F. H. KASPERSON.

TOOL HOLDING AND DRIVING DEVICE.

APPLICATION FILED JULY 13, 1909.

986,829. **Patented Mar. 14, 1911.**

Fig. 1.

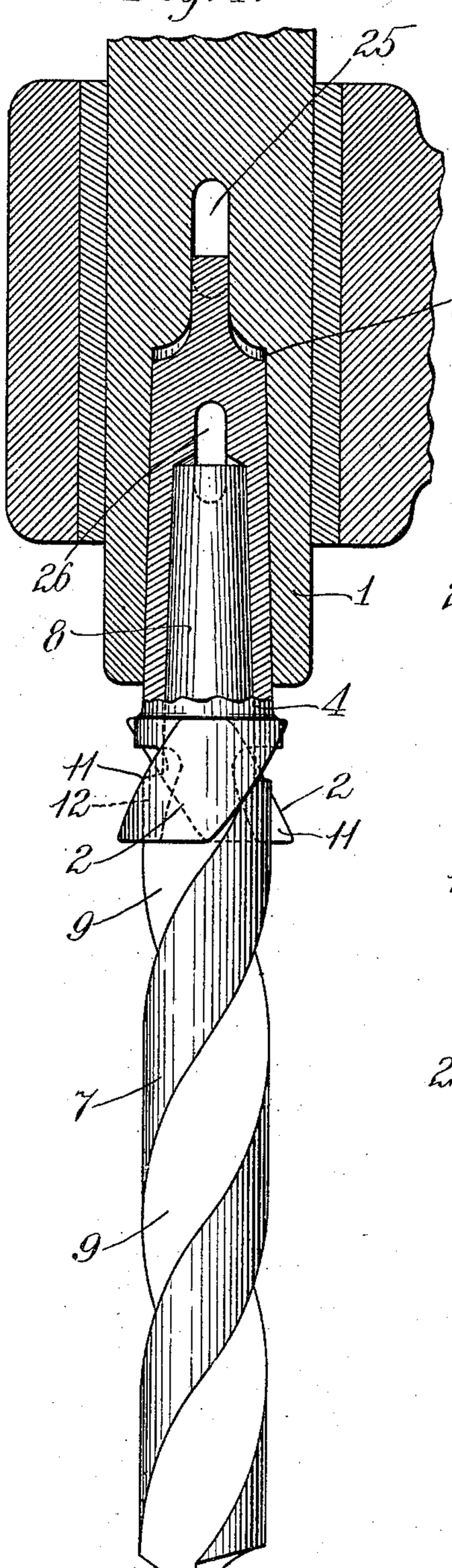

Fig. 3.

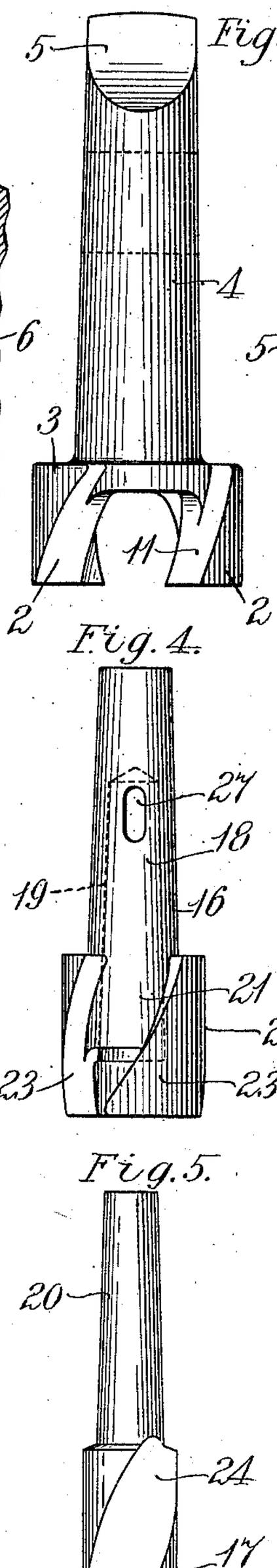

Fig. 2.

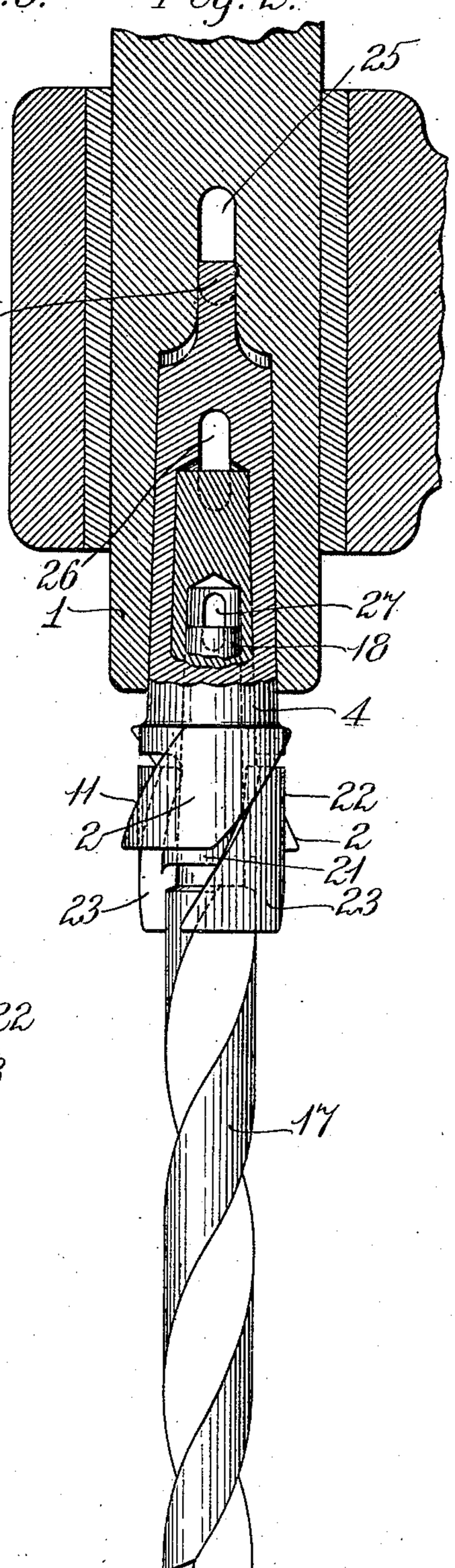

Fig. 4.

Fig. 5.

Witnesses.
Franklin E. Low.
Robert H. Kammler.

Inventor:
Frank H. Kasperson.
by Emery & Booth
Attys.

UNITED STATES PATENT OFFICE.

FRANK H. KASPERSON, OF HYDE PARK, MASSACHUSETTS.

TOOL HOLDING AND DRIVING DEVICE.

986,829. Specification of Letters Patent. **Patented Mar. 14, 1911.**

Application filed July 13, 1909. Serial No. 507,364.

To all whom it may concern:

Be it known that I, FRANK H. KASPERSON, a citizen of the United States, and a resident of Hyde Park, in the county of Norfolk, State of Massachusetts, have invented an Improvement in Tool Holding and Driving Devices, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to devices for holding and driving drills and other tools.

The character of my invention may be readily understood by reference to the following description of an illustrative embodiment thereof shown in the accompanying drawing wherein:

Figure 1 is an elevation, partly in section, showing a tool and holding device embodying my invention; Fig. 2 is an elevation, partly in section, showing the device adapted for a tool of a different size; and Figs. 3, 4 and 5 are detail views of parts shown in Fig. 2.

The tool-holding and driving device herein shown as embodying my invention is adapted to be applied to the usual drill-press or other spindle 1 (Fig. 1) having in its lower end the usual Morse taper-bore which formerly was used to receive the tapered shank of the drill or tool to be driven. Heretofore, it has been the usual practice to provide the end of the tapered shank of the tool with a driving tang which was adapted to be inserted into a slot entering the taper-bore of said spindle. The drive was then intended to be shared by the frictional engagement of said tapering surfaces and said tang. The collection of dust and foreign particles on said frictional surfaces, however, frequently prevented the intimate engagement of said surfaces and as a result the burden of the drive rested principally if not entirely on the tang at the end of the tool shank. This tang being considerably smaller than the cutting diameter of the drill and transmitting its drive with little mechanical advantage was frequently twisted off, thereby rendering the tool useless.

By my invention I aim to overcome the above and other objections and instead of driving the drill by a tang at the end of its shank said drill is driven adjacent the base of said shank by one or more driving teeth 2 which may be integral with or connected to said spindle as desired. In order to utilize the present spindle these teeth are illustrated herein as projecting from an enlarged head 3 of a socket 4 which has an outer taper adapted to fit into the bore of the usual spindle 1 and terminates in a tang 5 adapted to fit into the usual tang-receiving slot which forms a continuation of the spindle bore. This socket has a taper-bore 6 adapted to receive the shank of the tool to be driven. For purposes of illustration a twist drill 7 is shown herein having a shank 8 having no tang at its end and shorter and of smaller diameter if desired than the usual shank since it need only be of sufficient length and thickness to center the drill properly in the socket 4. The driving teeth 2 referred to project downwardly from said socket and are adapted to be received by the longitudinal grooves 9 of said drill. To adapt the usual drill to receive said teeth the base of the tool adjacent the shank may be turned down or cut away somewhat to expose the ends of said grooves and permit the ready insertion of said driving teeth. The tool material between said grooves 9 may be considered driven teeth which interengage with said driving teeth. These driving teeth are preferably of greater width and thickness and have their inner surfaces curved to conform to the contour of the drill shank. When the spindle is driven the edges of said teeth engage the sides of the grooves of the drill and a powerful, positive driving engagement is effected, whereby the drill is driven through its greatest diameter and without danger of any slip between said tool and socket. Furthermore, by my invention the point of application of the drive is changed from the end to the base of said shank and thus brought nearer to the active cutting portion of the drill, thereby eliminating any jumping or shuddering of the latter. As a result the cutting edge of the drill stands up or wears longer and the great strength of the driving parts eliminates any danger of their shearing off. To automatically retain and set the drill up into said socket the driving edges of the teeth are not made vertical but are inclined to the longitudinal axis of the drill to conform to the inclination of the grooves in said drill. The coöperating inclined edges

11 and 12 of the socket teeth and drill grooves respectively, constitute engaging cam surfaces which under the rotative driving action of the spindle tend to draw up or set the taper shank 8 of the tool snugly up into the taper-bore of the socket 4, thereby effectually preventing any loosening of the tool and insuring its accurate centering in its socket. If the tool to be driven does not have inclined grooves therein at its upper end, inclined grooves may be readily cut therefrom to receive said teeth as described. To permit the ready insertion and removal of said teeth into and from said grooves said teeth should be somewhat smaller than the width of said grooves.

To drive tools of different sizes from the socket 4 sleeves such as shown in Figs. 2 and 4, are provided. Herein a sleeve 16 is provided for driving a tool 17 which is smaller than the tool 7. This sleeve has an outer taper 18 to fit the bore of the socket 4 referred to and a tapered bore 19 to receive the shank 20 of the smaller tool. To retain all of the advantages of the drive described for the socket 4, this sleeve is driven from said socket by the engagement of the teeth 2 of the latter with the sides of grooves 21 formed in a head 22 on the lower end of said sleeve, said grooves being similar to those described for said drill 7. To drive the tool 17 from said sleeve 16, the latter is provided with teeth 23 which may be similar to those described for said socket and herein are conveniently formed from said head 22 between continuations of the sleeve grooves 21. These sleeve teeth 23 are received by the grooves 24 in the drill and have the same inclined cam action referred to, with respect to the socket 4 and drill 7, for automatically forcing the tool shank into the tapered bore of the sleeve and at the same time the oblique socket teeth 9 automatically force the outer tapered portion of said sleeve into the bore of the socket.

To accommodate a tool or tools smaller than the drill 17 additional sleeves similar to the sleeve 16 may be used. It is found, however, that in practice a nest of three sleeves will suffice to accommodate practically all sizes of tools used, since the thickness and strength of the shank need not be proportioned to the diameter of the tool as has heretofore been necessary when the drive is through the shank.

Not only are the sleeves nested when assembled as shown in Fig. 2 but their driving portions telescope and also may be considered nested. This nested arrangement of the driving portions enables the smallest drill to be driven from a socket capable of receiving the largest drill and at the same time said driving portions project but a slight distance from the end of the largest socket, are very compact and effectually prevent any shuddering or chattering of the tool.

The drills may be readily removed by turning them reversely from the direction of their drive when the opposite edges of said teeth will by their cam action tend to eject said drills or they may be removed by driving a wedge-shaped key into the keyway 25 of the spindle and the keyways 26 and 27 of said socket and sleeves respectively.

By my invention the drill is driven through its greatest diameter; there are no tangs to twist off; the tool is automatically set up into its sleeve or socket, and thereby automatically takes up wear and cannot work loose; slip between the tool and socket is absolutely prevented; a much shorter and smaller diameter tool shank than heretofore can be used, since the latter need be merely of sufficient length and thickness to center the tool; jumping and shuddering of the tool is prevented and its life prolonged. By the use of the intermediate sleeves described to accommodate smaller tools the advantages of the direct drive are retained.

It will be understood that my invention is not limited to the particular embodiment shown herein but that various modifications may be made without departing from the spirit and scope of my invention.

Claims:

1. A tool driving device comprising, in combination, tool receiving means having a bore therein; a tool having a portion adapted to fit into said bore and having a longitudinal groove extending substantially beyond said bore; and a tool driving projection immovable upon said tool receiving means and wholly beyond said bore for positive driving engagement with a wall of said groove.

2. A tool driving device comprising, in combination, tool receiving means having a tapered bore therein; a tool having a longitudinal groove extending a substantial distance longitudinally of the tool and having a tapered shank for intimate fit in said bore; and a tool driving projection immovable on said tool receiving means, said projection and tool groove being formed coöperatively to tend to thrust said shank tightly into said bore during the normal operation of the tool.

3. A tool driving device comprising, in combination, tool receiving means having a bore therein; a tool having a portion adapted to fit into said bore; and a longitudinal groove inclined to the axis of said tool; and a tool driving projection immovable upon said tool receiving means for positive driving engagement with a wall of said groove.

4. A device of the class described comprising, in combination, tool receiving means having a driving projection thereon, a tool having a shank of less diameter than a bore

in said means, a sleeve adapted to be set into said bore and to receive said tool and having a driving projection positively engaging the projection on said means and a portion of said tool.

5. A device of the class described comprising, in combination, a positively driven socket having driving teeth projecting therefrom, a tool having a shank of smaller diameter than the bore of said socket, a sleeve adapted to be set into the latter and to receive said tool and a head on said sleeve having grooves for receiving said socket teeth and provided with driving teeth for engaging said tool.

6. A device of the class described comprising, in combination, tool-receiving means having a bore therein and opposed teeth projecting from an end thereof, a tool having a shank smaller than said bore, and an intermediate member having teeth meshing with the teeth on said means and engaging the walls of a groove in said tool.

7. A device of the class described comprising, in combination, tool receiving means, a tool having a shank of less diameter than a bore in said means, a sleeve adapted to be set into said bore and to receive said tool, said means, sleeve and tool having portions formed for automatically tightening said tool in said sleeve, and automatically tightening said sleeve in said means during normal operation of the tool.

8. A device of the class described comprising, in combination, tool receiving means, a tool having a shank smaller than a bore in said means, and intermediate means formed for positively driving said tool from said receiving means and automatically setting said shank in said intermediate means and the latter in said bore during the normal operation of the tool.

9. A device of the class described comprising, in combination, tool receiving means having a driving element oblique to its axis, a tool having a driven element oblique to its axis and an intermediate sleeve adapted to be set into said means and to receive said tool and having a head provided with driven and driving elements oblique to its axis and adapted to engage said tool receiving driving element and tool driven element respectively.

10. A device of the class described comprising, in combination, tool receiving means, a tool having a shank smaller than a bore in said means, and means positively to drive said tool from said tool receiving means comprising a plurality of telescoping, driving sleeves having nested driving elements formed to automatically set said sleeves into tight engagement one with another when the tool is operated.

11. A device of the class described comprising, in combination, tool receiving means having a bore therein, a tool having a shank smaller than said bore, and a plurality of driving sleeves having nested driving elements exterior of the bore in said tool-receiving means, and positively engaging one another, one of said elements positively engaging said tool-receiving means and another of said elements positively engaging said tool.

12. A tool driving device comprising, in combination, tool receiving means having a bore therein; a tool having opposed longitudinal grooves inclined to the axis of the tool and having a shank adapted to enter said bore; and opposed tool driving projections immovable on said tool receiving means and adapted for positive driving engagement with walls of said grooves.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FRANK H. KASPERSON.

Witnesses:

HENRY T. WILLIAMS,

EVERETT S. EMERY.