

C. H. NORTON, J. C. SPENCE & H. N. CUDWORTH.
MACHINE FOR GRINDING.

APPLICATION FILED DEC. 28, 1908.

Patented Nov. 16, 1909

3 SHEETS—SHEET 1

940,548.

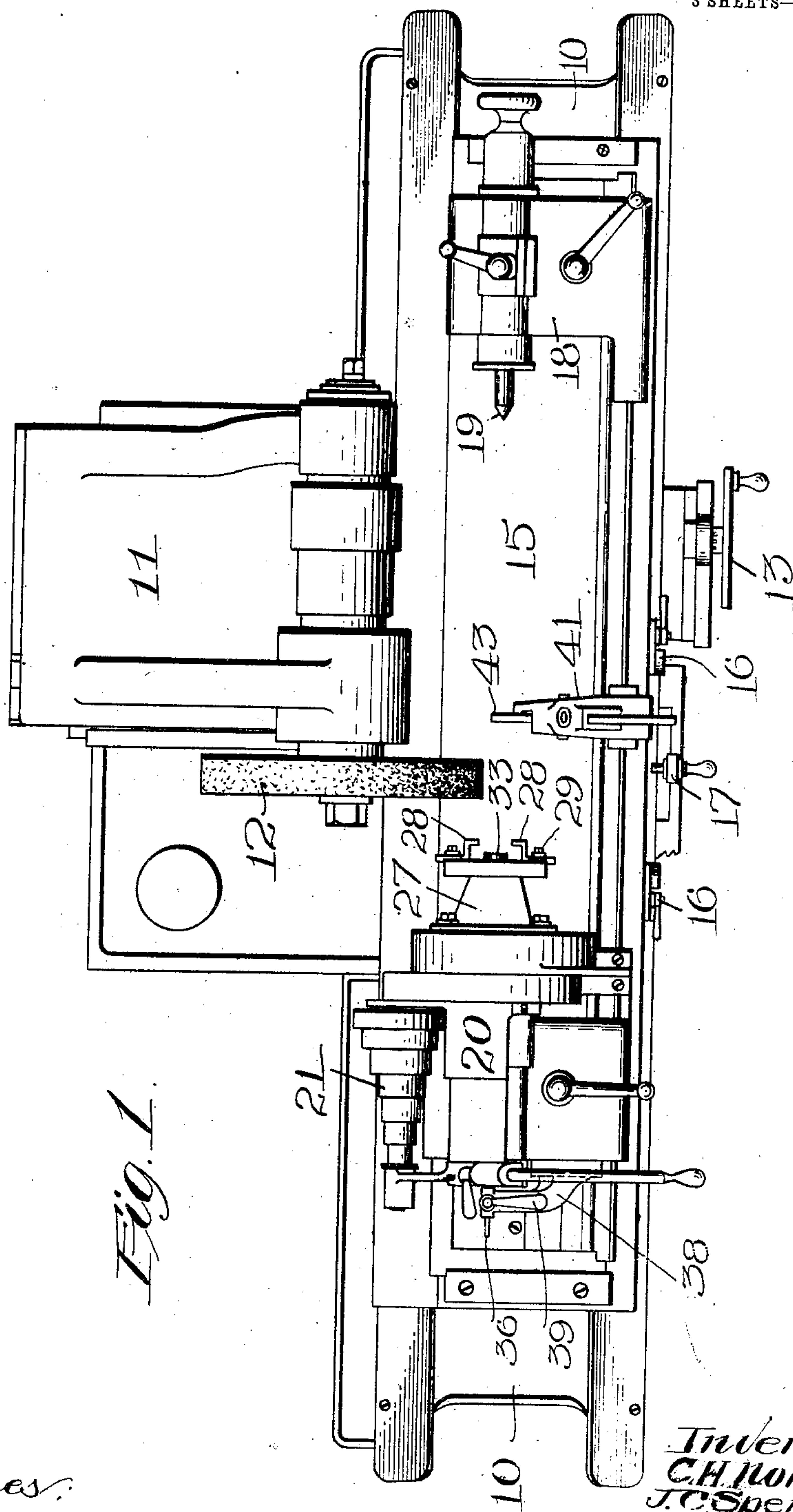


Fig. 1.

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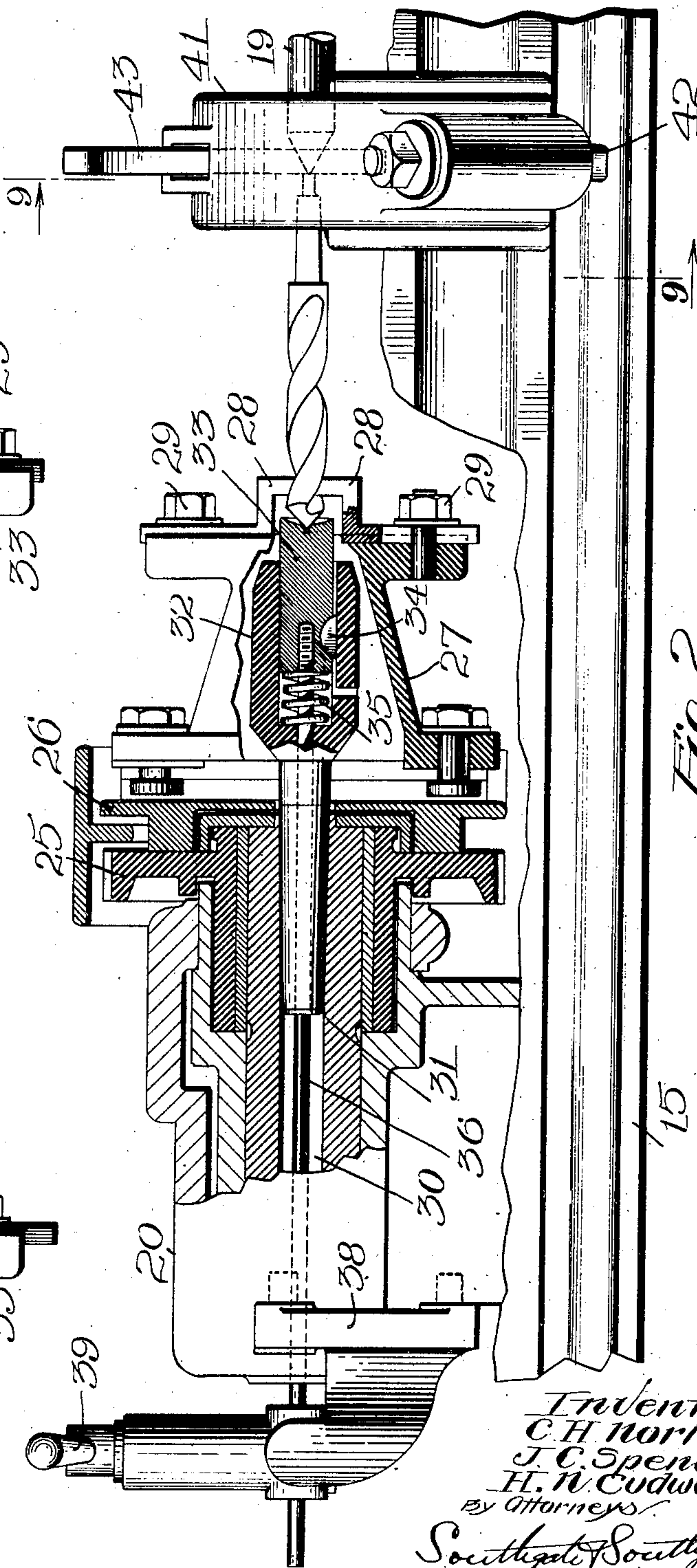
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3 SHEETS—SHEET 2.

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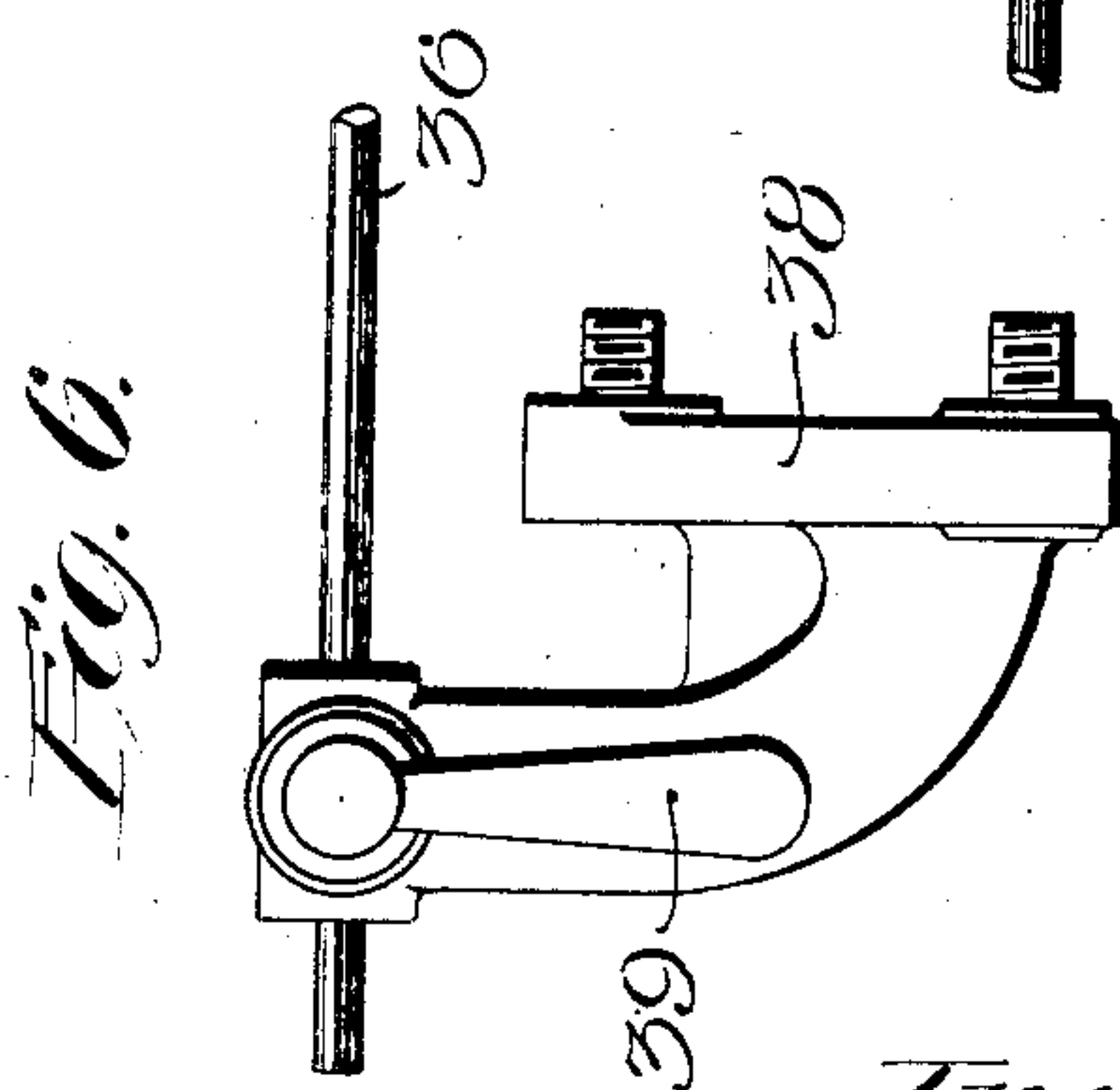
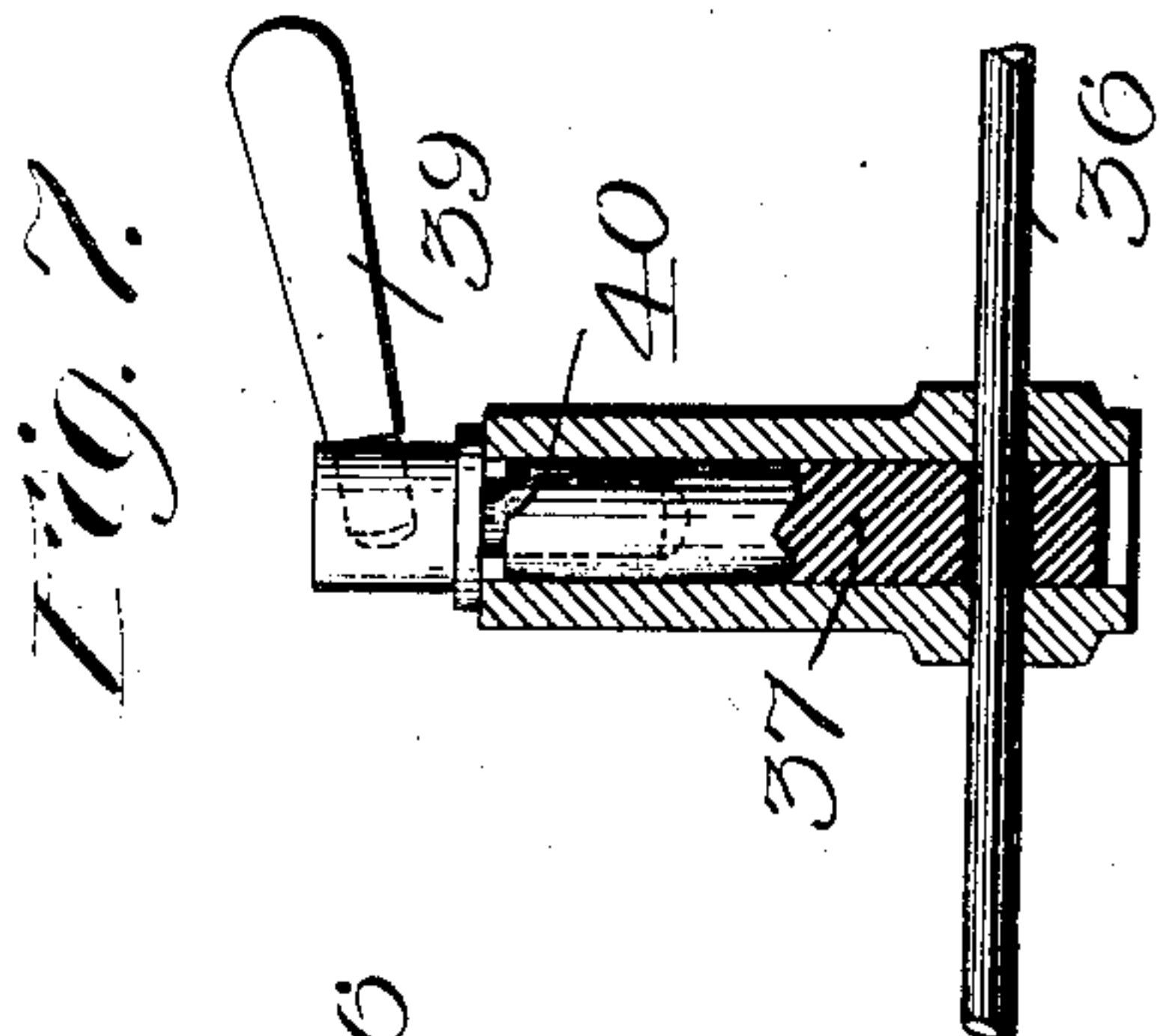
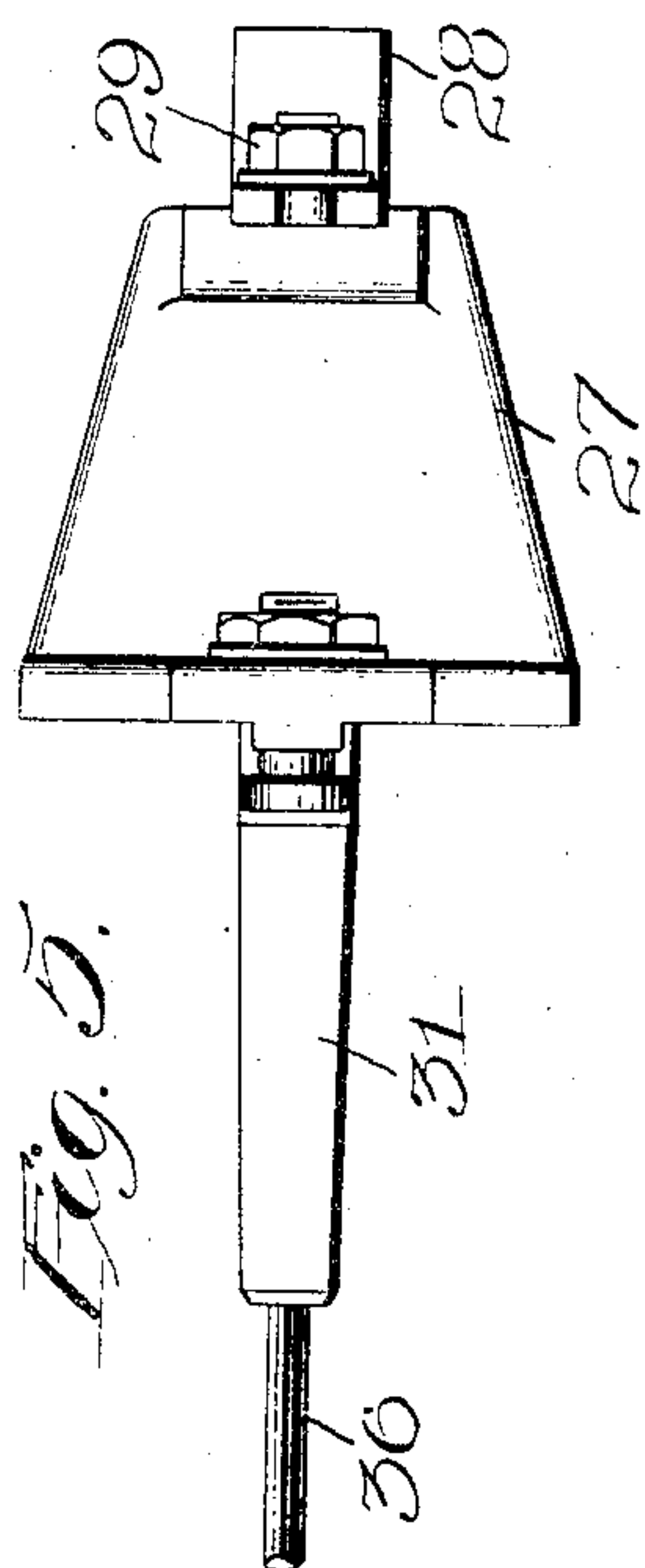
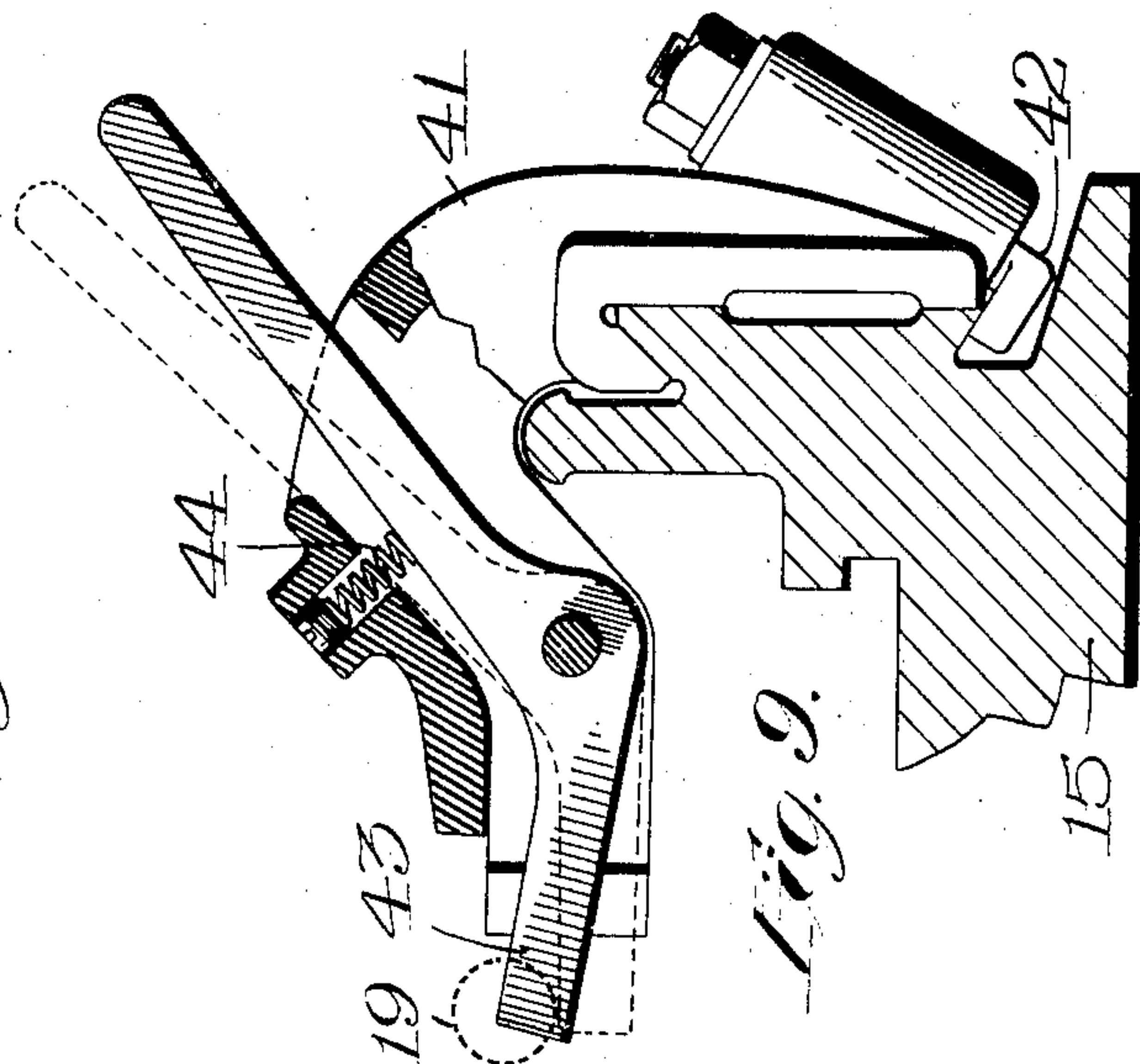
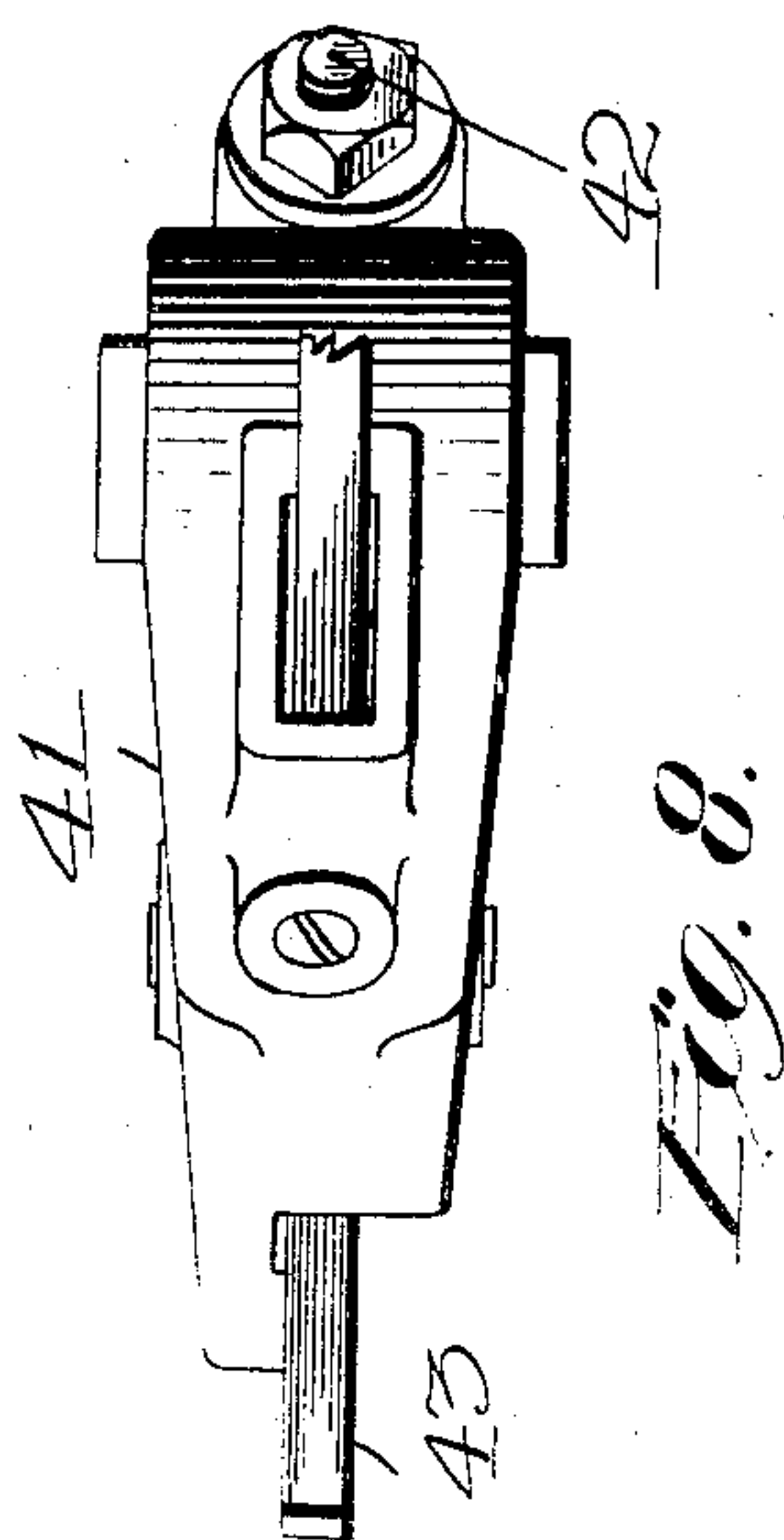
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3 SHEETS—SHEET 3.

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UNITED STATES PATENT OFFICE.

CHARLES H. NORTON, JOHN C. SPENCE, AND HIRAM N. CUDWORTH, OF WORCESTER, MASSACHUSETTS, ASSIGNORS TO NORTON GRINDING COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

MACHINE FOR GRINDING.

940,548.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, CHARLES H. NORTON, JOHN C. SPENCE, and HIRAM N. CUDWORTH, citizens of the United States, all residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Machine for Grinding, of which the following is a specification.

This invention relates to a machine and method for grinding or truing cylindrical and conical surfaces like the shanks of tools. Tools of certain classes, especially twist drills, are so constructed that the shanks of each size are substantially uniform in length, but the distance between the shank and the cutting edge may vary.

The principal objects of this invention are to provide a construction whereby a gage can be brought up on the work holding table or carriage into such position that a shoulder or the shank end of the drill or other article can be held against the gage and the opposite end or cutting edge centered by the head stock center, which will take a natural position to hold the end of the tool or the like in proper position with respect to the truing device or grinding wheel, so that the grinding wheel will operate at the required distance from the gage, as for example to grind the necessary length of shank on the tool, and after the gage is set will produce surfaces, tool shanks, or the like of the same length and position until the gage is reset; also to provide a gage, a support, and operating mechanism therefor particularly adapted for this purpose and adapted to gage the shank from the end thereof, independent of the variable prick-punch or counter-sink in the end; to provide a form of head-stock center capable of yielding to accomplish the above described functions; to provide an improved form of work-holding device for the head-stock; and in general to provide a simple, convenient and practicable construction which can be applied to a well-known type of grinding machine for the purpose of accurately and uniformly truing up cylindrical and conical surfaces especially the shanks of drills and similar tools, and also to provide a new method of grinding tool shanks.

Further objects and advantages of the invention will appear hereinafter.

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

Figure 1 is a plan of a grinding machine with a practicable embodiment of this invention applied thereto. Fig. 2 is a side elevation of the head-stock and certain other elements of the same on an enlarged scale showing a part of the head-stock in section; Figs. 3 and 4 are diagrams in plan showing how the drill is positioned, centered and clamped ready for the grinding operation; Fig. 5 is a plan of the work locating device removed from the head-stock; Fig. 6 is a plan of a bracket at the end of the head-stock; Fig. 7 is a central sectional view of the same; Fig. 8 is a plan of the gage and its support; and Fig. 9 is a sectional view of the same on the line 9—9 of Fig. 2.

The invention is shown as applied to a form of grinding machine involving a bed 10, a grinding wheel stand 11, a grinding wheel 12 thereon, and an adjusting device 13 for the grinding wheel. On the bed is arranged a reciprocating table 15, the reciprocation of which is controlled in any desired way, as for example, by means of dogs 16 fixed on the table, movable therewith, and adapted to operate a reversing lever 17, the details of which are not shown herein as any desired arrangement of connections can be used. The table is supplied in the usual way with a foot-stock 18 having a center 19 and also provided with a head-stock 20 shown as being operated by a cone-pulley 21 by means which will not be described as any ordinary means can be used. The cone pulley rotates a gear 25 on which is a face plate 26 carrying a fixture 27. On this fixture are mounted a plurality of adjustable driving jaws 28 which can be moved up to engage the work and clamp it by nuts 29 or in any other desired way. The head-stock is provided with a central longitudinal passage 30 therethrough having a tapered end in which is located a taper 31 having an enlarged hollow head 32 thereon. In this head is located a head center 33. This is provided with a key 34 movable in its key-way so that the head can move longitudinally, and a spring 35 is provided for normally forcing it up from the head-stock. Secured to the center is a rod 36 which extends through the head-stock and projects

from the end thereof. This rod passes into a clamp 37 mounted on a bracket 38 on the end of the carriage. This clamp is designed to be operated by a handle 39 which controls a screw 40 so as to clamp the end of the rod for a purpose which will be explained hereinafter. Located also on the table is a longitudinally adjustable bracket or support 41 having a screw or the like 42 for clamping it on the table in adjusted positions. This support carries a gage 43 shown as pivoted thereon and projecting therefrom. This gage is provided with a spring 44 for holding it in a certain position as shown in full lines in Fig. 9, in which the end of the gage projects in front of the foot-stock center 19 and in the path thereof when the foot-stock center is moved along the carriage or table. It will be seen that by pressing the outer end of the gage upwardly the gage can be withdrawn from its position in front of the foot-stock center. It will be understood that this gage reciprocates with the table or carriage and with the head-stock and tail stock.

The operation of the machine is as follows:—The dogs 16 being properly arranged with respect to the carriage to give the proper amount of reciprocation thereto, a drill or tool to be operated upon is set in the position indicated in Fig. 3 between the head-stock center and the gage, which is adjusted before or after the first tool is put in position so as to bring the end of its shank into proper relation with the grinding wheel when the carriage reciprocates. This adjustment may be made by trial or otherwise, and after the first drill is properly adjusted and ground, the gage support having been secured in its adjusted position, all tools to be subsequently trued up will be uniform with the first one. When the gage has been set as shown in Fig. 3, the head-stock center which has yielded to permit the tool to be applied is fixed in position by means of the clamp 37, so that the longitudinal position of the tool on the carriage is fixed. The gage is then thrown back by raising its outer end to the dotted line position in Fig. 2, and the foot-stock center brought up to engage the end of the tool as shown in Fig. 4. It will be observed that the gage is then held out of position by the foot-stock center itself against the force of the spring 44. The parts are then in position in which the tool can be clamped by means of the jaws 28, and the machine started into operation. The travel having previously been adjusted, it will be obvious that the rotation of the grinding wheel and the combined travel and rotation of the work will result in truing up the shank of the tool, and that every subsequent tool applied in the same way without changing the adjustment of the gage will be trued to ex-

actly the same length of shank. The taper on the shank is secured of course in the usual way by setting over the foot stock center.

While we have illustrated and described a preferred embodiment of the invention as applied to a particular type of grinding machine, we are aware that it can be applied in many other ways and that many modifications may be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore we do not wish to be limited to all the details of construction shown, or to the particular type of grinding machine shown, but

What we do claim is:—

1. In a device for grinding cylindrical and conical surfaces, the combination of a longitudinally movable head center, a foot stock center, and a gage movable transversely with respect to the foot stock center and located adjacent thereto.

2. In a machine for grinding cylindrical and conical surfaces, the combination of a longitudinally movable head center, a longitudinally movable foot stock center, said centers being adapted to receive the opposite ends of the work, a support and a gage adjustable longitudinally with respect to the centers and movable transversely in front of the foot stock center.

3. In a machine for grinding cylindrical and conical surfaces, the combination of a longitudinally movable head center for the work, a longitudinally movable foot stock center, said centers being adapted to receive the opposite ends of the work, a support, a gage movable transversely in front of the foot stock center, and a support for said gage slidable longitudinally, said gage being pivotally mounted thereon.

4. In a machine for grinding cylindrical and conical surfaces, the combination of a longitudinally movable head center for the work, a longitudinally movable foot stock center, said centers being adapted to receive the opposite ends of the work, a support, a gage movable transversely in front of the foot stock center, and yielding means for holding said gage in the path of the foot stock center.

5. In a machine for grinding tool shanks, the combination of a grinding wheel, a carriage reciprocable in front of the grinding wheel, a head center mounted on said carriage, a foot stock center on the carriage, and a gage movable with the carriage and adapted to receive the end of the work.

6. In a machine for grinding cylindrical and conical surfaces, the combination of a head stock, a center longitudinally reciprocable thereon, means extending from the head stock for fixing the center, a foot stock center, and a gage adapted to be moved in front of the foot stock center.

7. In a machine of the character described, the combination of a movable head stock, a head center longitudinally movable thereon, yielding means for forcing said head center outwardly, a grinding wheel, and a movable gage adapted to be fixed to move to a definite position with respect to the grinding wheel as the head stock moves and hold the end of the work.

8. In a grinding machine, the combination of a reciprocating carriage, a grinding wheel adapted to be held in fixed position, and a gage on the carriage adapted to be fixed thereon to move to a certain position

with respect to the grinding wheel, said carriage having means for supporting one end of the work, said gage being adapted to support the other end.

In testimony whereof we have hereunto set our hands, in the presence of two subscribing witnesses.

CHARLES H. NORTON.
JOHN C. SPENCE.
HIRAM N. CUDWORTH.

Witnesses:

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