

O. LENTZ.
BORING APPARATUS.

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BORING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 486,877, dated November 29, 1892.

Application filed September 23, 1891. Serial No. 406,597. (No model.) Patented in Germany July 15, 1891, No. 60,651; in Belgium July 15, 1891, No. 95,629, and in Austria-Hungary December 14, 1891, No. 34,131 and No. 73,578.

To all whom it may concern:

Be it known that I, OTTO LENTZ, engineer, a subject of the King of Prussia, residing at Culm, Prussia, Germany, have invented certain new and useful Improvements in Boring Apparatus, (for which I have obtained Letters Patent in Germany July 15, 1891, No. 60,651; in Belgium July 15, 1891, No. 95,629, and in Austria-Hungary December 14, 1891, No. 34,131 and No. 73,578;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The invention relates to boring apparatuses, and has for its object the provision of means for regulating the drop of the boring bar or tool, for automatically releasing said bar from the grapple, and for imparting a partial rotation to the boring-bar.

To these ends the invention consists in the combination of devices or elements and in structural features, as will now be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional view of a portion of the boring devices, illustrating the means for automatically releasing the boring-bar from the grapple and for imparting a partial rotation to the said bar. Figs. 2, 3, 4, and 5 are sections taken, respectively, on lines xx , yy , zz , and uu of Fig. 1. Figs. 6 and 7 are elevations taken at right angles to each other of the guide-frame and grapple for the boring-bar. Fig. 8 is a section of the casing-pipe with the boring devices shown in elevation.

Similar letters of reference indicate like parts wherever such may occur in the above-described figures of drawings, in which—

a indicates the boring-bar, to which the boring-tool is secured in the usual manner, said bar being provided with a head or lugs v for engagement with the tongues or grapple, whose jaws are pivoted in the head of a guide-frame R . This head of the guide-frame R consists of a ring guide h , between the transverse parallel bars h' of which are pivoted the arms or shanks w of the jaws w' of the tongues or grapple, said transverse

bars h' having each two lugs $h^3 h^4$, the former for connection with the hoisting-rope and the latter for connection with the guide-frame R . This frame consists of two parallel vertical bars R' , between which the boring-bar a slides, said boring-bar having near its upper end a slide-block a' , secured thereto by means of confining or retaining sleeves $a^2 a^2$. The lower end of the guide-frame R terminates in a head R^2 , having an axial aperture for the free passage and guiding of the boring-bar a , and to the end of each vertical bar R' is pivoted a dog or pawl d , that is adapted to engage the teeth on the periphery of a toothed disk b , rigidly connected with the boring-bar a near its lower end, said pawls d being held in engagement with the teeth of disk b by springs c , secured to a housing or framing encompassing the lower head R^2 of the guide-frame R .

To the lug h^3 of the upper head of frame R is pivoted one end of a flat bar e , that has a spiral twist e' formed in it, and is provided with a series of holes e^2 for the connection and vertical adjustment of a cylindrical or ring guide g , said cylindrical or ring guide, as well as the cylindrical or ring guide h being of about the same diameter as the casing-pipe r .

The devices for automatically releasing the boring-bar from the grapple consist, essentially, of diverging abutments Q , with which the shanks or arms of the grapple-jaws contact and by which abutments said jaws are opened by forcing their shanks or arms together as they slide into the gradually-contracting space between said diverging abutments. The devices for imparting a partial rotation to the boring-bar consist, essentially, of rolling bearings, between which the twisted portion of the bar e is adapted to slide and by means of which said bar is partially revolved. Inasmuch as these devices are to be arranged in the bore-hole or casing-pipe, and inasmuch as they should at all times be in proper relation to the boring devices, means whereby said devices may be automatically kept in such relation are provided. Furthermore, said devices being arranged in the bore-hole or casing-pipe, as set forth, so that access thereto cannot be had, means are provided for their removal with the boring devices.

In the drawings I have shown a device of

simple construction in which the rolling bearings and the diverging abutments are combined and held by frictional contact within the bore-hole or casing-pipe. This device consists of a cylindrical body q' , in the bore of which is fitted a bushing q , said cylindrical body having vertical radial slots, in which are fitted slide-blocks q^3 , provided at their upper and lower ends with lugs or projections confined within the slots by means of thimbles q^4 . (See Fig. 1.) Springs q^2 , arranged within the slots and having bearing on the bushing q , tend to press the slide-blocks outward into contact with the casing-pipe r .

Within the bore of the cylindrical body q' at its upper end are journaled two rollers i , with their peripheries facing each other and constituting the rolling bearings for the bar e . At its lower end the said bore of the body q' is made flaring outwardly, as shown in Fig. 1, the inclined faces constituting the abutments Q , that operate the shanks of the grapple-jaws. The flat bar e , from which the guide-frame R is suspended, is connected with the hoisting-rope s by means of a swivel, so as to permit the bar and frame to revolve freely without twisting the rope, any well-known means being provided for hoisting and lowering the rope s during the operation of boring.

The operation of the devices described is as follows: Supposing the frame R is being lifted so as to cause the rollers w^3 on the arms or shanks w of the jaws w' of the grapple to move along the abutments Q , this will cause said arms to move toward each other, while the jaws w' will move away from each other, as shown in Fig. 1, thereby releasing the boring-bar a . In its descent the said bar will be guided by the slide-block a' on the one hand and the lower end or head of the guide-frame R , the toothed disk b on the boring-bar a simply sliding from between the locking-pawls d on said lower head of frame R . If the frame is now lowered to grapple the boring-bar, the twisted portion e' of the flat bar e will pass between the rollers i , which will impart to the bar a partial rotation, and as the bar e is connected with frame R the latter will partake of said partial rotation. This, however, takes place before the pawls d are brought into engagement with the disk b and before the grapple seizes the head of the boring-bar a . A further lowering of the frame R will cause the spring-pawls d to engage the disk b , the grapple at the same time seizing the head of the boring-bar a . When the frame R is again lifted and before the shanks of the grapple contact with the abutment Q to release the boring-bar, the twisted portion e' of the bar e again passes between the rollers i , and inasmuch as the boring-bar is now locked to the frame at its lower end by the pawls d said boring-bar, as well as the boring-tool, will partake of this partial rotation, so that the position of the boring-tool will be changed after each impact.

By a proper adjustment of the cylindrical

abutment or guide cylinder or ring g on the bar e the drop of the boring-bar may be regulated, as it is obvious that the nearer the said abutment is adjusted to the support of the rolling bearings and diverging abutments the shorter will be the drop, for the reason that said ring will engage the slide-blocks q^3 of the device and carry the same along in the casing-pipe on its downward movement, thereby bringing the abutments Q closer to the grapple arms or shanks. When the ring g has been adjusted to the desired drop of the boring-bar a , said ring will maintain the rolling bearings and diverging abutments in proper relation to the grapple as the depth of the bore increases by carrying the same along with it as said depth increases. When it is desirable to remove the boring devices from the bore-hole or casing-pipe, this may be effected by hoisting the frame R , with the boring bar and tool, out of the casing-pipe, the ring h in this case carrying the support q' for the rolling bearings and diverging abutments along with it. Of course the springs q^2 should exert sufficient power upon the slide-blocks q^3 of the support q' to wedge the said blocks against displacement under the action of the rollers w^3 on the shanks of the grapple, or under the frictional contact between the rollers i and the twisted portion of the bar e . It will, however, be readily seen that neither of these devices exert any great power upon the bearings i Q , as the said bearings are in rolling contact with the bar and grapple-arms, so that a comparatively-small power is required to hold the support q' in the casing-pipe r . In order that the intentional displacement of the said support q' within the casing-pipe may be more readily effected, the upper and lower ends of the slide-blocks q^3 are beveled off, the rings g and h engaging said beveled portions whenever either of them is used to displace the support q' , thereby pressing the corresponding end of the blocks inwardly against the stress of their springs.

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

1. In a boring apparatus, means for imparting a partial rotation to the boring bar or tool, which consists of a flat bar having a spiral twist therein and the grapple for the boring bar or tool connected with the flat bar, in combination with rolling bearings and a support therefor arranged in the bore-hole or casing-pipe, between which rolling bearings the twisted flat bar has motion.

2. In a boring apparatus, means for maintaining the grapple-releasing devices and the devices for imparting a partial rotation to the boring-bar in proper relation to the grapple and for regulating the drop of the boring tool or bar, which consist in a flat bar having a spiral twist therein and an abutment adjustable vertically on said bar above its twisted portion, a grapple the pivoted jaws of which

are provided with arms or shanks, and a connection between the grapple and bar, in combination with rolling bearings between which the bar slides and diverging bearings connected with the rolling bearings and adapted to engage the shanks of the grapple-jaws, said rolling and diverging bearings being held in the bore-hole by frictional contact and adapted to be displaced therein by the abutment on the flat bar.

3. In a boring apparatus, the combination, with the grapple for the boring bar or tool, a guide-frame suspended from the grapple-support, said frame having at its lower end two pawls, and a flat bar having a spiral twist formed therein, connected with the grapple-support, of a boring-bar adapted to slide in the guide-frame, said boring-bar having a toothed disk near its lower end, with the teeth of which the pawls on the guide-frame are adapted to engage, and stationary rolling bearings, between which the flat bar slides, for the purpose set forth.

4. In a boring apparatus, the combination, with the grapple for the boring-bar, having extended arms or shanks w , provided with rollers w^2 , and the bar e , having the spiral twist e' , said bar being connected with the grapple-support, of the cylindrical body q' , having the lower end of its bore made flaring

outwardly, the rollers z , journaled within the bore of the body at its upper end and having bearing on the opposite faces of the flat bar e , and the spring-actuated blocks q^3 , substantially as and for the purpose set forth.

5. In a boring apparatus, the combination, with a bushing provided at one end with rolling bearings and at the opposite end with diverging bearings and held in the bore-hole or casing-pipe by frictional contact, of the grapple for the boring bar or tool, a flat bar connected therewith and having a twisted portion formed therein working between the rolling bearings of the bushing, and abutments secured to the bar and grapple-support at opposite sides of said bushing and adapted to engage the same, for the purpose set forth.

6. In a boring apparatus, the combination, with the bushing q' , held in the bore-hole or casing-pipe by frictional contact, of the grapple for the boring bar or tool, the flat bar e , connected with the grapple-support, and the rings g and h , connected, respectively, with the flat bar e and the grapple-support on opposite sides of the support q' , substantially as and for the purpose set forth.

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Witnesses:

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