No. 626,014. Patented May 30, 1899.

G. F. WEISS.

COAL DRILL.

(Application filed June 10, 1898.)

(No Model.)

Fig. 4.

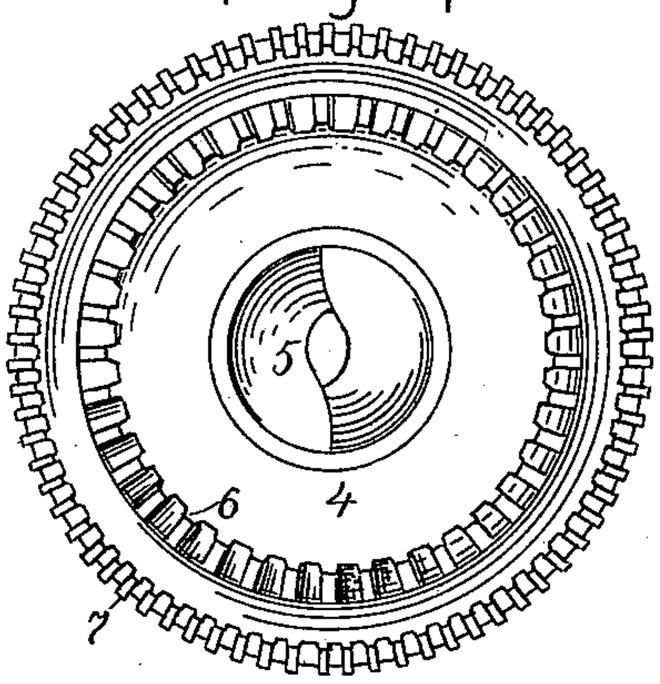


Fig. 1.

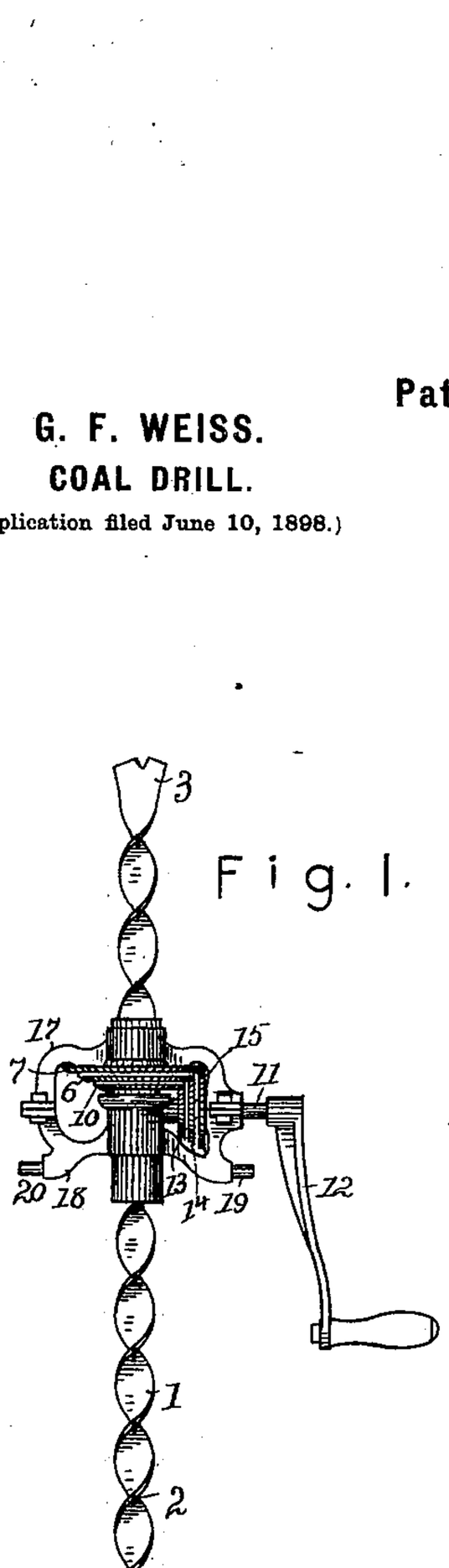


Fig. 2.

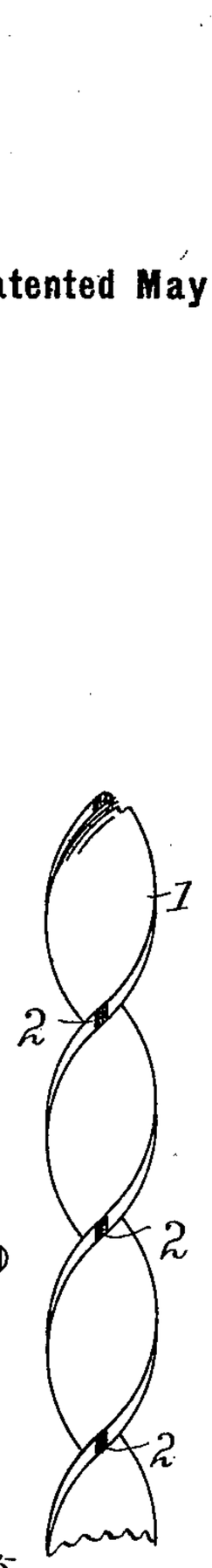


Fig. 5.

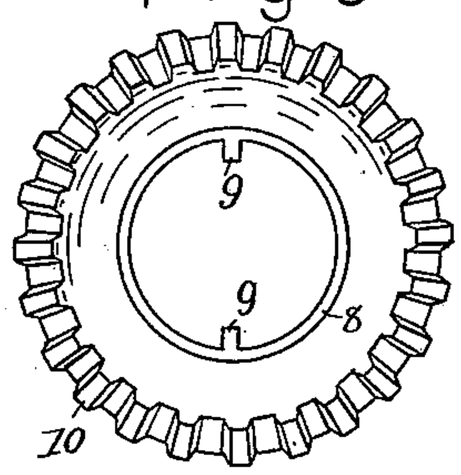


Fig. 3.

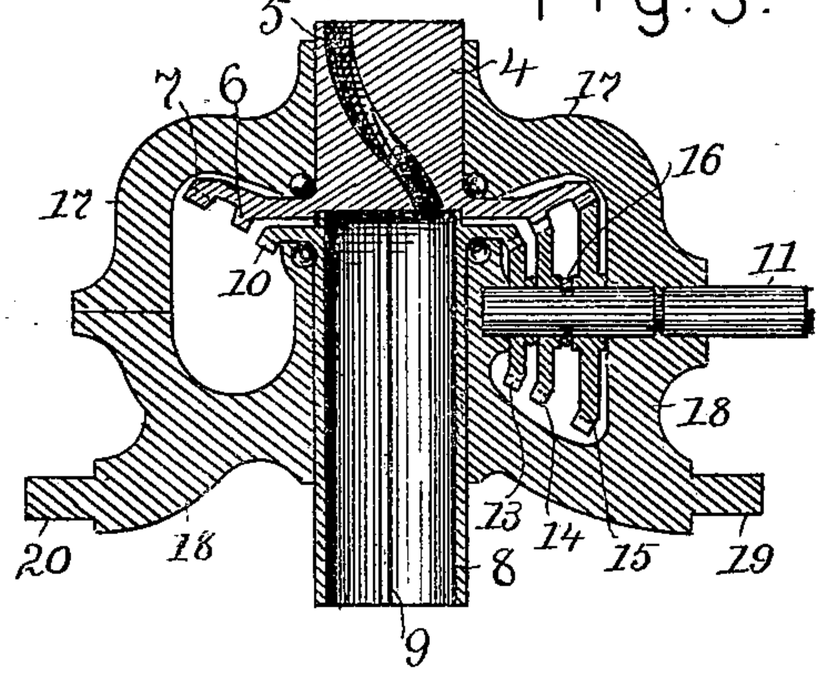


Fig. 6.

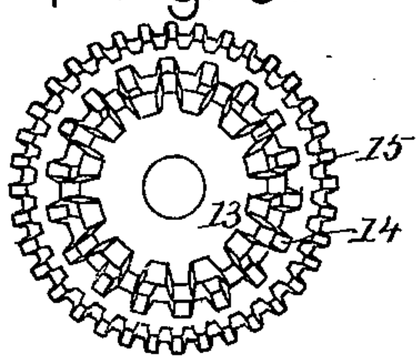


Fig. 7.

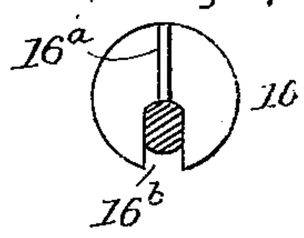
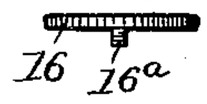


Fig 8



Attest

Nora Graham.

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GEO. F. WEISS

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his attorney

UNITED STATES PATENT OFFICE.

GEORGE F. WEISS, OF SPRINGFIELD, ILLINOIS.

COAL-DRILL.

SPECIFICATION forming part of Letters Patent No. 626,014, dated May 30, 1899.

Application filed June 10, 1898. Serial No. 683,140. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. WEISS, of Springfield, in the county of Sangamon and State of Illinois, have invented a certain Improved Coal-Drill, of which the following is a specification.

The invention is exemplified in the structure hereinafter described, it is defined in the appended claims, and it is designed to drive and feed a spiral drill by mechanism applied directly to the drill.

In the drawings forming a part of this specification, Figure 1 is a representation of my improvement in its entirety. Fig. 2 shows an enlarged fragment of the drill. Fig. 3 is an enlarged section through the drill driving and feeding mechanism. Fig. 4 is a face view of the feed-collar that acts directly on the spiral surfaces of the drill to force the drill into the coal. Fig. 5 is a face view of the sleeve that rotates the drill. Fig. 6 is a face view of the gear-wheels used to turn the feed-collar and the drive-sleeve. Figs. 7 and 8 are face and edge views, respectively, of a detachable clutch-yoke that is preferably employed to change the speed of the feed.

The drill proper is shown at 1. It is regularly spiral or of auger conformation, it has key-seats or grooves 2 cut into its perimeter lengthwise of its axis, and it has a suitable bit, as 3, formed on its end.

The means employed to rotate the drill comprise a sleeve 8, having ribs 9, that fit into the key-seat grooves of the drill, and also having a gear-wheel 10, by means of which it is turned.

The means employed to feed the drill into the coal consist of a collar 4, having a spiral opening 5, adapted to receive the drill, and a gear wheel or wheels, as 6 and 7, by means of which its relative speed of rotation is controlled. The gear-wheel 10 on the drive-sleeve is at one end of the sleeve and its teeth are presented inward or toward the opposite end of the sleeve. The gear-wheels on the feed-collar are one larger than the other and both larger than the wheel of the drive-sleeve, and their teeth are presented outward or away from the opposite end of the collar. The sleeve is placed with its wheel-bearing end against the wheel-bearing end of the collar, and the wheel of the sleeve nests with the wheels of the collar, as shown in Figs. 1 and 3. A transverse shaft 11 carries three gear-wheels 13, 14, and 15, of which 13 is fixed on the shaft and meshes with wheel 10 of the drive-sleeve, while the others are fixable on the shaft and mesh one with wheel 6 and the other with wheel 7 of the feed-collar. The shaft 11, the sleeve 8, and the collar 4 are journaled in a frame preferably composed of two parts 17 and 18, fastened together, and the bearings may be supplied with balls, as suggested in Fig. 3. The frame has a pair of studs 19 and 20, that rest in bearings in an anchor-bar fastened into the coal vein to be drilled, and the shaft has a crank 12, by means of which force is applied to the driving and feeding mechanism. The wheel of the drive-sleeve has in this instance twenty-four teeth and its fellow wheel 13 has twelve teeth, so that the drive-sleeve makes one rotation to two of the shaft 11. The wheel 6 on the feed-collar has thirty-seven teeth, and the drive-wheel 14, with which it meshes, has eighteen teeth, so that when the drive-wheel 14 is fastened on the shaft the feed-collar will lack one tooth of making a complete rotation while the shaft is making two and the drive-sleeve is rotating once.

It is clear that if the feed-collar were stationary the drill would be compelled to advance the length of its pitch at each rotation of the drive-wheel sleeve, and it is equally clear that if the feed-collar rotated at the same speed as the drive-sleeve there would be no tendency to move the drill lengthwise into the coal. So it follows that when the feed-sleeve is made to move slower than the drive-collar the difference in speed determines the rate of feed. For instance, the pitch of the drill is, say, three inches. The feed-collar is retarded one thirty-seventh of a rotation, and so the feed of the drill into the coal at each rotation is three thirty-sevenths of an inch. This suppositious rate of speed may be too great under some circumstances, and in that case the wheel 14 would be loosened on the shaft and the wheel 15 would be fixed. The feed-collar would then be controlled by wheels 15 and 7, with the result that the collar would be retarded one seventy-third of a rotation and the drill would be fed into the coal three seventy-thirds of an inch, wheel 7

having seventy-three teeth and wheel 15 having thirty-six teeth. These proportions are suggestive merely, and they may be varied to any desired extent, as the main essential is merely that the feed-collar shall travel at a slower rate of speed than the drive-sleeve, while it is desirable that the relative rate of speed may be varied to suit various conditions.

The wheels 14 and 15 may be fixed to shaft 11 by various different mechanical devices; but the one I prefer to use is that shown in Figs. 7 and 8. This consists of a plate 16, recessed at 16^b to fit over a squared portion of the shaft and provided with a rib 16^a, that is adapted to engage a radial groove in a hub of a wheel. To use this appliance, the opposing surfaces of the hubs of wheels 14 and 15 are each provided with a groove for the rib, and the wheel desired for use is keyed to the shaft by slipping the rib into the groove of the hub, with the recess fitting over the square of the hub. This leaves the other wheel loose on the hub, and a change may be readily made by withdrawing the plate, turning it around, and placing it on the shaft with the rib in the groove of the hub of the other wheel.

By making the frame in two parts, one part forming a bearing for the sleeve and the other for the collar, the different pieces of mechanism are easily assembled and wear may be readily compensated for. It is also advantageous to use the two parts of the frame as halves of the boxing for shaft 11.

What I claim is—

1. In a drill for coal and the like, the combination of a spiral drill-shaft having a longitudinal groove or grooves, a rotatable drive-sleeve mounted on the drill-shaft and having a spline engaging the groove thereof, a rotatable feed-collar mounted on the drill-shaft and having bearings conforming to the spiral surfaces thereof, a drive-shaft at right angles with the drill-shaft, a gear-wheel fixed on the drive-sleeve, a plurality of gear-wheels of different diameters fixed on the feed-collar, a gear-wheel fixed on the drive-shaft in mesh with the wheel of the drive-sleeve, a plurality of wheels mounted loosely on the drive-shaft and meshing one with each of the wheels of the feed-collar and means for fixing either of the loose wheels onto the drive-shaft, substantially as set forth.

2. In a drill for coal and the like, the combination of the frame, the feed-collar journaled in the frame and having a pair of variant gear-wheels, the drive-sleeve journaled in the frame and having a gear-wheel nesting in the wheels of the collar, the transverse shaft journaled in the frame, the gear-wheel for the drive-sleeve fixed on the shaft, the wheels for the feed-collar mounted loosely on the shaft, and the removable key-plate attachable to the shaft and applicable to both of the loose wheels, substantially as set forth.

In testimony whereof I sign my name in the presence of two subscribing witnesses.

GEORGE F. WEISS.

Witnesses:
W. A. VINEY,
T. P. WRIGHT.