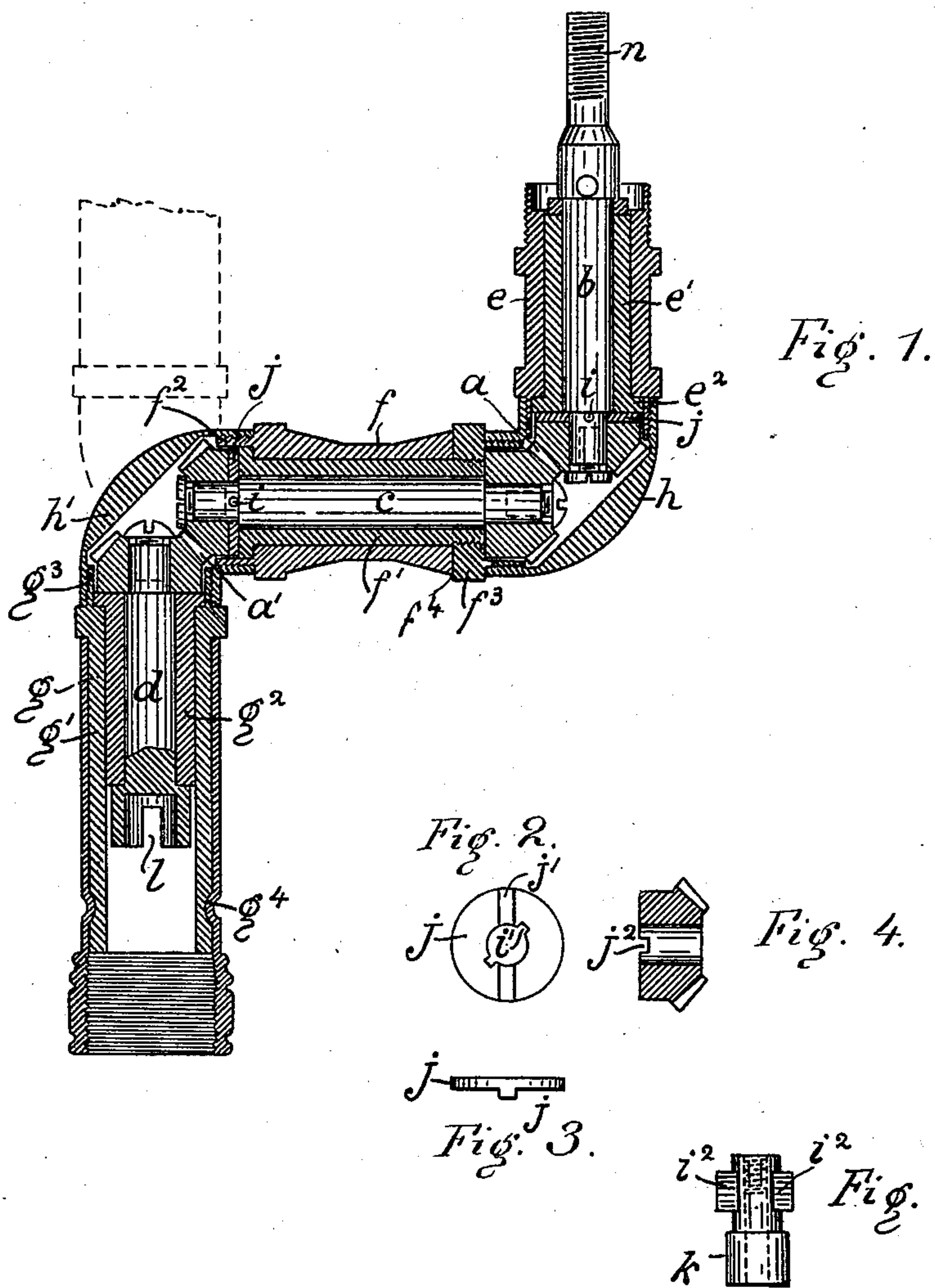


(No Model.)

M. S. P. DAHL.  
UNIVERSAL DRILL SHAFT.

No. 543,083.

Patented July 23, 1895.



Witnesses  
Walter Wagner  
Charles F. Sacher.

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# UNITED STATES PATENT OFFICE.

MANGNUS S. P. DAHL, OF CHICAGO, ILLINOIS.

## UNIVERSAL DRILL-SHAFT.

SPECIFICATION forming part of Letters Patent No. 543,083, dated July 23, 1895.

Application filed March 5, 1895. Serial No. 540,585. (No model.)

*To all whom it may concern:*

Be it known that I, MANGNUS S. P. DAHL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Universal Drill-Shafts, fully set forth in the following specification, reference being had to the accompanying drawings, forming a part hereof, in which—

Figure 1 shows a central longitudinal section of all the parts surrounding the shafts, the latter being shown entire. Fig. 2 shows the under side of a washer, of which Fig. 3 shows the same in elevation. Fig. 4 shows a central longitudinal section of a gear adapted for the washer or plate shown in the two preceding figures. Fig. 5 shows a connector or coupler which connects my device with any suitable driving device.

Like letters of reference refer to like parts.

The object of my invention is to construct a drill-shaft for dentists' drills or other uses, in which the drill may point in every direction of a complete circle and sphere, wherein the drill-shaft is in a case which moves with it, but is free from its axial motion, and also free from all resisting strain when moved from place to place and from all other vibrations and consequent uncertainty of direction while in action. To attain said desirable ends I construct my said new device in substantially the following manner, namely:

I place the shafts  $b$   $c$   $d$ , connected with miter-gears  $a$   $a'$ , and inclose them in the double shells  $e$   $e'$   $f$   $f'$  and the treble shells  $g$   $g'$   $g''$  and elbows  $h$   $h'$ , of which the shells  $e$ ,  $f$ , and  $g$  are connected by screw-threaded coupling ends  $e^2$   $f^2$   $g^3$  to said elbows, substantially as shown. The shell  $e$  is chambered at the end which unites with the elbow to receive the flanged end of the shell  $e'$ , within which turns the shaft  $b$ , and is held in place by it and its miter-wheel. The shell  $f$  is likewise chambered at the end which joins the elbow  $h'$  to receive the flanged shell  $f'$  within it. The shell  $f'$  has a ring  $f^3$ , screw-threaded on its other end, forming a flange thereon, with a threaded ex-

tension which screws into the elbow  $h$ . The shell  $f$  has a free sliding joint on the flange  $f^3$ . By said construction said shells  $f$  and  $f'$  turn upon each other and on the shaft  $c$ , thus permitting the axes of the shafts  $b$  and  $d$  to point in every direction of a complete circle. The end of the shell  $g'$  has a threaded extension  $g^3$ , which is chambered to receive the flanged end of the shell  $g^2$ , and miter-gear on shaft  $d$ , and near its outer end is a circumferential groove  $g^4$ , into which is depressed the correspondingly-grooved shell  $g$ , the end of which forms a free moving joint against the flange of the shell  $g'$ , thus securing said shells revolubly upon each other.

One of each pair of gears is of rawhide to make them as noiseless as possible and to hold them upon the shaft. A ribbed flange or plate  $j$ , with notches  $i'$  to fit upon the pins  $i$ , is put one on each shaft. The rib  $j'$  enters a groove  $j^2$  of the gear, thus holding it from turning on its shaft.

The slots  $l$  in the chambered end of the shaft  $d$  receive the lugs  $i^2$  of the connector  $k$ , through which these shafts are connected with the tool-holder screwed into the threaded end of the shell  $g$ .

The end  $n$  of the shaft  $b$  screws into the connecting device of a flexible shaft or any like device. By means of this construction the drill may be held securely and steadily to any point in any direction whatever.

The shell  $f$  turns with the elbow  $h'$ , and the shell  $f'$  with the elbow  $h$ , and the shell  $g$  with the tool-holder or chuck screwed fast into its open end.

What I claim is—

The combination with three end-connected shafts, whereof two revolve in their planes around the third, of superimposed inclosing shells for said shafts and elbows connecting the ends of the shells, substantially as specified.

MANGNUS S. P. DAHL.

Witnesses:

WM. ZIMMERMAN,  
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