

W. R. FOX.
DRIVING CONNECTION FOR DRILL SPINDLES.
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1,234,455.

Patented July 24, 1917.

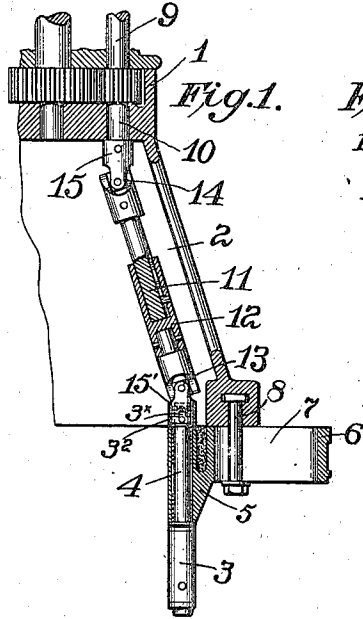


Fig. 1.

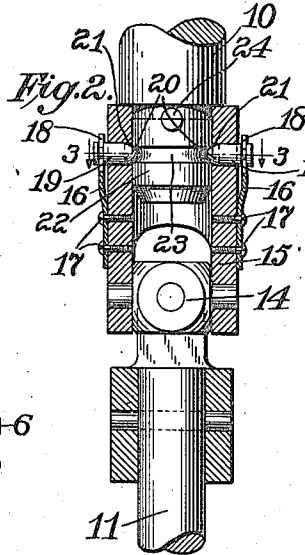


Fig. 2.

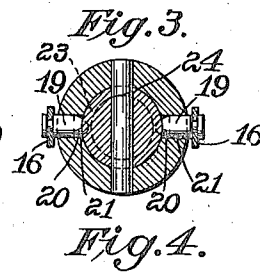


Fig. 3.

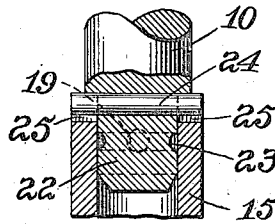


Fig. 4.

Fig. 5.

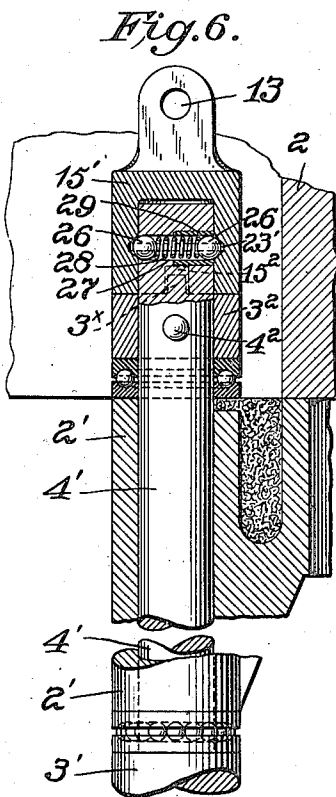


Fig. 6.

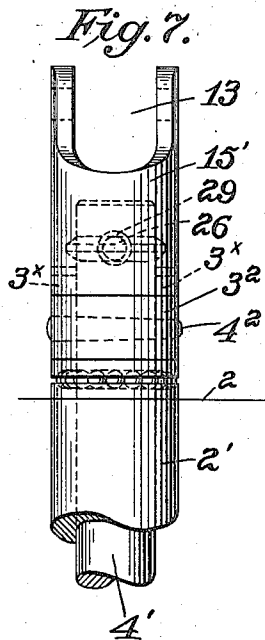


Fig. 7.

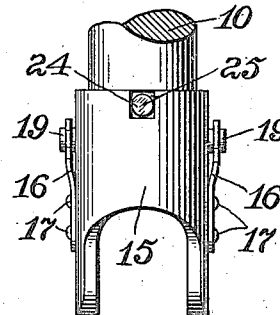
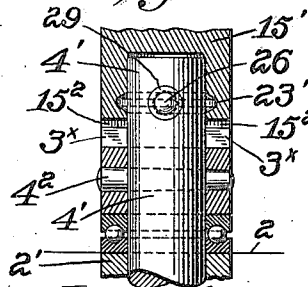


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM R. FOX, OF GRAND RAPIDS, MICHIGAN.

DRIVING CONNECTION FOR DRILL-SPINDLES.

1,234,455.

Specification of Letters Patent.

Patented July 24, 1917.

Continuation of application filed January 23, 1914, Serial No. 813,855. This application filed November 22, 1915. Serial No. 62,920.

To all whom it may concern:

Be it known that I, WILLIAM R. FOX, a citizen of the United States, residing at Grand Rapids, Michigan, have invented certain new and useful Improvements in Driving Connections for Drill-Spindles, of which the following is a specification.

The present invention relates to improvements in drills and is especially adapted for use in multiple drills although it is not restricted in its application to this particular form of machine.

The invention has for its principal object the provision of improved detachable slip socket connections, which may be employed between the spindle driving shaft and the drill spindle or between a flexible shaft, coupled to the driving shaft and the drill spindle, as the case may be.

In either case the invention consists in providing an improved, strong and effective slip connection between the two members, which is capable of being readily unfastened, and which, when fastened will be secure and reliable as a coupling.

The invention as hereinafter described is in the nature of a continuing application based on my co-pending application Serial Number 813,855 and represents improvements designed to be applied to a multiple drill of the type shown in my prior Patent No. 1,058,045.

The invention consists of the combination and arrangement of parts more fully described in the following specification, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a detail view, partly in section, through the head of the drill, showing the features of the invention embodied therein.

Fig. 2 is a longitudinal sectional view of one form of the invention.

Fig. 3 is a transverse section taken on line 3—3 of Fig. 2, showing the driving pin in position.

Fig. 4 is a vertical section taken at a quarter turn from the position shown in Fig. 2.

Fig. 5 is a side elevation of the form shown in Fig. 2.

Fig. 6 is a longitudinal section of a modified form of connection.

Fig. 7 is a front elevation of the form shown in Fig. 6, and

Fig. 8 is a fragmentary, longitudinal sectional view taken at a quarter turn from the position shown in Fig. 6.

Referring to the drawing, in Fig. 1, a portion of the upper gear spindle box 1 is shown at the upper part of the head 2. The drill is provided with a plurality of drill spindles, one of which is shown at 3, supported by and driven from the central supporting head 2. Each drill spindle 3 is provided with an upper portion 4, which is somewhat reduced in diameter and has a bearing in the bracket 5 carried by the removable adjusting arm 6. The adjusting arm 6 is provided with a slot 7 through which a bolt 8 carried by the lower part of the head 2 passes. By means of this bolt and slot connection the arm may be adjusted and entirely removed when desired. In the upper gear box 1 the driving gear spindles 9 are vertically arranged and are provided with depending portions 10 terminating in extensions below the lower surface of the gear box and to which a shaft or coupling 11 is attached. The shaft 11 at its lower end is attached by means of a split joint 12, which has a universal joint connection 13 with the upper part 4 of the drill spindle. At its upper end the shaft 11 is connected by means of a universal joint 14 with a detachable slip socket 15 to the lower depending portion 10 of the gear spindle 9. It is with the improved and novel features of this slip socket 15 that the present invention treats. Flat springs 16 are secured to the lower part of the socket by means of screws 17 and are provided with forked upper ends 18, which engage in suitable grooves in the outer ends of a pair of locking pins 19, provided with beveled ends 20, and passing through suitable openings 21 in the upper part of the slip socket. The driving spindle 10 is provided with a reduced portion 22 fitting within the upper part of the detachable slip socket and a shoulder seating against the upper edge of said socket. The reduced portion 22 of the driving shaft is provided with an annular groove 23 in which the locking pins 19 are adapted to engage. The end of the driving spindle 10 is beveled so as to engage the beveled portions of the locking pins to retract them. A pin 24 is passed

through said driving bar just below the shoulder thereof and secured thereto. The pin 24 engages in diametrically opposite notches 25 in the upper edge of the slip socket. This insures a driving connection between the spindle driving shaft and the slip socket. It will be seen from the above description that the slip socket 15 can be quickly snapped onto the end of the spindle driving shaft 10 and when once in place will form a perfect driving connection effective against unfastening with no relative lost motion of the parts.

Figs. 6, 7 and 8 illustrate a modified form of the invention and experience has shown that this modification possesses certain advantages not present in the form embraced by Figs. 1 to 5 inclusive, but it will be understood that either or both forms are equally applicable to another place, for example as a means of attaching the universal joint 13 at the lower end of the shaft 11 with the upper portion of the drill spindle 4. By providing a detachable slip joint at the point where the upper end of the spindle 4, as well as at the point where the universal joint 14 is attached to the driving spindle 10, it is possible to easily disconnect the universal joints, both upper and lower so that the drill spindle proper can be entirely removed from the driving gear at the top of the machine. For the purpose of clearly bringing out these advantages the modified form of slip socket is illustrated in Figs. 6, 7 and 8 as applied to the upper end of the spindle 4.

Referring now to these figures the under side of the head is indicated by the horizontal line shown in Figs. 6 and 7. The depending sleeve 15' is shown with the lower part of the universal joint 13 at its upper end. The drill spindle 3' provided with an upper reduced portion 4' in a bearing sleeve 2' is shown and a collar 3² is further provided at the upper end of the spindle 4' being pinned thereto as indicated at 4². This is an improvement over the former construction in that previously the joint itself was pinned and sewed also as a collar, but the joint now being removable it will be necessary to have the collar. The collar 3² serves as a support for the spindle and prevents it from dropping down. The collar 3² is also provided with a transverse tongue 3* which engages with correspondingly formed recesses 15² thus serving as driving keys to avoid putting another pin through the spindle, as is necessary in the joints in the upper construction.

In the form shown in Figs. 6, 7 and 8 exactly the same principles are relied upon for the results sought, but the structure is modified and the parts varied so as to effect a refinement of the first form. The outside springs 16 are dispensed with altogether,

which gives a smoother and neater finish to the sleeve portion of the slip socket 15' and at the same time, no projecting parts are presented upon which pieces of clothing, waste or the like might catch and tear.

In the embodiment of the invention a transverse bore 27 is drilled, through the upper end of the spindle 4'. A pair of steel balls 26 slightly smaller than the diameter of the bore 27 are placed therein and the metal at each end of the bore 27 is upset sufficiently to permit the balls to protrude the maximum distance without permitting them to come completely out. A coiled wire spring 28 tends to normally press the balls 26 outwardly in opposite directions. In some instances, for example, where the device is used in a shaft that is hardened before being assembled, it may be desirable to use a sleeve or bushing 29, as shown at one side in Fig. 6. An annular groove 23' in this form is provided around the interior surface of the socket or sleeve portion 15' and it is with this annular groove that the balls 26 engage, being snapped therein by the action of the coiled spring 28 when the parts are assembled.

Although two different forms of the invention have been illustrated and described as applied at different ends of the split joint 11, it is to be understood that either form is equally applicable in either place.

What I claim is:—

1. In a drill, the combination of a spindle, a spindle driving shaft, a rigid member carried by said shaft having portions projecting therefrom, a detachable slip socket member provided with recesses with which said portions engage, spring pressed locking means adapted to be connected to said shaft and said slip socket member and suitable connections between said slip socket member and the drill spindle.

2. In a drill, the combination of a spindle having a transverse bore formed near its upper end, a pair of spring pressed balls carried within said bore adapted to project slightly beyond the surface of said shaft, a detachable slip socket member having an annular interior groove formed in its lower end with which said spring pressed balls are adapted to engage and means for driving said slip socket member, substantially as described.

3. A driving shaft having a reduced end, a detachable slip socket member, a rigid member carried on said shaft, spring pressed locking means carried by said shaft, said slip socket member being formed with recesses adapted to receive said rigid member and further provided with a groove with which said spring pressed locking means are adapted to engage, substantially as described.

4. In a drill, the combination of a spin-

dle, a spindle driving shaft, a detachable slip socket member adapted to be coupled with said driving shaft, a tongue and groove connection between said driving shaft and
5 said slip socket member, spring pressed locking means carried by one of said members, the other member having a recessed portion with which said locking means engage, and suitable connections between said slip socket
10 member and the drill spindle, substantially as described.

5. A driving shaft, a detachable slip

socket member, rigid driving means carried on said shaft, said slip socket being formed with recesses adapted to receive said rigid
15 member and spring pressed locking means adapted to detachably connect said shaft with said slip socket member.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM R. FOX.

Witnesses:

MYRA JONES,

FLORENCE GERMAN.