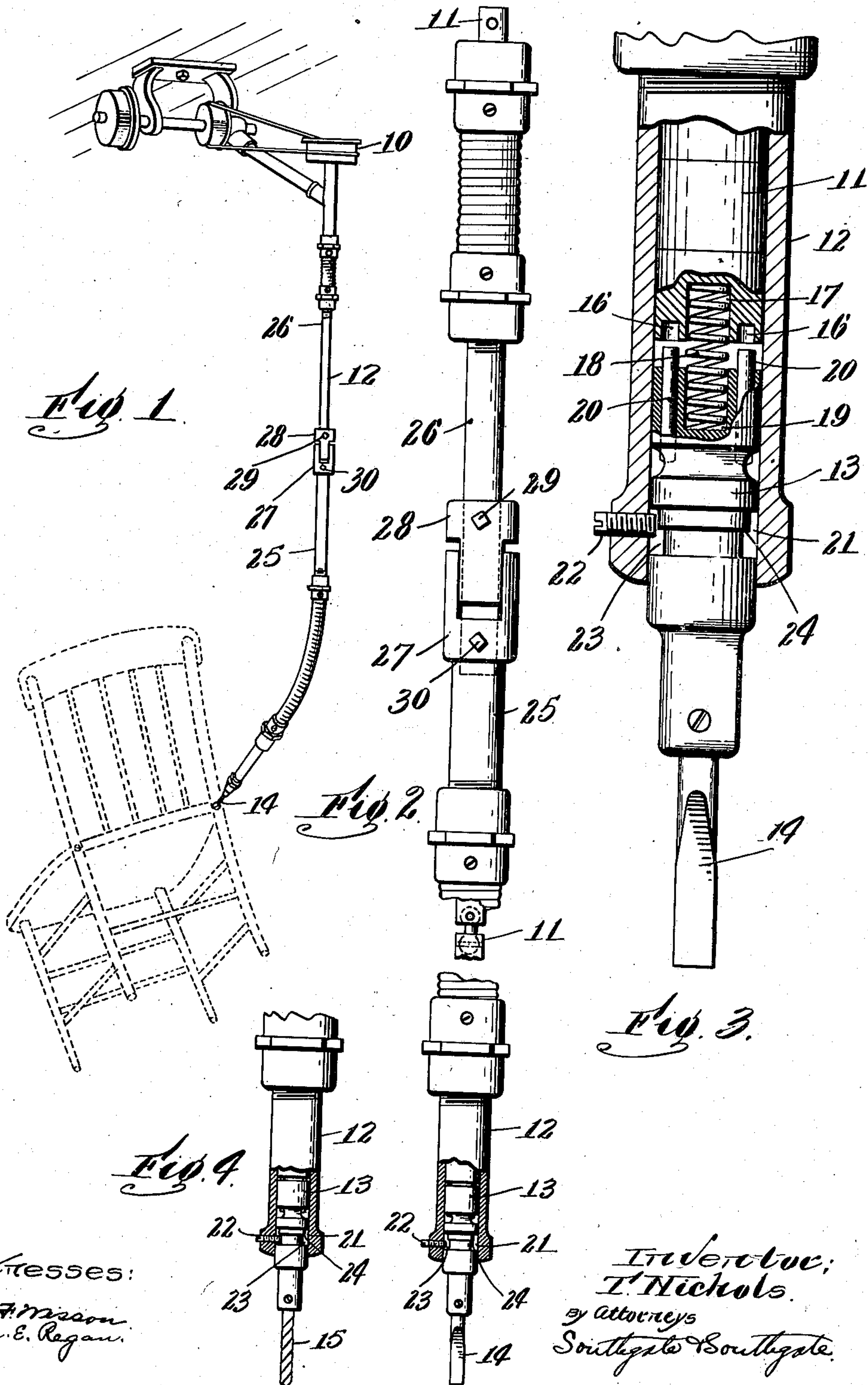


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PATENTED MAR. 10, 1908.

T. NICHOLS.
FLEXIBLY SUPPORTED TOOL.
APPLICATION FILED OCT. 12, 1906.



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UNITED STATES PATENT OFFICE.

THOMAS NICHOLS, OF TEMPLETON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ELLIOTT J. McKNIGHT, OF GARDNER, MASSACHUSETTS.

FLEXIBLY-SUPPORTED TOOL.

No. 881,865.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed October 12, 1906. Serial No. 338,600.

To all whom it may concern:

Be it known that I, THOMAS NICHOLS, a citizen of the United States, residing at Templeton, in the county of Worcester and State of Massachusetts, have invented a new and useful Flexibly-Supported Tool, of which the following is a specification.

My invention relates to that class of tools which are operated by flexible shafts. Flexible shafting has been recognized for some years as being suitable for the operation of drills and certain other kinds of rotary tools.

The principal objects of my invention are to provide means preferably in connection with flexible shafting whereby the same can conveniently and efficiently be employed for operating screw-drivers and the like which are employed intermittently whereby a great amount of labor may be saved in certain kinds of operations; also to provide means whereby the same construction can be employed for drills, augers, countersinks, buffers, sandpaper holders, or other tools operating continuously in a manner similar to that heretofore employed, without replacing the parts of the instrument used for screw-drivers and the like, and to improve various features of tool operating devices as will appear hereinafter. In order to accomplish these results I have provided means whereby ordinarily the screw-driver or other implement will be held by a holder supported with the flexible shaft in such position that it will not be rotated by the shaft. This is desirable for the reason that it is necessary to place the screw-driver in the slot of the screw before commencing the operation of the same. I have furthermore provided means for automatically connecting the tool holder with the flexible shaft when the screw-driver is placed against a stationary surface, as the slot of the screw-head, and pressed upon. Furthermore, I have provided means whereby the tool holder can positively be connected with the flexible shaft so that it will rotate with it at all times, the latter adjustment being preferably employed when the device is to be used for drilling and for other operations which do not necessitate the holding of the tool in stationary position at the commencement of the operation. I have also provided means whereby the position of the tool can be changed longitudinally, in other words, an adjustment of the length of the flexible shaft.

While the invention is of utility in many industries, I have found it especially useful in applying screws to chairs in the manufacture of the latter. When employed in this manner a flexible shaft construction embodying the principles of my invention is of great utility as it saves time in setting up chairs and also permits the employment of relatively unskilled labor, whereas heretofore, in this particular case, it was necessary to employ labor of some skill and men having considerable strength.

Reference is to be had to the accompanying drawings in which,

Figure 1 is a perspective view showing a device constructed according to the principles of my invention as employed in the manufacture of chairs. Fig. 2 is a side elevation of the flexible shaft and support partly in section. Fig. 3 is a sectional view of the lower part of the same on an enlarged scale, and Fig. 4 is a view similar to the lower part of Fig. 2 showing the use of the device for a drill.

The flexible shaft may be driven in any desired way and in Fig. 1, I have illustrated a driving mechanism which has heretofore been employed. This involves a driven pulley 10 connected with the flexible shaft 11 which is mounted in a hollow flexible support 12. At the bottom of this shaft it is intended to be connected with the tool holder 13. This tool holder is designed to hold a screw-driver 14 or a drill 15 or any other tool which it may be desired to employ.

The tool holder is mounted in the lower end of the flexible support 12 and is designed to be connected with and easily disconnected from, the flexible shaft for the purpose above mentioned. In order to secure these results, I have shown the lower end of the shaft as provided with a clutch section comprising eccentric cavities 16 and also with a central cavity 17. In the latter is located a spring 18 which sets in a similar cavity 19 in the tool holder. Obviously, the effect of the spring is to yieldingly force the shaft and tool holder apart or in other words, to disconnect the tool holder from the shaft so that the latter may revolve without revolving the former. This permits the screw-driver to be placed in the slot of the screw while in stationary position. It is desired that as soon as the device is manipulated to press the screw-driver against the screw, the

tool holder shall be picked up by the shaft and rotated therewith. For this purpose the tool holder is provided with a complementary clutch section, shown as comprising 5 removable pins 20 adapted to enter the cavities 16. It is, of course, to be understood that one or more pins and cavities eccentric with respect to the shaft or tool holder, may be used and that any ordinary clutch or 10 other means may be employed for forming the clutching action at this point.

It will be seen that when the device is pressed against the screw, the pins 20 are forced into the cavities 16 and the holder is 15 rotated as long as pressure is applied. When released, the spring forces the clutch sections apart and the tool no longer rotates with the flexible shaft. It is to be noted that the pins 20, the parts upon which the greatest 20 wear comes are removable, consequently, after the device has been in use long enough to wear these parts, they can readily be removed and replaced without damage to the rest of the tool holder. This is a source of 25 great economy in the operation of a device of this character.

It will be observed that the tool holder is provided with an annular groove 21 and that the support 12 is provided with a set-screw 30 entering the groove. In the operation 35 above described, this set-screw acts as a stop to limit the motion of the tool holder in both directions and to prevent the tool holder from being removed from the support 12. If it is desired to remove the tool holder, this 40 screw can be withdrawn and the tool holder can then be taken out in an obvious manner.

When it is desired to use a tool constructed in accordance with the principles above illus- 45 trated for drills or other tools which do not have to be placed in any particular position before the operation thereof is commenced, it is desirable to provide for positively connecting the clutch sections of the shaft and 50 tool holder so that the tool will operate with the shaft at all times. For this purpose the groove 21 is provided with a deeper groove 23 at its lower side and when it is desired to operate tools in this manner, the tool holder 55 is pushed up so as to engage the clutch sections which brings the groove 23 opposite the screw 22. This screw is then moved inwardly until it engages in said groove 23 against the shoulder 24 which is formed at its upper side.

The parts will now appear as shown in Fig. 4 and the clutch sections will be positively connected so that the tool in the holder will rotate with the flexible shaft at all times.

60 It will be seen, therefore, that the device is applicable to tools which rotate at all times with the shaft and also to tools which must be placed in a particular position before the operation commences.

65 In order to conveniently provide for mov-

ing the tool longitudinally as above described, I have made the support in telescoping sections, constituting tubes 25 and 26, one tube to move inside the other. On one of these 70 sections I have fixedly mounted a clutch member 27 and on the other I have adjustably mounted a similar clutch member 28 for engaging the member 27. A screw 29 is employed for fixing the member 28 to the tube 26. The tube 26 easily slides in the tube 25 75 and when the lower part of the support is moved longitudinally, the play of the parts is provided for by this clutch.

The upper part of the support 12 is, of course, non-rotatable and it is desired that 80 the lower part be prevented from rotating also. This is accomplished by this clutch, the two parts of which are always in engagement with each other in all positions of the tool. This part of the device is of utility not 85 only in moving the tool longitudinally, but in swinging it upwardly as it would otherwise tend to bind the parts.

If it is desired to hold the two tubes 25 and 26 in stationary position with respect to each 90 other, this can be done by tightening a screw 30, which passes through the section 27 on the tube 25, into engagement with the tube 26 within.

While I have illustrated and described a 95 particular construction in which I prefer to embody my invention, and a particular tool with which it may be used, I am aware that modifications may be made therein by any person skilled in the art to accomplish the 100 same results and that the invention may be used for all kinds of rotary implements, tools, sandpaper holders, etc., without departing from the scope of my invention as expressed in the claims. Therefore, I do not wish to be 105 limited to the exact construction shown and described but

What I do claim and desire to secure by Letters-Patent is:—

1. In a flexibly supported tool, the combination of a flexible shaft, a hollow flexible 110 support containing the shaft, a tool-holder, an adjustable screw for engaging the tool-holder and positively holding the tool-holder in engagement with the shaft, and yielding 115 means tending to disconnect the tool-holder from the shafts.

2. The combination with a shaft, of a tool-holder having a pair of grooves, one deeper than the other, the deeper groove being 120 located at a greater distance from the shaft than the other groove, and means adapted to enter either of said grooves to fix the location of the tool-holder with respect to the shaft. 125

3. The combination of a shaft having a clutch section on the end thereof, a tool holder having a complementary clutch section, a spring between the shaft and tool holder for forcing the clutch sections apart, 130

and means for positively holding the clutch sections together, said means comprising a groove on the tool holder and an adjustable member adapted to enter said groove when the clutch sections are in engagement and to prevent the clutch section from becoming disengaged.

4. The combination of a flexible shaft having an eccentric socket in its end, and a second socket, a tool holder having a pin adapted to engage said eccentric socket and having a socket registering with said second socket, a spring mounted in the registering sockets in the shaft and tool holder and operating to force the shaft and tool holder apart, said tool holder having a pair of grooves, one deeper than the other, the deeper groove being located at a greater distance from the flexible shaft, and a screw adapted to enter said grooves.

5. The combination of a flexible shaft, a hollow flexible support containing the shaft, a tool holder mounted in said support, a clutch for connecting said tool holder and shaft, resilient means for disconnecting the sections of said clutch, said support comprising telescoping tubes, and a clutch mounted on said tubes for preventing the rotation of one independently of the other.

6. The combination of a flexible shaft, a hollow flexible support containing the shaft and comprising telescoping tubes, and a clutch comprising a clutch section fixedly mounted on one of said tubes, and a clutch section mounted on the other tube in such position that said clutch sections will remain in engagement in all positions of the telescoping tubes.

7. The combination of a flexible shaft, a hollow flexible support containing the shaft and comprising telescoping tubes, a clutch comprising a clutch section fixedly mounted on one of said tubes, a clutch section mounted on the other tube in such position that said clutch sections will remain in engagement in all positions of the telescoping tubes and a screw mounted in the larger of said telescoping sections and adapted to engage the smaller telescoping section and fix it with respect to the larger section.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

THOMAS NICHOLS.

Witnesses:

ALBERT E. FAY,
LEVI G. McKNIGHT.