(No Model.)

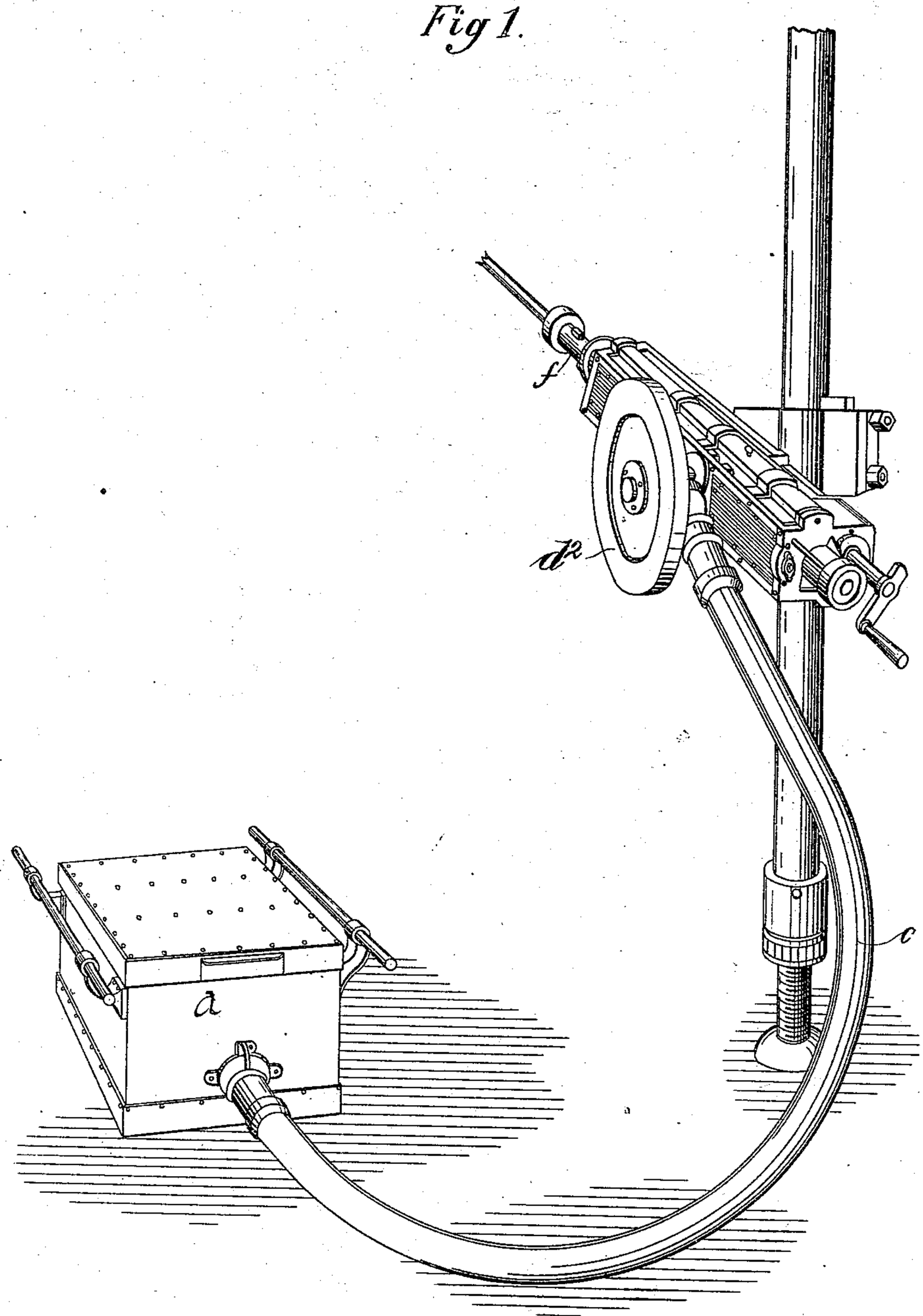
3 Sheets—Sheet 1.

A. E. W. MEISSNER.

PERCUSSION DRILL.

No. 551,594. Patented Dec. 17, 1895.

Fig 1.



WITNESSES.

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(No Model.) 3 Sheets—Sheet 2.

A. E. W. MEISSNER.

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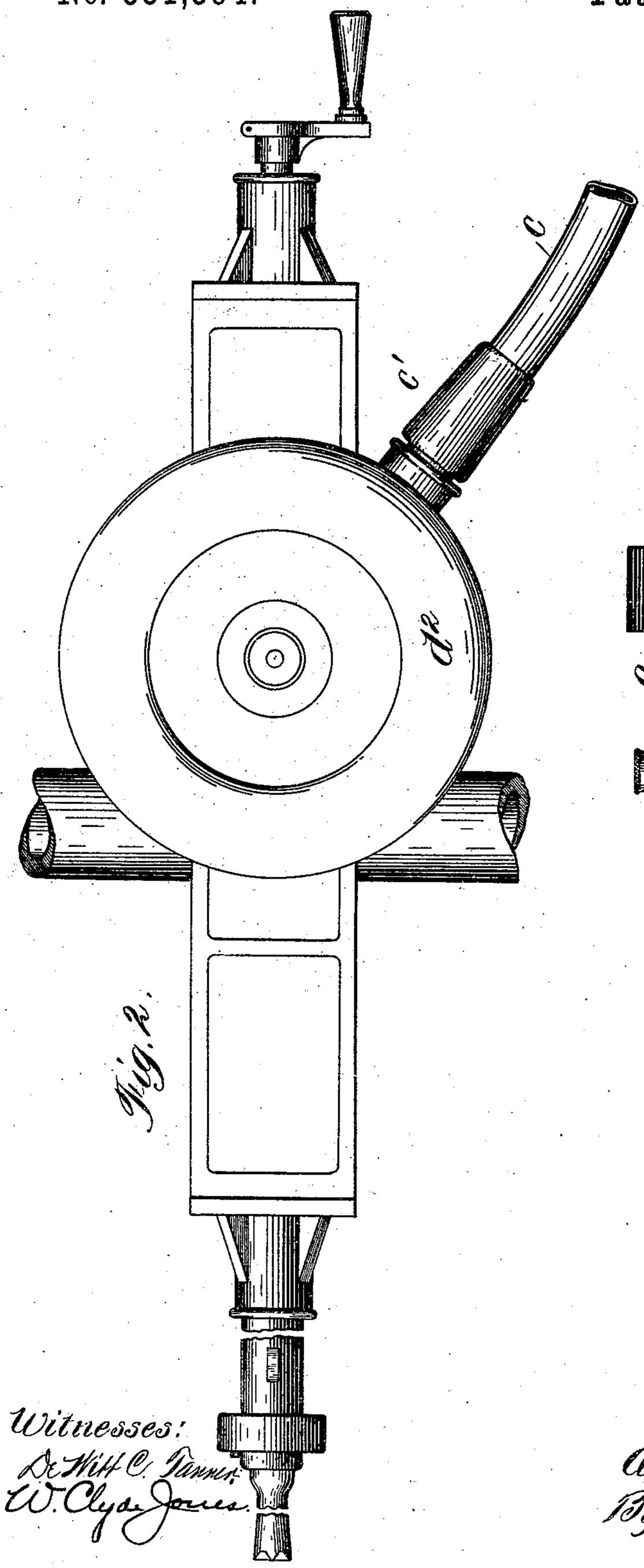

Fig. 2.

Fig. 2a.

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(No Model.)

3 Sheets—Sheet 3.

A. E. W. MEISSNER.

PERCUSSION DRILL.

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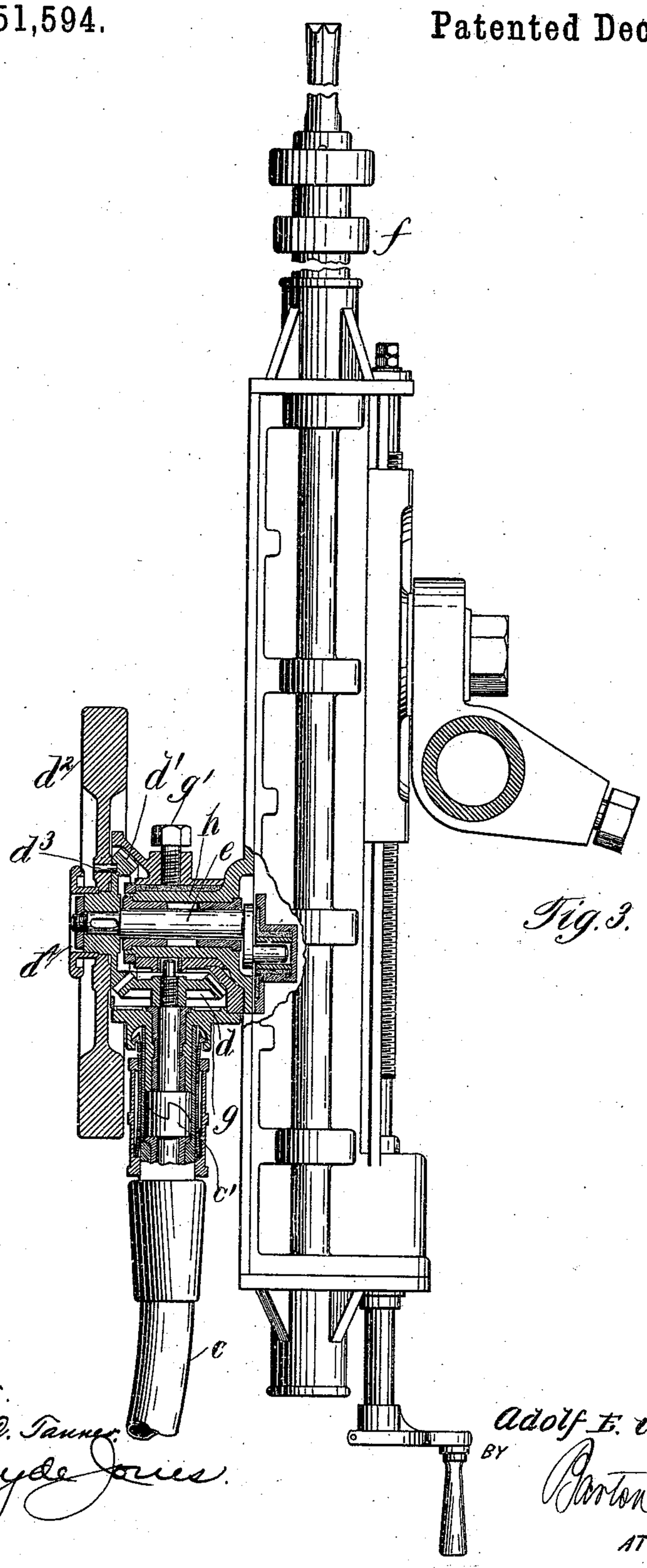

Fig. 3.

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UNITED STATES PATENT OFFICE.

ADOLF EMIL WALDEMAR MEISSNER, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO THE SIEMENS & HALSKE ELECTRIC COMPANY OF AMERICA, OF CHICAGO, ILLINOIS.

PERCUSSION-DRILL.

SPECIFICATION forming part of Letters Patent No. 551,594, dated December 17, 1895.

Application filed August 17, 1895. Serial No. 559,635. (No model.) Patented in Belgium March 15, 1894, No. 108,701; in Italy March 21, 1894, No. 35,821; in France May 4, 1894, No. 236,250; in Germany May 22, 1894, No. 76,267; in South African Republic June 19, 1894, No. 654; in England October 6, 1894, No. 24,083; in Norway November 30, 1894, No. 3,592, and in Sweden January 24, 1895, No. 5,786.

To all whom it may concern:

Be it known that I, ADOLF EMIL WALDEMAR MEISSNER, a subject of the Emperor of Germany, residing at Charlottenburg, near Berlin, Germany, have invented new and useful Improvements in Percussion-Drills, (Case No. 619,) of which the following is a specification, and for which Letters Patent have been granted in Germany, No. 76,267, dated May 22, 1894; in France, No. 236,250, dated May 4, 1894; in Great Britain, No. 24,083, dated October 6, 1894; in Norway, No. 3,592, dated November 30, 1894; in Italy, No. 35,821, dated March 21, 1894; in Sweden, No. 5,786, dated January 24, 1895; in Belgium, No. 108,701, dated March 15, 1894, and in South African Republic, No. 654, dated June 19, 1894.

My invention relates to improvements in the method of and means for imparting motion to percussion-drills or similar reciprocating machines.

In operating portable percussion-drills and similar portable percussion-machines, it has heretofore been found possible to produce the desired movement of reciprocation in the drill advantageously only by apparatus producing a direct reciprocating motion—as, for instance, compressed-air machines and electromagnetic solenoid machines.

It has not been found possible to use rotary power-machines, especially rotary electric motors, advantageously, without special appliances, for the following reasons: The shock or recoil of the plunger renders impracticable the introduction of gear-wheels between the rotary machine and the plunger, even with the interposition of suitable springs such as are shown in Carl Hoffmann's United States Patent No. 509,373, dated November 28, 1893. The power machine or motor must, therefore, be connected direct on the crank-shaft or on a similar device needed for the production of the reciprocating motion, and, hence, the power machine or motor must make as many revolutions as the tool must strike blows, and must therefore be a comparatively-slow-speed machine. A slow-speed machine, especially an electric motor, is one of low efficiency, and will therefore have to be made comparatively heavy. The transportation of such machines, however, which are a combination of the machine itself and a heavy motor, would be in many cases exceedingly difficult. In mines it would be simply impossible.

The employment of light motors—that is, of high-speed motors—would be possible only in the case that the rotating gears be not exposed to the injurious effects of the blow and recoil. The transportation of such machines is still more facilitated if the motor is made an entirely independent part and the transmission of power is effected by a suitable flexible easily-connected medium; but even this can be employed only if it is well protected against the injurious results of the blow and recoil.

The object of my invention is an arrangement which makes it possible both to employ a high-speed motor and to separate this entirely from the working machine itself.

Referring to the drawings, Figure 1 is a perspective view of the machine as a whole. Figs. 2 and 2^a are side elevations of the drilling-machine and the motor, the connection between them being shown broken; and Fig. 3 is a plan view, partly in section, of the same.

Like letters refer to like parts in the several figures.

Power is transmitted from the electric motor a through the gear-wheels b b', at a reduced speed, to the flexible shaft c. This flexible shaft is connected by means of a coupling c', permitting of an easy and rapid connection and disconnection with the shaft of a bevel-wheel d, gearing with a bevel-wheel d', which carries a fly-wheel d^2.

The fly-wheel d^2, which is solidly connected with the bevel-gear d', is, by means of a key and slot, mounted on a shaft e, which in turn imparts to the plunger f the necessary reciprocating motion by any well-known means, as by connecting-rods or pitmen, or by means

of a crank and pin working in a transverse guide.

In the drawings a hand feeding device for feeding the plunger forward to its work is shown; but for the practical completion of this machine an automatic feeding device is intended, which will be the subject-matter of a separate application for Letters Patent.

As it is necessary to use the drill at different heights and at different angles, an arrangement is provided, which permits of the drill being connected with the flexible shaft without necessitating too sharp bends in the latter. For this purpose the gear *d* is mounted in the casing *g*, which can rotate around the box *h*, and which can be fastened in any position thereupon by the set-screw *g'*. The box *h* also contains the bearing for the shaft *e*.

It has been found in practice that the weight of the fly-wheel at the usual number of blows of percussion-drills and similar apparatus can be kept small for all practical purposes. Should, however, the total weight of the machine and fly-wheel in certain cases be found too great for transportation, another arrangement, also illustrated in the drawings, can be made, by which the fly-wheel is easily detachable. For this purpose the fly-wheel is fastened on the wheel *d'* by means of a pin d^3 or in any other manner, thus taking the stress off the nut d^4.

It will be seen that by the above-described arrangement it is possible to employ an electric motor of the highest speed and therefore of the highest efficiency. The employment of such high-speed motor is rendered possible by the introduction of the reducing-gearing *d d'*, and of the latter by the use of the fly-wheel, the accumulated energy of which is utilized for the forward blow. The loss of speed of the fly-wheel on account of this work is so little, and the lost energy is restored by the motor during the remainder of a whole revolution of the fly-wheel so gradually, that an injurious recoil on the gear is prevented. The flexible shafting also to some extent performs, with regard to the reducing-gearing *b b'*, the same function that the fly-wheel performs with regard to the gearing *d d'*—that is, it absorbs any jar or recoil transmitted from the blow of the plunger—but its most important advantage is that it not only of itself follows the normal feed of the machine, but permits the plunger and casing to be moved about to follow the work quite independently of the motor, and the motor itself to be located in the most convenient place, as will be dictated by the conditions existing, for instance, in mines where the unevenness of the floor and the lack of space must be met with.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a reciprocating machine, the combination with a reciprocating plunger, of a crank shaft for imparting movement to said plunger, a fly wheel mounted directly upon said crank shaft, a high-speed electric rotary motor independent of the said reciprocating machine, and a flexible shaft connecting said motor with said crank shaft through suitable gears; substantially as described.

2. In a reciprocating machine, the combination with a reciprocating plunger, of a crank shaft for imparting movement to said plunger, a fly wheel mounted directly upon said crank shaft, a high-speed electric rotary motor independent of the said reciprocating machine, a flexible shaft connecting said motor with said crank shaft, and suitable gears interposed between said motor and said flexible shaft and between said flexible shaft and said crank shaft; substantially as and for the purpose set forth.

In testimony whereof I have affixed my signature in the presence of two witnesses.

ADOLF EMIL WALDEMAR MEISSNER.

Witnesses:

JOHN B. JACKSON,

OSCAR BIELEFELD.