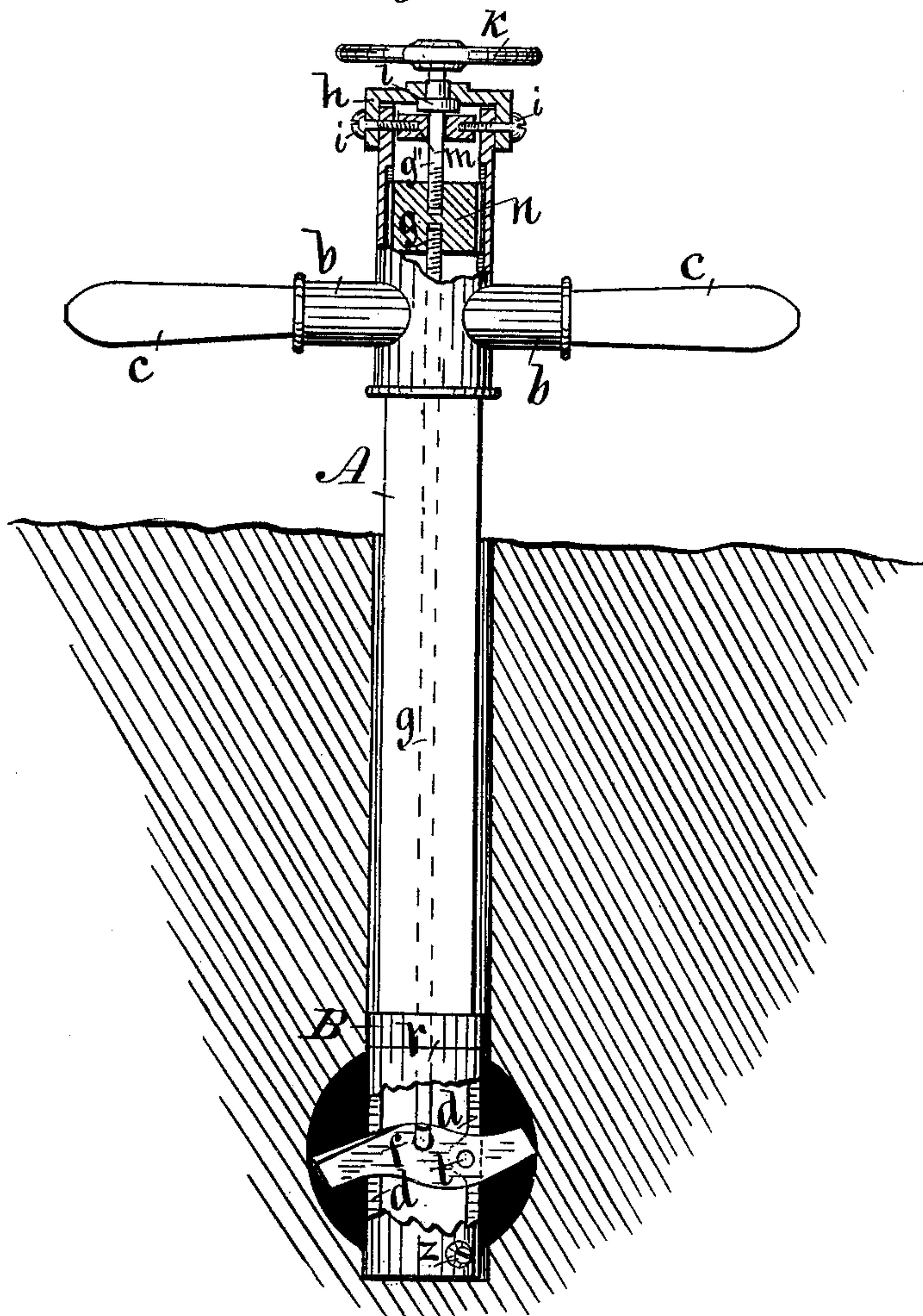


J. & I. GIFFORD.  
Mining Tool.

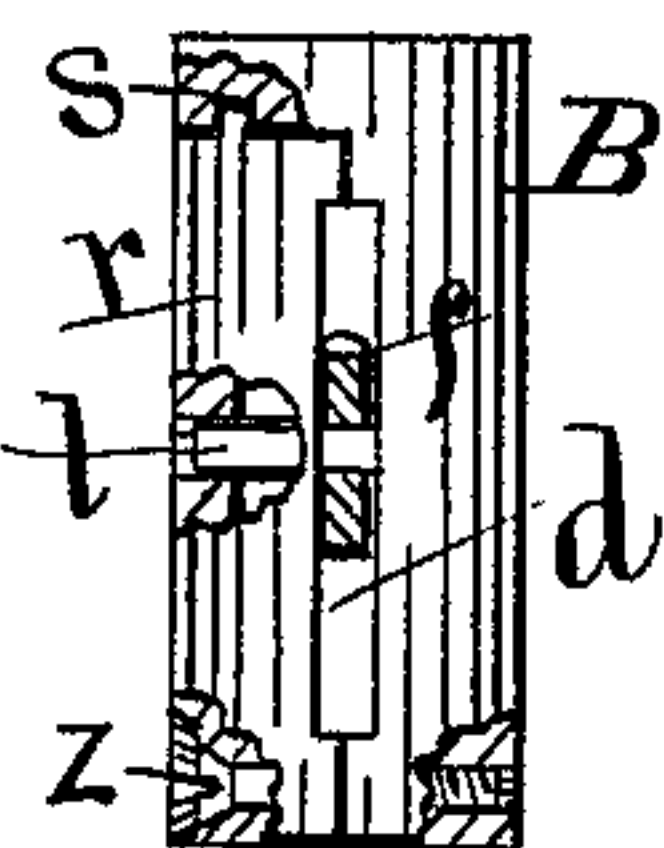
No. 220,070.

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*Fig. 1*



*Fig. 2*



Witnesses:  
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# UNITED STATES PATENT OFFICE.

JOSEPH GIFFORD AND ISAAC GIFFORD, OF DES MOINES, IOWA.

## IMPROVEMENT IN MINING-TOOLS.

Specification forming part of Letters Patent No. **220,070**, dated September 30, 1879; application filed March 27, 1879.

*To all whom it may concern:*

Be it known that we, JOSEPH GIFFORD and ISAAC GIFFORD, of Des Moines, in the county of Polk and State of Iowa, have invented an Improved Mining-Tool for Forming a Powder-Chamber in the Bottom of a Bore, of which the following is a specification.

Our invention relates to that class of tools that are designed to be operated in a bore formed by a rock-drill, for the purpose of enlarging the diameter of the bottom of the bore and forming a powder-chamber, as a means of diminishing to the minimum the labor and explosive material required in mining and quarrying by the drilling and blasting process.

It consists in forming a removable end-piece for a tubular shaft in sections, and combining therewith a duplex cutter in such a manner that the cutter can be readily adjusted and actuated by means of operating devices mounted at the top end of the shaft to cut simultaneously upward and downward to produce a spherical chamber at the bottom of the bore, as hereinafter fully set forth.

Figure 1 of our drawings is a perspective view, showing our complete tool inserted in a bore. Fig. 2 is a side view of our removable end-piece, having parts broken away to show the manner of forming and combining the sections. Together they clearly illustrate the construction, application, and operation of our complete invention.

A is a tubular metal shaft, that may vary in size, as desired. It has branches *b b* near its top end, that form sockets for hand-levers *c c*.

B represents our removable end-piece, formed in two parts. *r* is the minor part, secured to the major part by means of dowels *s* at its top end, and a set-screw, *z*, at its lower end. *t* is the pivot upon which the duplex cutter is placed and operated. This pivot may be formed integral with one of the parts, or it may be attached in any suitable way.

The complete end-piece B is tubular, and has slots in its sides, through which the pivoted cutter extends and moves. It is rigidly secured to the lower end of the shaft A by means of a screw, or in any suitable way.

*f* is the duplex cutter or reamer, placed on the pivot *t* before the part *r* was fixed in place,

in such a manner that its cutting-edges incline in opposite directions. *g* is a rod linked to the pivoted cutter *f*. It extends upward through the shaft A. *h* is a cap fitted to the top of the shaft, and secured thereto by means of set-screws *i i*, or in any suitable way. It has an opening that forms a bearing for a short rod, *g''*, that passes downward through the cap. *k* is a hand-wheel fixed to the top end of the short rod *g''*. *l* is an enlargement or collar formed on or fixed to the same rod *g''*. *m* is a loose collar, through which this same rod *g''* is passed downward. The screws *i*, that fasten the cap *h* to the top end of the shaft A, penetrate this collar *m*, and retain it in a fixed position relative to the shaft and cap, to engage the collar *l* on the rod *g''*, as required, to prevent any vertical movement of the rod *g''*.

*n* is a sliding block, that has flanges or beads at its sides, that enter corresponding grooves, slots, or bearings formed in the sides of the shaft A. The ends of the rods *g* and *g''* are screwed into the sliding block *n* in such a manner that the combined rods can be readily lengthened and shortened, by means of the sliding coupling, by simply turning the hand-wheel *k*, that is fixed to the top end of the short rod *g''*.

In the practical operation of our improved mining-tool, the cutter *f* is adjusted so that its ends do not project outside of the removable end-piece B. The tubular shaft can then be set into a bore of corresponding size that was previously drilled into a bed of coal or other substance that can be drilled and broken by means of powder.

When our tool is thus placed, the cutter can be readily adjusted so as to make its ends project through the slots in the end-piece B from opposite sides—one from the top portion to cut downward, and one from the lower portion to cut upward—as the complete tool is revolved, and as required to cut a spherical chamber in the bottom of the bore. Turning the hand-wheel *k* to revolve the rod *g''* will impart vertical motions to the sliding block or coupling *n*, and thereby move the rod *g* up and down, as required, to adjust the cutter *f* on its pivot *t*. By thus properly adjusting the cutter and re-

volving the complete tool by means of the hand-levers *c*, a powder-chamber can be readily cut in the bottom of a bore, and a given quantity of powder or other explosive material packed therein to do better execution than would result from placing and exploding it in a bore that has no chamber, and much time, labor, and explosive materials saved in mining and quarrying operations.

I claim—

1. In a mining-tool, the removable end-piece *B r s t*, having a detachable section, *r*, dowels *s*, and a pivot, *t*, and slots at its sides, adapted to receive and pivot an adjustable cutter, substantially as and for the purposes shown and described.

2. The combination of the end-piece *B r s t* and the duplex cutter *f*, substantially as shown and described, for the purposes specified.

3. The removable end-piece *B r s t*, carrying the pivoted cutter *f*, in combination with the tubular shaft *A*, having handles *c* and carrying an adjustable rod, *g*, substantially as and for the purposes shown and described.

4. The improved mining-tool composed of the tubular shaft *A*, having handles *b c* and carrying operating devices *g g' h i k l*, and the removable and separable end-piece *B r s t*, carrying a pivoted duplex cutter, *f*, substantially as shown and described, to be operated in the manner set forth.

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