Sept. 8, 1936. J. L. TUTTLE 2,053,644

PORTABLE RESURFACING TOOL

Filed March 18, 1935

FIG. 1

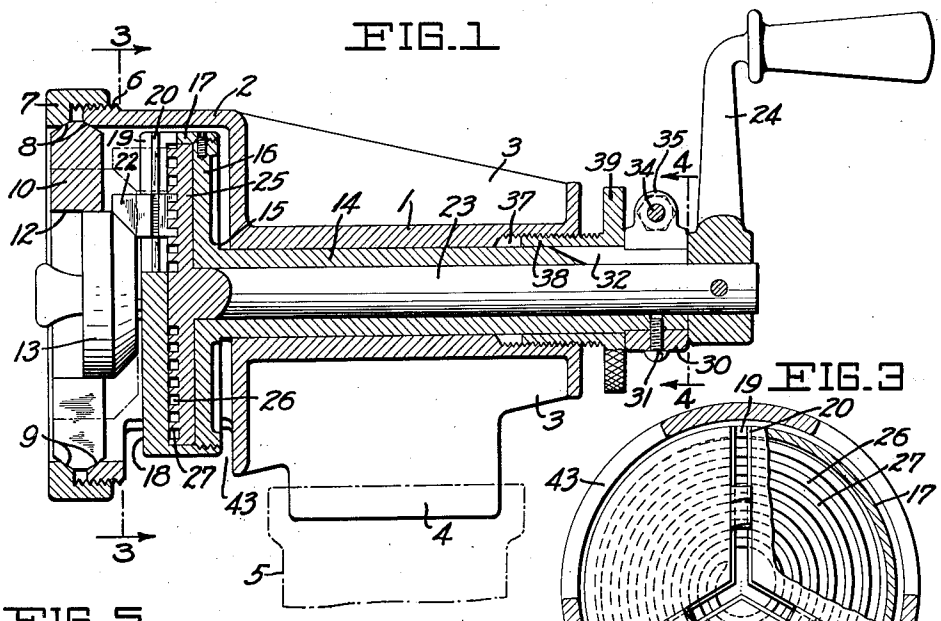


FIG. 3

FIG. 5

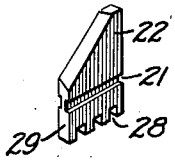


FIG. 4

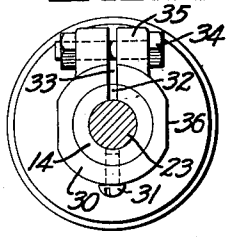


FIG. 2

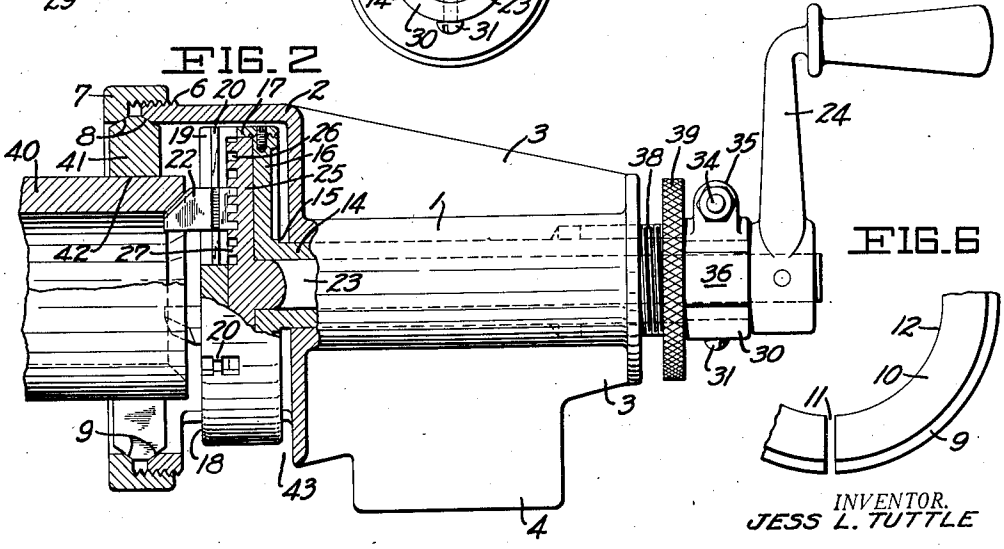


FIG. 6

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PORTABLE RESURFACING TOOL

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3 Claims. (Cl. 82—1)

This invention relates generally to a tool of the portable type which may be used for resurfacing the mating faces of such articles as poppet valves, pipe line unions, or the like.

An important object of the present invention is the provision, in a tool of the character described, of means for effecting simultaneous and equal adjustment of a plurality of cutters or like devices and for permitting such adjustment to be made at any time during operation of the tool.

Other objects of the invention are to provide a simple, compact and efficient tool of the character described which may be utilized for instance in the repairing of pipe line leaks due to defective union joints, and in reseating joints in certain types of centrifuging machinery without the necessity of dismantling the defective parts; to provide a tool of the character described which will produce a finished surface on valves or the like without chattering; and to provide a tool for the purposes set forth which is capable of efficient operation even though it is in the hands of one unskilled in its use.

There are on the market, numerous types of tools for resurfacing valves or for like purposes. The majority of these however, utilize a plurality of individually adjustable cutters usually mounted in clamps secured to a head journaled for rotation so as to move the cutters in an arcuate path around an axis. These devices are capable of doing satisfactory work provided economy of time is not an important factor, however when the latter condition obtains, so much time must be spent in the adjustment of the devices that mechanics, especially emergency repair service men, are reluctant to use them. Furthermore to properly adjust a device of this character, precision measuring tools must be used which means that the mechanic must be possessed of greater skill than the ordinary mechanic, if proper adjustment of the cutters is to be had.

Another undesirable feature of the individually adjustable type of cutter lies in the fact that if the cutting edge of one of the cutters is positioned radially from the rotational axis only a minute fraction of an inch, farther than the remaining cutters, it will be required to take the entire brunt of the cut and since it receives no support from the other cutters is very likely to chatter and thus render the tool incapable of producing a satisfactory result.

The present invention is designed to overcome these difficulties in providing means for simultaneously adjusting radially a plurality of cutters to insure that each cutting edge is following an arcuate path of identical radius. Means are provided for locking the cutters in position, once their position has been determined, so as to preclude further relative movement therebetween. Means are also provided, in the form of adapters of various sizes, for permitting the tool to be used for work of varying diameters, means are further provided for permitting ready interchangeability of the cutters so that the tool may be adapted to perform refinishing operations on surfaces having a wide degree of contour, and means are provided for regulating the quantity of metal which may be removed from a surface by the tool.

The broader aspects of the invention may be ascertained by referring to the drawing of which:

Figure 1 is a longitudinal sectional view of the tool of the present invention, showing the set-up of the various parts for performing a resurfacing operation externally of an object.

Figure 2 is a view similar to Figure 1 showing the arrangement of parts incident to performing an internal refacing operation.

Figure 3 is a vertical sectional view taken in a plane indicated by the line 3—3 of Figure 1 and showing the cutter head.

Figure 4 is a cross sectional view taken in a plane indicated by the line 4—4 of Figure 1 and shows the clamp for preventing relative movement of the cutters once they are set.

Figure 5 is a perspective view of a cutter.

Figure 6 is a fragmental view of a clamp ring.

In greater detail, the invention comprises a frame having a tubular stem portion 1 and a bell shaped housing 2 formed concentrically therewith. Ribs 3 are provided for reinforcing purposes, the lower one of these having a depending portion 4 by means of which the frame may be clamped for support in a suitable device such as the vise shown by the dot and dash lines 5.

Threads 6 are provided on the end of the housing 2 and a cap 7 is threaded thereon. Both the inner bores of the housing 2 and the cap 7 are provided with opposed tapered surfaces 8 which are adapted to engage like surfaces 9 of a clamp ring 10. This clamp ring is provided with a saw cut 11, Figure 6, and an internal bore 12 for receiving the object to be refaced which, in this instance, is illustrated as a stopper plug 13. It will be seen that an object, such as that illustrated, may be placed in the bore 12 in the correct position and the nut 7 turned to cause movement thereof inwardly toward the housing 2, whereupon due to the tapered faces of the nut and housing, a compressive force is exerted on the

ring 10 causing it to grip the plug 13 and securely hold it in position.

It is obvious that clamp rings having a wide range of bore sizes may be provided so that the tool may be adapted to work of various diameters within the range thereof.

Journaled in the stem portion 1 is a sleeve 14 extending outwardly from the stem at one end and provided at the other end with a shoulder 15 and a flange 16. The peripheral edge of the flange is threaded to receive a cap 17, the end wall 18 of which is provided with three radial slots 19, having formed on their side walls splines 20 adapted to engage grooves 21 formed in each of the cutter blades 22. It will be seen therefore that each cutter blade is provided with a guide to permit radial movement thereof to and from the axis of rotation of the sleeve 14.

Means are provided for simultaneously moving the cutter blades. Journaled within the sleeve 14 is a shaft 23 projecting beyond the end of the sleeve and fitted with a crank 24 by means of which it may be rotated. The end of the shaft within the housing formed by the flange 16 and the cap 17 is provided with a disc 25 on the face of which, adjacent the cutter blades, is formed a spiral groove 26, the metal ridges between each convolution of the groove providing a continuous planar thread 27 which is adapted to engage in notches 28 formed in extensions 29 of each cutter blade.

It will be readily seen that by holding the sleeve 14 against rotation and rotating the shaft 23 the thread 27 will force the cutters to move radially an equal amount and, due to the small advance per revolution of the thread, a very fine adjustment of the cutters may be obtained.

Means are provided for preventing relative movement between the cutters once they are adjusted. The end of the sleeve 14 where it projects beyond the stem 1 is provided with a portion of reduced diameter on which is fitted a split collar 30 secured to the sleeve 14 by suitable means such as the screw 31. As will be seen in Figure 4 the end of the sleeve is provided with a saw cut 32 in registry with the cut 33 of the collar 30 and a bolt 34 is provided mounted in bosses 35 formed integrally with the collar. By tightening this bolt the sleeve 14 may be securely clamped upon the shaft 23 and, due to their operative connections with the cutters 22, prevent relative movement of the latter once they are adjusted. Flat portions 36 are formed on each side of the collar 30 to provide means for applying a wrench to rotate the cutters should the cut be deeper than is possible to handle with the crank 24.

Means are provided for limiting the depth of cut which may be taken with the cutter blades. The end of the stem 1 adjacent the operating crank is provided with a counterbore 37 threaded to receive a tubular stop member 38 provided with a flange 39 having its periphery knurled to permit turning of the member 38 by hand. It will be seen that the face of the split collar 30 bears against the face of the flange 39 and that movement of the latter from or toward the stem 1 will permit the cutters 22 to be shifted axially, thus regulating the quantity of metal which may be removed from the object being resurfaced. The fit between the threads of the stop member 38 and those in the counterbore 37 are preferably made quite snug. The reason for this is to preclude any disturbance of the axial adjustment of the cutters due to frictional engagement between the flange 39 and the rotating collar 30.

Figure 2 illustrates the set-up of the apparatus to effect resurfacing operations internally of an object. In this case the object 40 may be tubular in cross section. The only change necessary to be made in the tool to perform this operation is the reversing of the cutter blades 22 and the substitution of a clamp ring 41 having an internal bore 42 of such dimensions as to accomodate the increased diameter of the object 40. As will be readily seen the blades may be changed by manipulating the crank 24 and the sleeve 14 to cause the blades to move radially outwardly whereupon they emerge from the ends of the grooves 19 at the periphery of the cap 17. The blades may then be reversed, reinserted in the grooves, drawn inwardly to the correct positions required for the resurfacing operation to be performed.

To effect ready removal and change of the blades and to provide means for observing the progress of the cutting operations, portions 43 of the wall of the housing 2 are omitted.

In reiteration, the device of my invention just described permits wholly satisfactory repairs to be made in the mating parts of such articles as pipe line unions, sanitary fittings, the connections joining the necks of centrifuge bowls and their shafts, and in many like articles. Due to the portability of the apparatus described, repairs may be effected on the premises which would otherwise require that the apparatus be dismantled and the defective parts taken to a machine shop for repair. The saving in time alone, in such instances, practically pays for the repairs.

I claim:

1. In a portable resurfacing tool, a fixed frame, means on said frame for supporting an object to be resurfaced, a sleeve journaled for rotary and axial movement on said frame, a flange mounted on said sleeve for rotation therewith, said flange having a plurality of slots in the face thereof extending radially from the axis of said sleeve, a cutter blade slidably mounted in each slot, a shaft journaled in said sleeve, a flange formed integrally with said shaft and positioned to lie adjacent said sleeve flange, a spiral planar thread formed on a face of said shaft flange and positioned to lie adjacent said slots, means on each cutter for engaging said thread, means for rotating one of said flanges relative to the other to cause said cutters to move in said slots radially to and from the axis of said sleeve and shaft, and clamp means for locking said sleeve and said shaft together to prevent relative rotation between said flanges, and to permit simultaneous rotation of said flanges about said axis by said flange rotating means.

2. In a portable resurfacing tool, a fixed frame, means on said frame for supporting an object to be resurfaced, a sleeve journaled for rotary and axial movement on said frame, a flange mounted on said sleeve for rotation therewith, said flange having a plurality of slots in the face thereof extending radially from the axis of said sleeve, a cutter blade slidably mounted in each slot, a shaft journaled in said sleeve, a flange formed integrally with said shaft and positioned to lie adjacent said sleeve flange, a spiral planar thread formed on a face of said shaft flange and positioned to lie adjacent said slots, means on each cutter for engaging said thread, means for rotating one of said flanges relative to the other to cause said cutters to move in said slots radially to and from the axis of said sleeve and shaft, means for preventing relative movement between said flanges comprising a clamp collar on said

sleeve for exerting pressure diametrically thereof to cause said sleeve to grip said shaft, and means for limiting the axial movement of said sleeve comprising a tubular sleeve adjustably mounted on said frame and disposed between said frame and said collar.

3. In a portable resurfacing tool, a fixed frame having a bell-shaped portion formed thereon, means for supporting an object to be resurfaced on said frame, said means comprising a split ring having a central bore for receiving said object and a periphery provided with a sloping surface engageable with a similarly sloped surface formed in said bell-shaped portion of the frame, a nut threaded on said bell-shaped portion and engaging said split ring for exerting, when tightened, and in conjunction with the sloping surfaces of said split ring and said bell-shaped frame portion, a uniform compressive stress radially of said split ring to clamp said object in the bore thereof, a sleeve journaled on said frame for rotary and axial movement in alinement with the axis of said split ring, a flange mounted on said sleeve for rotation therewith, said flange having a plurality of slots in the face thereof extending radially from the axis of said sleeve, a cutter blade slidably mounted in each slot, a shaft journaled in said sleeve, a flange formed integrally with said shaft and positioned to lie adjacent said sleeve flange, a spiral planar thread formed on a face of said shaft flange and positioned to lie adjacent said slots, means on each cutter blade for engaging said thread, means for rotating one of said flanges relative to the other to cause said cutters to move in said slots radially to and from the axis of said sleeve and shaft, means for preventing relative movement between said flanges comprising a clamp collar on said sleeve for exerting pressure diametrically thereof to cause said sleeve to grip said shaft, and means for limiting the axial movement of said sleeve comprising a tubular sleeve adjustably mounted on said frame and disposed between said frame and said collar.

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