

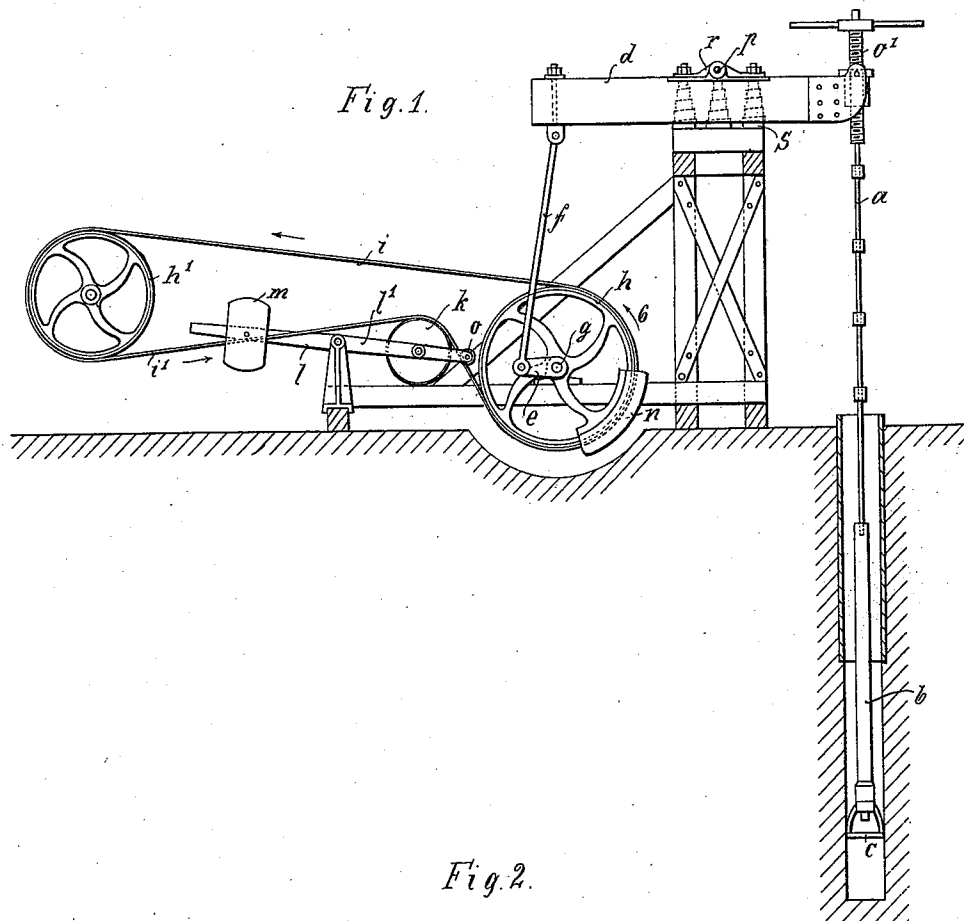
(No Model.)

2 Sheets—Sheet 1.

A. RAKY.
BORING APPARATUS FOR DEEP BORINGS.

No. 510,366.

Patented Dec. 5, 1893.



Witnesses:
Arthur Walther.
Emil Kasper.

Inventor:
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

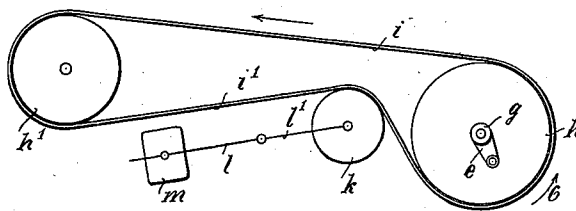


Fig. 4.

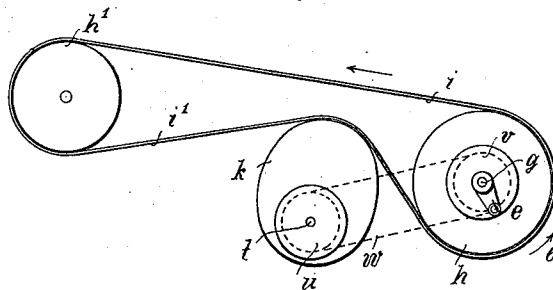
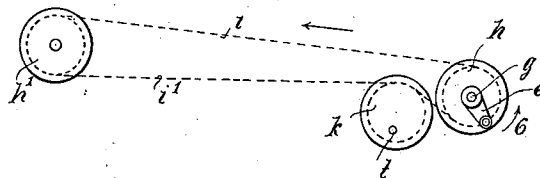


Fig. 5.



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UNITED STATES PATENT OFFICE.

ANTON RAKY, OF DÜRENBACH, GERMANY.

BORING APPARATUS FOR DEEP BORINGS.

SPECIFICATION forming part of Letters Patent No. 510,366, dated December 5, 1893.

Application filed September 15, 1893. Serial No. 485,636. (No model.) Patented in Luxemburg July 20, 1893, No. 1,863.

To all whom it may concern:

Be it known that I, ANTON RAKY, a subject of the German Emperor, residing at Dürrenbach, in the Territory of Alsace, German Empire, have invented new and useful Improvements in Boring Apparatus for Deep Borings, (for which a patent has been obtained in Luxemburg, No. 1,863, filed July 20, 1893, and applications have been filed in France, Germany, Austria-Hungary, Italy, Belgium, and Great Britain,) of which the following is a specification.

My invention relates to boring apparatus in which the boring-rods with the tool are operated by a crank, and my improvements in such apparatus relate to a combination of the driving-belt with a special tension-device, by the automatic disengagement of which said belt is slackened when the boring-tool has begun to go downward again, so that a free fall of the latter for the remainder of its path occurs.

In order to make my invention more clear, I refer to the accompanying drawings, in which similar letters refer to similar parts, and in which—

Figure 1 is a side-view of one form of construction of my improved boring apparatus, the frame being in vertical longitudinal section. Fig. 2 is a plan-view of the same, the oscillating beam *d* being broken off at its left hand end. Fig. 3 shows a modified arrangement of the tension device above mentioned. Fig. 4 shows another modification of the same, and Fig. 5 a third modification.

The rods *a* with the heavy auger *b* and its tool *c* are suspended from the oscillating beam *d*, which latter is moved from crank *e* by connecting-rod *f*. Crank *e* is fixed to shaft *g* having pulley *h*. The latter is driven from pulley *h'* by belt *i i'*. Part *i'* of the latter is led over a roll *k*, having its bearing in double-armed lever *l l'*, arm *l* of which has the weight *m*. By means of this weight, said part *i'* of the belt is put under tension. Pulley *h* has fixed to its rim a sector *n*, which when revolving in the direction indicated by arrow *o*, can act on a small roll *o* attached to arm *l'* of lever *l l'*, so as thereby to turn said lever on its pivot in such a direction, that roll *k* is moved downward, thus slackening the belt. This slackening takes place when the

heavy auger *b* with its boring-tool *c* has begun to go downward, so that now for the remainder of the way a free fall occurs.

The rods *a* may be regulated by the screw *o'* held by beam *d*. The beam oscillates on pivot *p*, the two bearings *r r'* of which are supported by the springs *s*. The purpose of this arrangement will be explained hereinafter.

The movement of the lever *l l'* and the slackening of the belt resulting therefrom need not be performed mechanically, as in Figs. 1 and 2, but may be attained perfectly automatically, as in Fig. 3. In this modification the arrangement of the belt *i i'* and the weighted lever *l l'* with its roll *k* is exactly the same as in Figs. 1 and 2, but sector *n* and roll *o* have been dispensed with. The effect however, is the same, as will be seen from the following: When the rods shall be lifted by pulley *h*, they exert, by reason of their own weight and that of the heavy auger, a counteraction tending to rotate pulley *h* in opposite direction. A great friction is caused thereby between said pulley and the belt, in consequence of which the rods are lifted. If, now, the rods begin to descend, their counteraction is reversed and they thus tend to turn pulley *h* in the direction of the movement of the belt. Friction between the latter and said pulley is decreased thereby in such a degree, that it is overcome by the weight of the rods and auger. Pulley *h* is not driven now by the belt but by the rods, in consequence whereof part *i'* of the belt becomes the driving part, so that lever *l l'* is turned by the pressure exerted by said part *i'* on roll *k*. It results therefrom, that part *i* of the belt will slacken, so that now the free fall of the auger can occur.

In the construction shown in Fig. 4 even lever *l l'* with its weight is dispensed with. Roll *k* is, in this case, of elliptical shape, is mounted eccentrically on a pivot *t* and has fixed to it a rope-pulley or chain-wheel *u*. A like pulley or wheel *v* is fixed to pulley *h*, and is connected with pulley or wheel *u* by rope or chain *w*, by means of which latter roll *k* is rotated, and thus the belt intermittently slackened.

In the last modification shown in Fig. 5 the pulleys and rolls *h h'* and *k* are replaced by

chain-wheels, and all these wheels are acted on at a time by one and the same chain *i i'*. Chain-wheel *k* is mounted eccentrically on pivot *t*, and acts thus in the same manner on the chain, *i. e.*, slackens the chain intermittently in the same manner, as was the case with regard to the roll and belt in Fig. 4.

As was previously mentioned, beam *d* is elastically supported by springs *s*. The purpose of this arrangement needs still further explanation.

The rods *a*, as a matter of course, are rigid and are therefore liable to break, when not properly adjusted by screw *o'* with regard to the depth of the bore-hole. A break of the undermost of the rods *a* would occur, when tool *c* strikes on the bottom before the pinion of crank *e* had reached its highest position, while, on the other hand, this pinion would be broken off, if it reached its highest position before tool *c* can strike on the ground. In order to prevent accidents of that kind, the said elastic or yielding supports for beam *b* have been arranged, which, in either case take up, or compensate, those dangerous shocks. The rods are adjusted in such a way, that, when the pinion of crank *e* is in its highest position, the tool *c* is shortly above the ground of the bore-hole. If now, however, the rods with the heavy auger *b* are falling freely downward, as above described, the tension of the respective springs will be overcome by the inertia of said parts, and the tool will powerfully strike down upon the rock or other stone to be bored.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

1. In a deep-boring apparatus with crank for operating the rods, the combination with wheel *h* driving crank *e*, and with belt, rope or chain *i i'* driving said wheel *h* from wheel *h'*, of a tension-roll *k* adapted to slacken said belt, rope or chain intermittently, for the purpose as described.

2. In a deep-boring apparatus with crank for operating the rods, the combination with wheel *h* driving crank *e*, and with belt, rope or chain *i i'* driving said wheel *h* from wheel

h', of an eccentric tension-roll *k* adapted to slacken said belt, rope or chain intermittently, for the purpose as described.

3. In a deep-boring apparatus with crank for operating the rods, the combination with wheel *h* driving crank *e*, and with belt, rope or chain *i i'* driving said wheel *h* from wheel *h'*, of an eccentric tension-roll *k* adapted to slacken said belt, rope or chain intermittently, said tension-roll being driven by an auxiliary belt, rope or chain *w*, for the purpose as described.

4. In a deep-boring-apparatus with crank for operating the rods, the combination with wheel *h* driving the rods *a* by crank *e*, connecting-rod *f* and beam *d*, and with belt, rope or chain *i i'* driving said wheel *h* from wheel *h'*, of a tension-roll *k* adapted to slacken said belt rope or chain intermittently, the beam being supported by springs *s*, for the purpose as described.

5. In a deep-boring-apparatus with crank for operating the rods, the combination with wheel *h* driving the rods *a* by crank *e*, connecting-rod *f* and beam *d*, and with belt, rope or chain *i i'* driving said wheel *h* from wheel *h'*, of an eccentric tension-roll *k* adapted to slacken said belt, rope or chain intermittently, the beam being supported by springs *s*, for the purpose as described.

6. In a deep-boring-apparatus with crank for operating the rods, the combination with wheel *h* driving the rods *a* by crank *e*, connecting-rod *f* and beam *d*, and with belt, rope or chain *i i'* driving said wheel *h* from wheel *h'*, of an eccentric tension-roll *k* adapted to slacken said belt, rope or chain intermittently, the tension-roll being driven by an auxiliary belt, rope or chain *w*, said beam being supported by springs *s*, for the purpose as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ANTON RAKY.

Witnesses:

J. O. SEILE,
ERNEST THERIN.