

4. In an apparatus of the character described, the combination of a casing, a sleeve
35 projecting therefrom and forming a handle, a shaft journaled in said sleeve, a turbine wheel in the casing and carried on one end of said shaft, a tool on the other end thereof,
40 a second sleeve projecting from the casing through which motive fluid is conveyed to

the turbine wheel, and an outer casing surrounding a portion of the first named casing and forming an exhaust chamber, said
45 outer casing having an exhaust opening which directs the exhaust toward the tool.

5. In an apparatus of the character described, the combination of a casing, a sleeve projecting therefrom and forming a handle,
50 a shaft journaled in said sleeve, a turbine wheel in the casing and carried on one end of said shaft, a tool on the other end thereof, a second sleeve projecting from the casing through which motive fluid is conveyed to
55 the turbine wheel, and an outer casing surrounding a portion of the first named casing and forming an exhaust chamber, said outer casing having an exhaust opening, and means forming a muffler interposed in the
60 path of flow of the exhaust fluid to said exhaust opening.

6. In an apparatus of the character described, the combination of a casing, a sleeve projecting therefrom, a shaft journaled in
65 the sleeve, a tool on the outer end of the shaft, a turbine wheel in the casing and carried by the shaft, said wheel having a flange with tangential openings therein for the passage of motive fluid, tangential openings in the casing in the same plane as those
70 in the flange, an outer casing surrounding a portion of the first named casing and providing a chamber into which the motive fluid exhausts from the openings in said
75 first named casing, said outer casing having exhaust openings which direct the exhaust fluid toward the tool, and means forming a muffler interposed in the path of flow of the exhaust fluid to said exhaust openings.

In witness whereof, I have hereunto set
80 my hand this 23rd day of November, 1916.

CHARLES H. FRANKLIN.