(No Model.) 2 Sheets—Sheet 1.

G. PECH.

WELL BORING MACHINE.

No. 465,048. Patented Dec. 15, 1891.

FIG. 6.

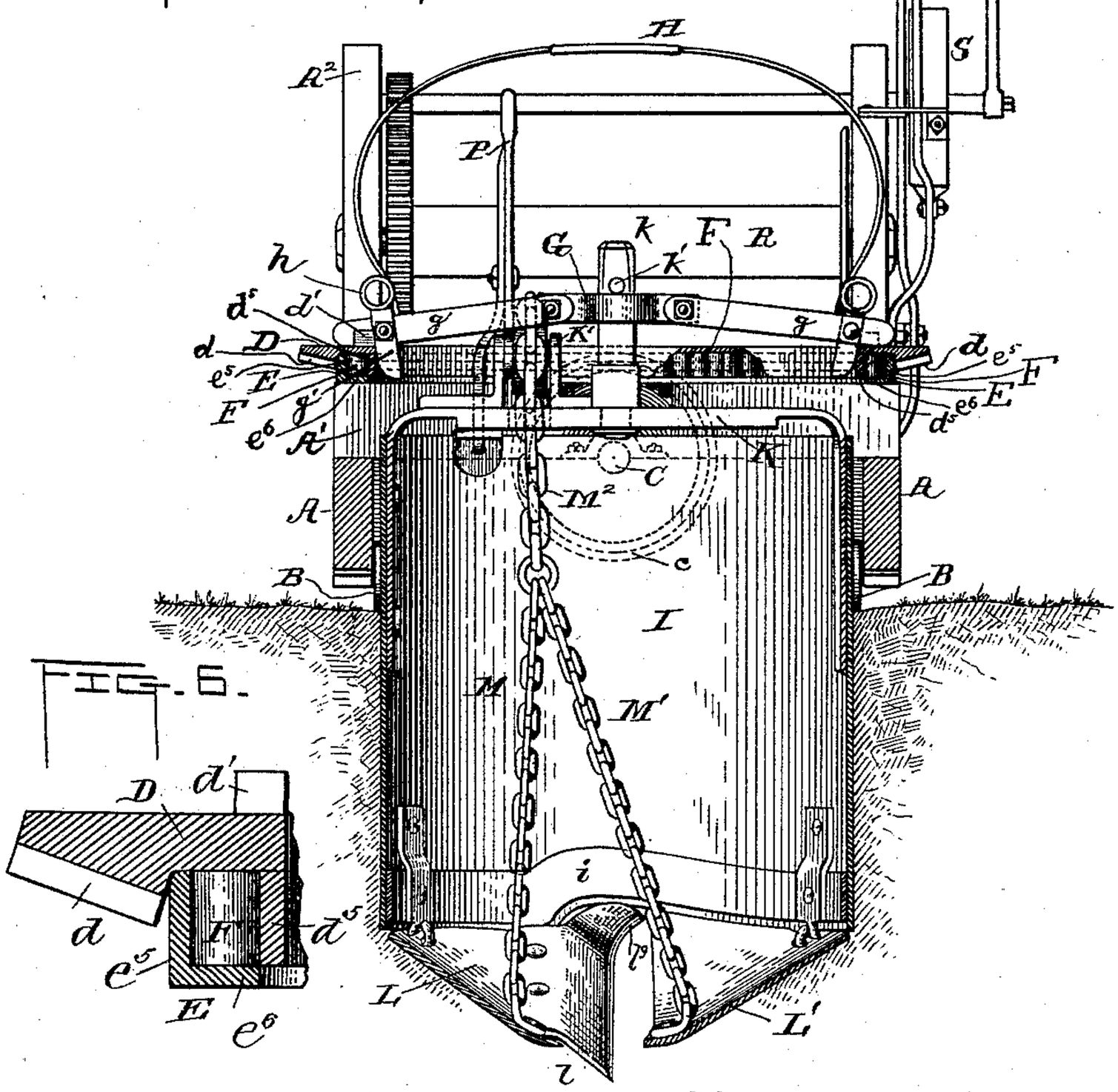
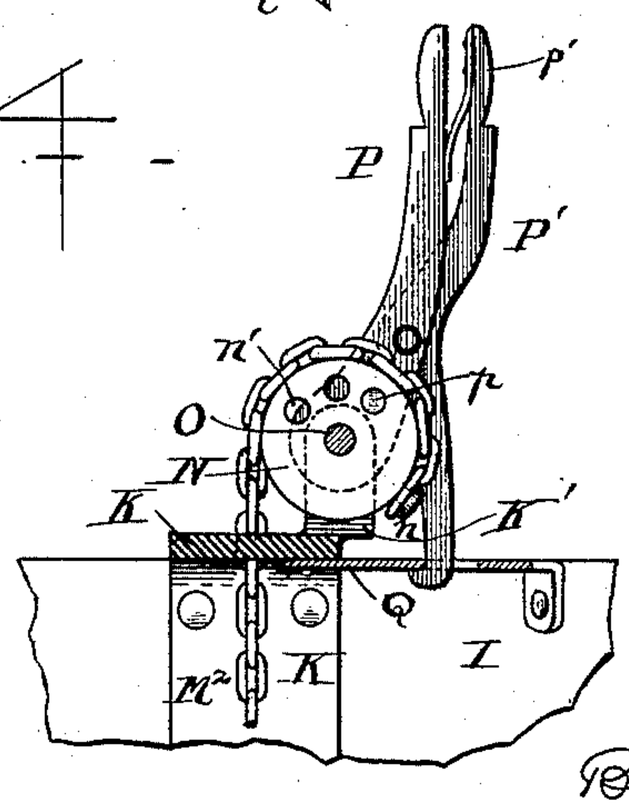


FIG. 4.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

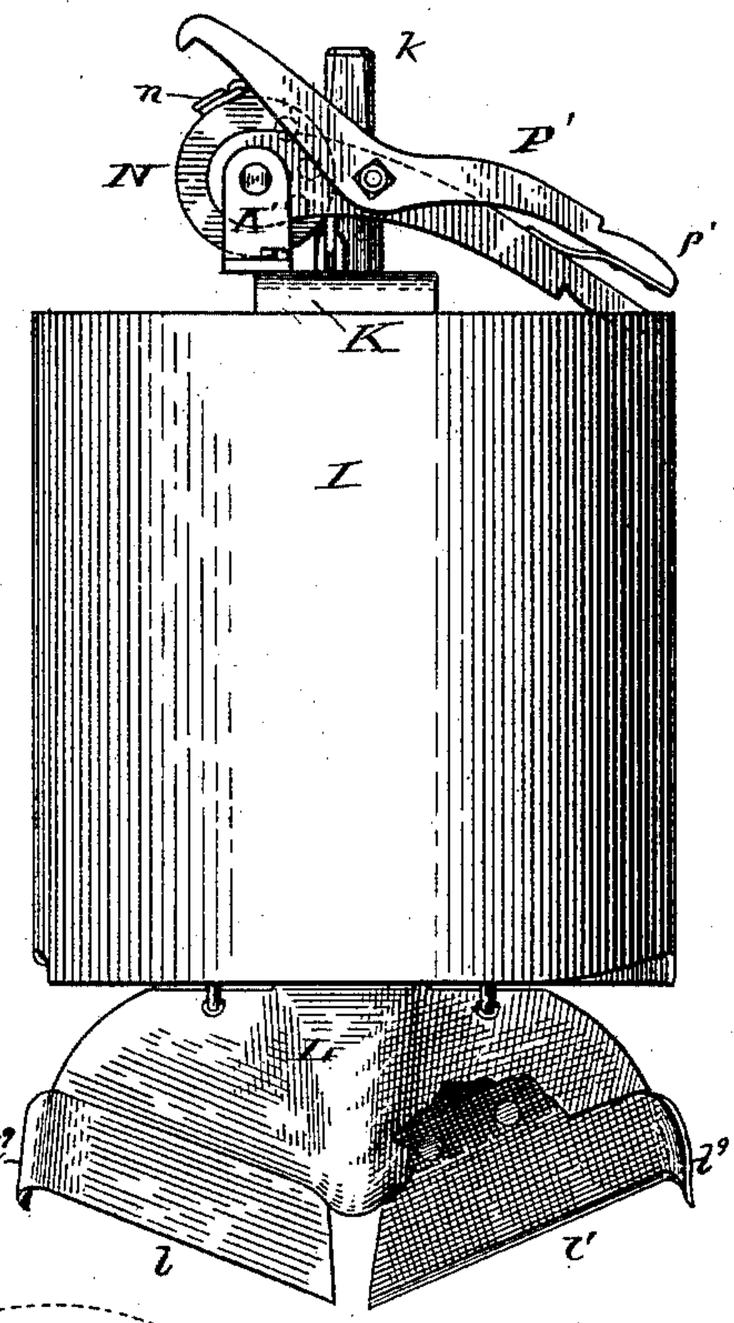


Fig. 3.

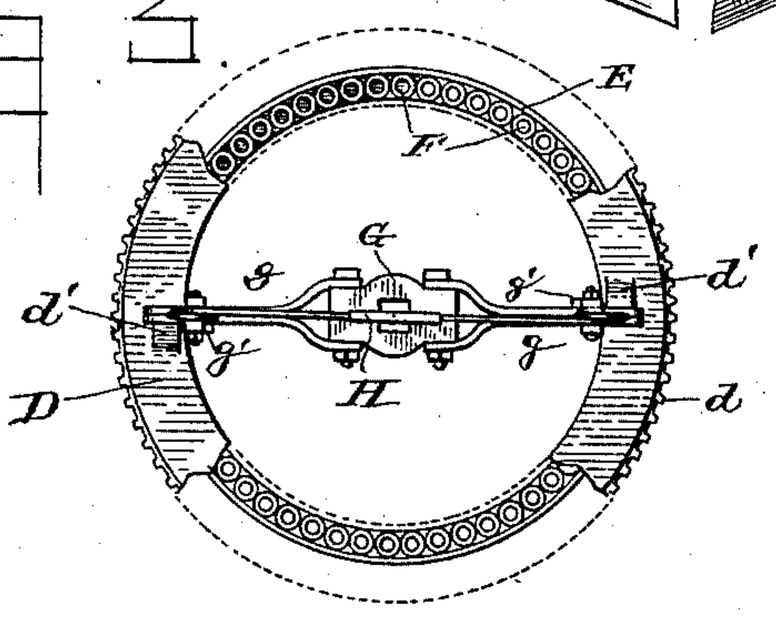
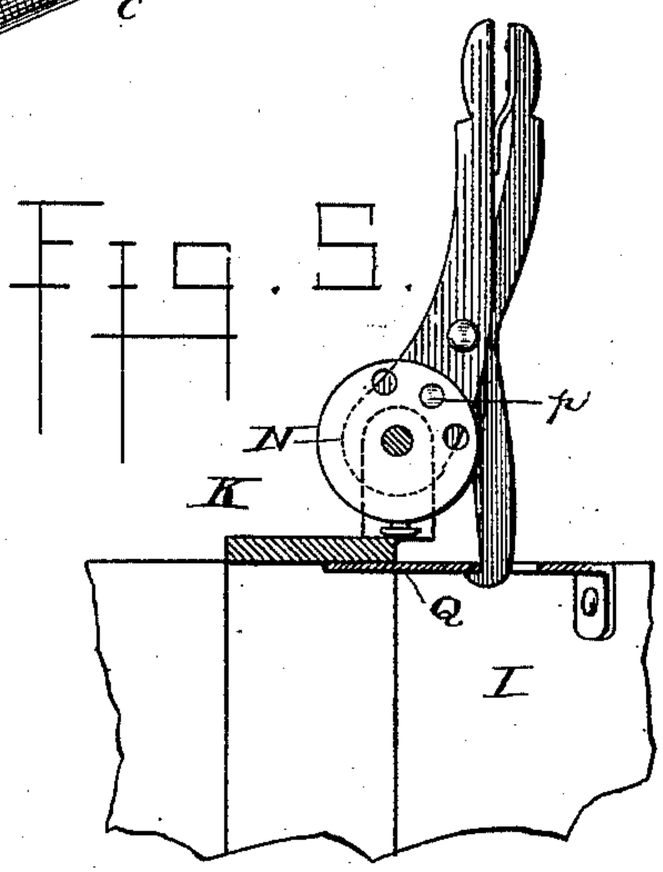


Fig. 5.



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UNITED STATES PATENT OFFICE.

GUSTAV PECH, OF LEMARS, IOWA.

WELL-BORING MACHINE.

SPECIFICATION forming part of Letters Patent No. 465,048, dated December 15, 1891.

Application filed March 24, 1891. Serial No. 386,199. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV PECH, a citizen of the United States, residing at Lemars, in the county of Plymouth and State of Iowa, have invented certain new and useful Improvements in Well-Boring Machines; and I do 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 the letters of reference marked thereon, which form a part of this specification.

My invention relates to well-boring machinery; and it consists in certain improvements in the auger and its actuating devices, as hereinafter set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation showing the auger at work. Fig. 2 is a side elevation of the auger, showing the position of the hinged bottom when discharging the contents of the auger, the nearer door being partly broken away. Fig. 3 is a plan view, partly broken away, of the annular boring head or curb, showing the cross-arm in position. Fig. 4 shows the lifting and locking levers which operate the hinged bottom. Fig. 5 illustrates the manner in which the drum for the chain can be adjusted. Fig. 6 is a cross-section of a portion of the roller-box on an enlarged scale.

The several parts of my machine are mounted in suitable bearings or otherwise secured to a framing composed of sills A, cross-beams A′, and uprights A^2. The frame-work is mounted on rollers B to enable it to be easily moved about.

The machinery for actuating the auger consists of a horizontal shaft C, carrying a beveled gear *c*, which meshes with an annular gear *d*, formed upon or attached to the annular boring-head D. This boring-head D has a flat upper surface, the gear-teeth being formed on the under side of the same near its outer edge. An annular flange d^5 depends from the inner edge of the boring-head. The head is supported by an annular bearing consisting of an angle-iron E, having an outer vertical flange e^5, upon the upper edge of which the boring-head rests, and a horizontal flange e^6, by which said bearing is attached to the frame-work.

In the space between the vertical flange of the bearing and the depending flange of the boring-head is a series of loose upright rollers F, standing on end upon the horizontal flange of the angle-iron and of a diameter substantially equal to the space between the vertical flange of the angle-iron and the depending flange of the boring-head. These rollers may be either solid or tubular, as preferred. They serve to reduce the friction between the boring-head and the angle-iron arising from the lateral thrust of the boring-head, due to the fact that the power is applied to it at one side only.

I am aware that boring-heads have been supported upon horizontal friction-rollers mounted on pins, which keep them a fixed distance apart. These, however, merely sustain the weight of the boring-head and do not reduce the side-thrust friction.

Upon the upper face of the boring-head are two diametrically-opposite lugs *d′*, which serve as dogs to drive the cross-bar by which power is communicated to the auger. The cross-bar is composed of a central yoke G, containing a socket to engage with the stem K of the auger. An arm *g* is hinged to each end of the socket and extends over the face of the boring-head. Near the outer end of each arm is secured a finger or projection *g′*, which lies inside of the boring-head to prevent lateral displacement of the cross-bar. One end of a strong arched spring H is secured to each arm *g*, the tendency of the spring being to force the arms inward and thereby raise the central yoke. The spring is preferably provided with small coils *h* near its extremities to increase its efficiency. When in place, the ends of the arm lie in front of the lugs *d′* on the boring-head, so as to be engaged thereby.

The auger consists of a cylindrical shell I. A strong bail K extends diametrically across the upper end of the shell, to which its downwardly-turned arms are rigidly secured. A stem *k* extends upward from the middle of the bail in the axis of the shell I. This stem is squared, so as to be engaged by the socket in the yoke G. A hole *k′*, passing transversely through the stem K, assists to connect a long shank to the auger when necessary.

The lower edge of the shell I is stiffened by an internal band *i*. The cutting-edges of the auger are formed upon or secured to the two-part bottom, each part being hinged to the lower part or edge of the shell I. When closed, the bottom presents an approximately conical appearance, the line of division between the two parts passing diametrically across the shell and through the apex of the cone. The cutting-edges are preferably formed upon separate blades *l l'*, riveted each to one of the inclined edges of the hinged bottom L L'. At their outer ends the blades are curved upward and forward, extending slightly beyond the cylindrical shell, which is suitably cut away at these points to permit the cutting-blades to act freely. The outer extensions l^9 of the cutting-blades cause them to cut a hole large enough for the auger to turn in freely. Each cutting-blade projects below the inclined edge of that part of the bottom which lies opposite to it, there being sufficient space between them to permit the earth loosened by the cutting-edge to pass up into the shell I. It will be seen that the shell, with its hinged bottom and the cutting-edges, constitutes a hollow or chambered auger. The two parts of the hinged bottom L L' are held up in place by chains, cable, or other supporting device M M', the lower ends of which are fastened, respectively, to the two parts of the bottom, and the upper ends of which may be united in or attached to a single chain, cable, or other supporting device M^2, which passes over a drum N and is firmly secured thereto, as by means of the stud *n*. The chain-drum is mounted on a shaft O, journaled in ears K', secured upon the bail K. Independently mounted on the shaft is a lever-handle P. A pin *p* engages with one of several holes *n'* in the drum N and enters a suitable hole in the lever. This enables the position of the drum to be adjusted with reference to the lever P, as illustrated in Figs. 4 and 5. Pivoted to the back of the lever is a catch P', preferably provided with a hook-shaped lower end, adapted to pass through a notch or slot in a plate Q, suitably secured to the shell I and bail K. The upper end of the catch is preferably provided with a spring-pressed handle *p'*, located adjacent to the handle of the lever P. When the lever P is pulled back from the position shown in Fig. 2 to that shown in Figs. 1, 4, and 5, the drum is partially rotated, thus raising the chains, cable, or other supporting device M^2 and closing the bottom into working position, the parts L L' being held in this position by the catch P' engaging with the plate Q. When the operation of boring has been completed and the shell has become filled with earth, it is hoisted out in the usual manner and swung around to the place where the earth is to be dumped. Upon releasing the catch P' the weight of the earth causes the hinged bottom to drop into the position shown in Fig. 2, allowing the earth to escape freely from the shell I.

The hoisting of the auger is accomplished by means of ropes passing over pulleys at the upper end of derrick, or in any other suitable manner. These appliances are so well known and in such common use that I have not deemed it necessary to illustrate them in full.

Fig. 1 shows the drum R for the hoisting-rope and a portion of the gearing by which it is operated, together with the friction-brake S and the levers T, which operate the clutches for throwing into operation the boring machinery and hoisting machinery.

It remains now to describe the operation of my yielding cross-bar. When the auger is at work, there is great friction between the stem of the auger and the cross-bar, since the stem must slide downward as the auger fills. It is customary to provide anti-friction rollers to permit the stem to slide easily. My cross-bar dispenses with these rollers and with the expenditure of power to overcome any friction at this point. When the auger starts to fill, my cross-bar is bent, with the yoke G standing considerably above the face of the boring-head D. As the auger works downward, the hinged arms *g* permit the yoke to move downward with the stem. When the auger is raised, the spring H throws the yoke up again into its normal position.

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

1. A well-auger consisting of a cylindrical shell having a two-part hinged bottom, each part having a cutting-blade curved upward and forward at its outer end, the shell being cut away adjacent to the outer edge of the cutting-blade, substantially as described.

2. A well-auger consisting of a cylindrical shell having a two-part hinged bottom and a chain, cable, or other supporting device connected with said bottom for opening and closing it, substantially as described.

3. A well-auger consisting of a cylindrical shell having a two-part hinged bottom, a chain connected with said bottom, and a drum mounted on the auger, to which said chain is attached, substantially as described.

4. A well-auger consisting of a cylindrical shell having a two-part hinged bottom, a chain connected with said bottom, a drum mounted on the auger, to which said chain is attached, a lever connected with the drum, and a detent for locking the lever when the bottom is closed, substantially as described.

5. The combination, with the cylindrical shell, of the two-part hinged bottom, the chain connected with the bottom, the drum mounted on the auger and having the chain attached to it, and the lever mounted independently of the drum and adjustably connected therewith, substantially as described.

6. The combination of the cylindrical shell I, the bail K, secured thereto, the bottom L L', hinged to the shell, the chains M M' M^2, connected with the bottom, the chain-drum N,

mounted on the bail K and having the holes n', the lever P, the pin p, passing through a hole n' into the lever, the catch p', pivoted to the lever, and the notched plate Q, substantially as described.

7. A cross-arm for a well-auger, comprising a yoke G, arms g, hinged thereto, and a spring attached to both arms, substantially as described.

8. A cross-arm for a well-auger, comprising a yoke G, two diametrically-opposite arms hinged thereto, fingers g', attached to said arms, and an arched spring H, connecting said arms, substantially as described.

9. The combination, with a suitable frame-work, of an annular angle-iron E, having a vertical flange e^5 and an inturned horizontal flange e^6 attached to said frame-work, an annular boring-head D, resting upon the vertical flange and provided with an annular depending flange d^5 within and concentric with said vertical flange, and a series of loose upright rollers F, standing upon the horizontal flange e^6 of the angle-iron and of a diameter substantially equal to the space between the vertical flange e^5 of said angle-iron and the depending flange d^5 on the boring-head, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GUSTAV PECH.

Witnesses:
P. S. RISHEL,
JOHN LATENSER.