No. 789,535. PATENTED MAY 9, 1905.

W. H. GLOCKER.

PIPE BORING MACHINE.

APPLICATION FILED APR. 7, 1904.

3 SHEETS—SHEET 1.

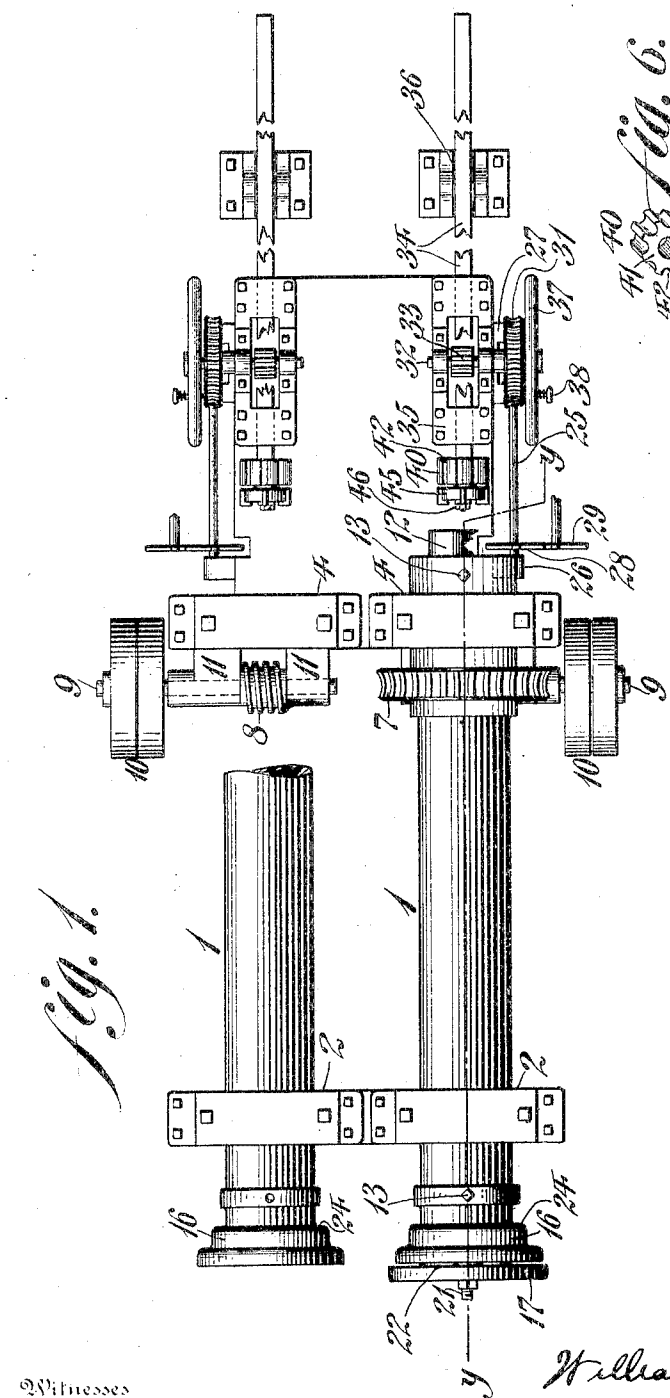


Fig. 1.

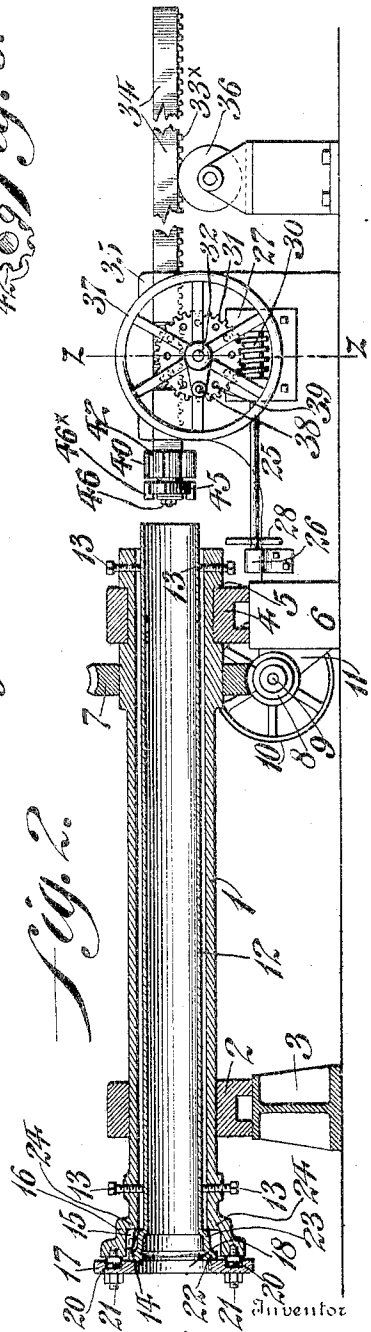


Fig. 2.

Fig. 3.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 4.

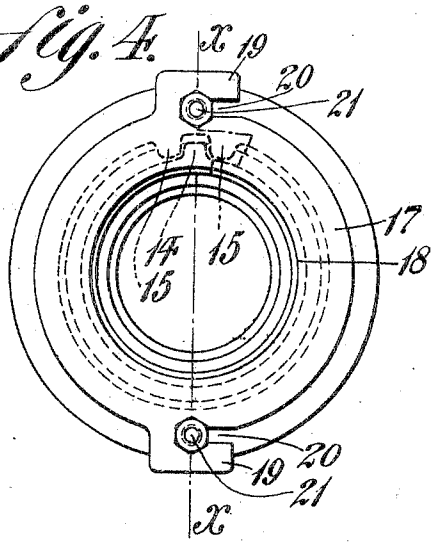


Fig. 3.

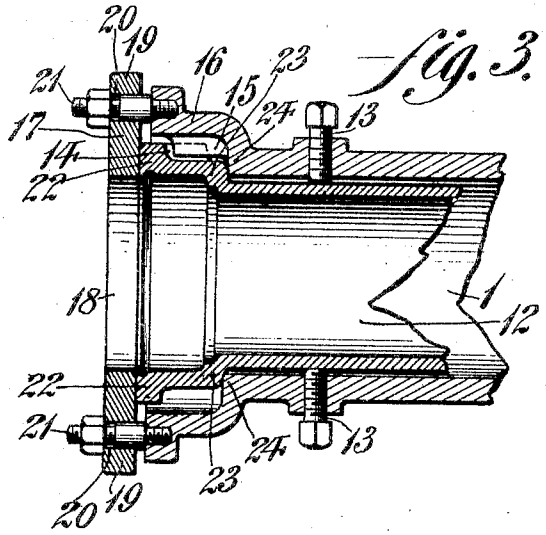


Fig. 8

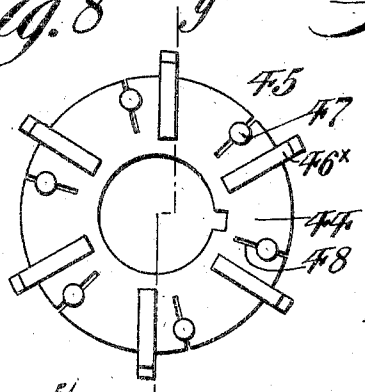


Fig. 7.

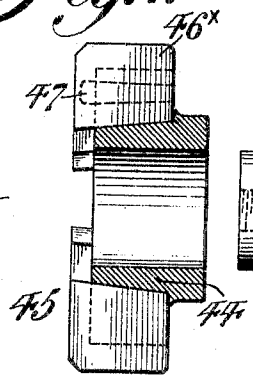
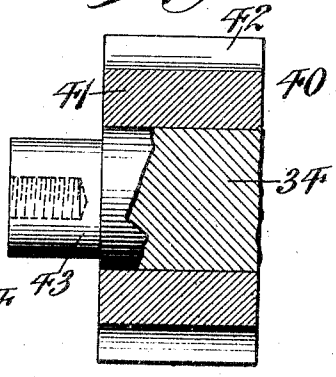


Fig. 5.



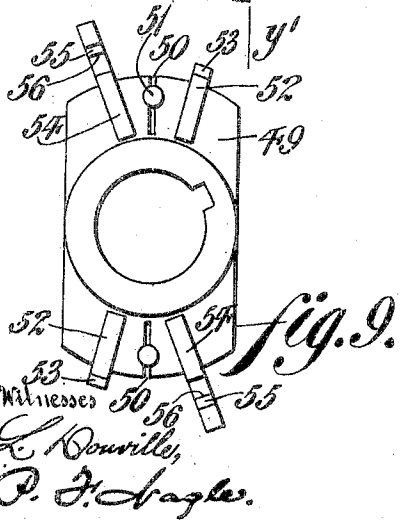


Fig. 9.

Witnesses
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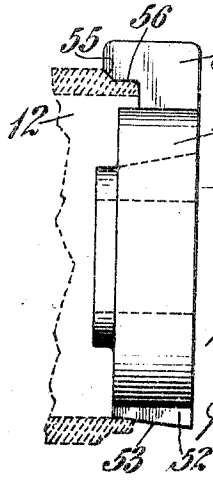


Fig. 10.

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3 SHEETS—SHEET 3.

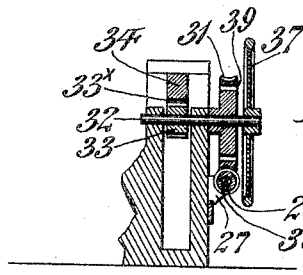


Fig. 13.

Fig. 12.

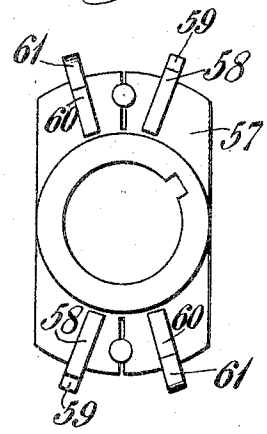


Fig. 11.

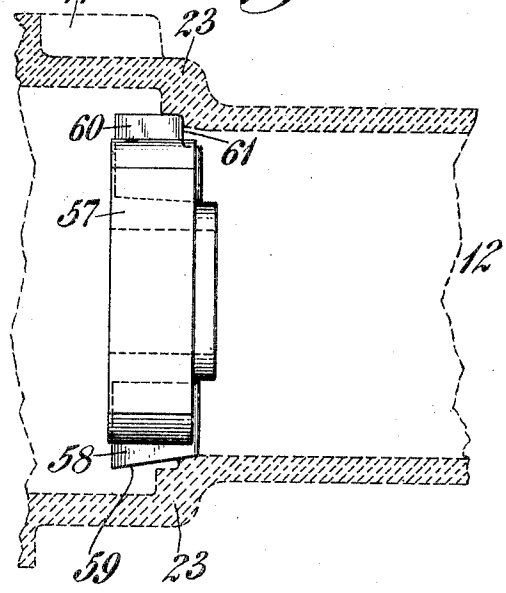
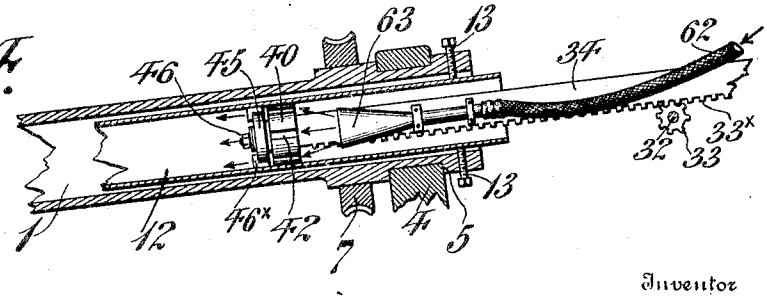


Fig. 14.



Witnesses

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No. 789,535. Patented May 9, 1905.

UNITED STATES PATENT OFFICE.

WILLIAM H. GLOCKER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE WILLIAM CRAMP & SONS SHIP & ENGINE BUILDING COMPANY, A CORPORATION OF PENNSYLVANIA.

PIPE-BORING MACHINE.

SPECIFICATION forming part of Letters Patent No. 789,535, dated May 9, 1905.

Application filed April 7, 1904. Serial No. 202,069.

To all whom it may concern:

Be it known that I, WILLIAM H. GLOCKER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Pipe-Boring Machines, of which the following is a specification.

My invention relates to a novel construction of a pipe-boring machine wherein I employ a rotatable chucking-tube in which the pipe to be bored is adapted to be inserted and held in position by novel devices to be hereinafter described.

It further consists of a novel construction of mechanism for feeding forwardly toward the rotatable chucking-tube the boring-bar carrying a non-rotatable cutter of novel construction, said cutter being provided with a carrier adapted to support the front end of said boring-bar.

It further consists of a novel construction of a cutter for turning the outside, facing the end, and beveling the inside of the spigot end of the pipe in one operation, and also of a novel construction of a cutter for counterboring and beveling the bell end of the pipe in one operation.

It further consists of novel mechanism for advancing the boring-bar at the requisite slow rate of speed and means for retracting said boring-bar at an accelerated rate of speed, novel mechanism being provided for effecting the movement of said boring-bar in both directions.

It further consists of novel details of construction, all as will be hereinafter fully set forth.

Figure 1 represents a plan view of a pipe-boring machine embodying my invention, certain of the parts being broken away for clearness of illustration. Fig. 2 represents a longitudinal sectional view on line $y\,y$, Fig. 1. Fig. 3 represents, on an enlarged scale, a sectional view of the clamping device adapted to coact with the end of the chucking-tube for holding in position the pipe to be bored, the section being taken on line $x\,x$, Fig. 4. Fig. 4 represents an end view of Fig. 3. Fig. 5 represents, on an enlarged scale, a sectional view of the boring-bar and the carrier thereon. Fig. 6 represents, on a reduced scale, a perspective view of the carrier in detached position. Fig. 7 represents a section of boring-cutter on line $y'\,y'$, Fig. 8. Fig. 8 represents an end view of Fig. 7. Fig. 9 represents an end view of a cutter employed for turning the outside, facing the end, and beveling the inside of the spigot end of the pipe in one operation. Fig. 10 represents a side elevation of Fig. 9. Fig. 11 represents a side elevation of the cutter employed for counterboring and beveling the bell end of the pipe in one operation. Fig. 12 represents an end view of the cutter seen in Fig. 11. Fig. 13 represents a section on line $z\,z$, Fig. 2. Fig. 14 represents a side elevation, partly in section, showing the inclined chucking-tube and its adjuncts provided with an air-blast to facilitate the discharge of the boring-chips.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates the chucking-tube, same being capable of rotation and being mounted at or near one extremity in the box or bearing 2, which is supported upon the bed 3.

4 designates the bearing for the opposite end of the chucking-tube, the same being seated in a recess 5 in said chucking-tube, whereby longitudinal movement of the latter is prevented, said bearing 4 being mounted upon a bed or pedestal 6.

7 designates a gear secured to the chucking-tube 1 and adapted to rotate in unison therewith, said gear being rotated by means of the worm 8, the latter being mounted upon the shaft 9.

The shaft 9 is rotated by means of the pulley or pulleys 10, to which power may be applied from any source, said shaft being provided with suitable bearings 11.

12 designates the pipe to be bored, the general position of the parts when assembled being readily understood from Figs. 2 and 3, wherein it will be seen that said pipe is supported within the chucking-tube 1 by means

of screws 13, which, it will be understood, are here used only for centering the pipe, the latter, in the form shown, being caused to rotate in unison with the chucking-tube by means of the lug 14, which is cast on the bell end thereof, said lug being adapted to engage the space between the two lugs 15 within the enlarged ends 16 of the chucking-tube 1, the general relative position of the parts being understood from Figs. 2, 3, and 4, whereby it will be seen that the engagement of the lug 14 with the space or recess between the lugs 15 will cause said pipe 12 and chucking-tube 1 to rotate in unison, whereby the set-screws 13, as stated, are utilized merely for centering said pipe 12. In practice I prefer in some instances to incline the tube 1 and its adjuncts, as will be understood from Fig. 14, to be hereinafter referred to.

17 designates a clamp or ring which is preferably of annular contour and is provided with the opening 18 therethrough, said clamp having the oppositely-located lugs 19, which are provided with the recess 20 therein, in which are located the fastening-bolts 21, whereby the clamp is secured to the enlarged end 16 of the chucking-tube 1 in such a way that it bears against the extremity 22 of the pipe 12 to be bored, so that the shoulder 23 of the latter is held in juxtaposition to the contiguous shoulder 24 of the chucking-tube 1, whereby said pipe 12 is securely held from lateral or longitudinal displacement.

It will be understood from the foregoing that with reference to Fig. 1 I have shown the chucking-tubes and their adjuncts as arranged in pairs, each of said chucking-tubes being provided with a worm-gear, and each gear has its own independent rotating or actuating mechanism, as will be readily understood from Fig. 1, and that, furthermore, each chucking-tube is provided with its own independent boring mechanism, which will now be described.

25 designates a shaft having the bearings 26 and 27, said shaft having mounted thereon a star-wheel 28, which is adapted to be intermittently actuated by the power derived from a contiguous star-wheel or other actuating means 29 or its equivalent source of power.

30 designates a worm mounted on the shaft 25, said worm being adapted to mesh with the worm-gear 31, which is loosely mounted on the shaft 32, which is provided with suitable bearings, as will be understood from Fig. 13.

33 designates a gear which is tight on the shaft 32 and is adapted to mesh with the teeth of the rack $33^{\times}$ of the boring-bar 34, which latter is mounted in suitable bearings in the housing 35 and is supported in any convenient manner, as by the roller 36, which is also mounted in suitable bearings.

37 designates a hand-wheel, which is provided with a pin 38, it being understood that said hand-wheel and pin are tight on the shaft 32 and that when it is desired that the gear 31 and the hand-wheel 37 rotate in unison it is only necessary to insert the pin 38 into the desired hole 39, whereby the hand-wheel 37, the gear 31, the shaft 32, and the pinion 33 will rotate in unison.

40 designates the carrier, the construction of which will be understood from Figs. 5 and 6, said carrier consisting of a body portion 41, having the fluted or grooved periphery 42, which is adapted to easily fit the internal bore of the pipe 12, as will be understood from Fig. 14, it being apparent that the function of said carrier is to simultaneously support the front end of the boring-bar during its progress into the pipe 12 and that it also acts as a bushing for steadying said boring-bar while counterboring the bell end of the pipe 12. The longitudinal grooves permit passage of the blast, as hereinafter stated, and avoid scratching of the internal finished surface of the tube in case the carrier is not an exact fit therefor by permitting chips which work their way between the carrier and the tube to be carried freely by the edges of the next groove without appreciable cutting. As will be understood from the enlarged view (seen in Fig. 5) the boring-bar 34 is provided with an extension 43, upon which is slipped the head or body 44 of the cutter 45, the latter being held in place when the parts are assembled by the nut 46. In Figs. 2, 7, and 8 I have shown the preferred form of cutter which is employed during the act of straight boring, it being apparent that the blades $46^{\times}$ of the cutter are inserted in suitable recesses in the cutter-body 44 and that thereafter tapered pins 47 are driven into tapered seats located in the slots 48, as will be understood from Figs. 7 and 8, whereby the cutter-blades $46^{\times}$ will be tightly held in the desired position, and when it is desired to remove or interchange the same it can be readily done by removing the tapered pins 47 or their equivalents.

The operation is as follows: The parts being assembled in the position seen in Figs. 1 and 2 in a particular embodiment of my invention which I have illustrated herein, it will be apparent that the rotation of the shaft 9 and the worm 8 will effect the rotation of the worm-wheel 7, the chucking-tube 1 and its adjuncts, and simultaneously with the rotation of said chucking-tube the rotation of the pipe 12 to be bored will be caused by the engagement of the lug 14 with the lugs 15, as will be understood from Figs. 2, 3, and 4, said pipe 12 being effectively held in position by means of the bars 17 and their adjuncts. Rotation having been imparted to the shaft 25 from any suitable source, it will be apparent that the meshing of the worm 30 with the gear 31 will effect the rotation of said gear, shaft 32, and pinion 33, it being understood that the pin 38 is in engagement with one of the holes 39. The rotation of the above parts will, through

the medium of the rack on the boring-bar 34, cause the cutter 45 to advance toward the rotating pipe 12, whereby the boring of the same will be effectively accomplished, and as the boring-bar and the cutter advance it will be evident that the carrier 40 will serve to at all times support the front end of the boring-bar. It will also be apparent that the carrier 40, being provided with the grooved and fluted portions 42, will, in conjunction with the air-blast device (seen in Fig. 14) and the inclined chucking-tube, (also seen in Fig. 14,) serve to facilitate the discharge of the boring-chips from the interior of the pipe 12. After the pipe has been bored and it is desired to withdraw the boring-bar 34, the carrier 40, and the cutter 45 it is only necessary for the operator to pull the pin 38 out of engagement with one of the holes 39, whereupon it will be apparent that the hand-wheel 37, the shaft 32, and the pinion 33 can be readily rotated as rapidly as may be desired without causing the rotation of the gear 31 or the worm 30. whereby the boring-bar 34, the carrier 40, and the cutter 45 and their adjuncts can be quickly withdrawn from the interior of the pipe 12 and caused to assume the position seen in Fig. 2. In order to effectively and expeditiously complete the desired operations upon the pipes 12 while they are contained in the chucking-tube and prior to their removal therefrom preparatory to assembling the same, I have found it to be exceedingly desirable to finish both the spigot and bell ends of the pipe while the same is contained in said chucking-tube, and to do this I have devised the construction of the cutters seen in Figs. 9 to 12, inclusive, the cutter for turning the outside facing the end and beveling the inside of the spigot end of the pipe in one operation being seen in Figs. 9 and 10, to which reference will now be made.

49 designates the body of the cutter, the same being provided with the slots 50, containing the tapered pins 51.

52 designates the cutter employed for beveling the inside of the spigot end, said cutter being provided with the beveled cutting-face 53, as will be understood from Figs. 9 and 10, it being apparent that two of the said cutters 52 are employed for this purpose. The action of these during the beveling of the inside of the spigot end of the pipe 12 is evident from the lower portion of Fig. 10.

54 designates the cutter which simultaneously turns or cuts the outside of the spigot end and faces the end, said cutter being provided with the overhanging cutting edges 55 and 56, whose operation and function will be clearly understood from the upper portion of Fig. 10. It will thus be clearly apparent that by removing the cutter 45 and placing upon the extension 43 the form of cutters seen in Figs. 9 and 10 I am enabled by a single operation to turn the outside, face the butt-end, and also to bevel the inside of the spigot end. In the construction seen in Figs. 11 and 12 I have shown the preferred construction of cutter for counterboring and beveling the bell end of the pipe 12 in a single operation. Here 57 designates the cutter-body, which is provided with the cutters 58, arranged oppositely to each other and provided with the beveled cutting-face 59, whereby the bell end is beveled, as will be understood from the lower portion of Fig. 11.

60 designates the cutter whereby the counterboring of the bell end of said pipe 12 is effected, said cutter having the cutting edge 61, which is set back somewhat, as will be understood from the upper portion of Fig. 11, wherefrom it will be seen that the counterboring and beveling of the bell end of the pipe can be readily effected in one operation.

As clearly shown in Fig. 11, the cutter-body 57, by which the operations are performed on the bell end of the pipe, is attached to the end 43 of the cutter-bar 34 after the operation of boring the pipe is completed and operates during the movement of the cutter-bar in its reverse—that is, retracting—direction.

It will be clear from the foregoing that by my novel construction of mechanism described I have provided a simple and effective means not only for boring the interior of the pipe, but also for finishing both the beveled and spigot ends of the same, so that all the above-described operations can be effected while the pipe 12 is in the chucking-tube 1 and at a minimum expense in the cost of handling the pipe and manipulating the various parts of the mechanism for effecting the desired result.

In the construction seen in Fig. 14 I have shown an air-blast pipe 62 as clamped to the boring-bar 34 and provided with a funnel 63, through which the air is discharged through the grooves 42 of the carrier 40 to the desired point, the coaction of the air-blast with the inclined chucking-tube 1 and its adjuncts serving to effectively cause the discharge of the chips from the pipe 12. It will of course be understood that when the chucking-tube and its adjuncts are used in an inclined direction, as seen in Fig. 14, the boring-bar and its adjuncts are given a corresponding inclination.

It will be apparent from Fig. 1 that I have shown my novel apparatus as constructed in pairs, so that, if desired, while one set of the boring apparatus is in operation the other may be temporarily idle for the purpose of removing or replacing the pipe to be bored. It will of course be understood that the broad principle of my invention is applicable to a single apparatus or to any desired duplications of the same, and it will be apparent that slight changes may be made in the manner of assembling the various parts of the apparatus or in the manner of transmitting the necessary

rotary or reciprocating movements to the desired parts without departing from the spirit of my invention, and I do not, therefore, desire in every instance to be restricted to the exact construction that I have herein shown and described.

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

1. A boring device comprising a tubular chuck, a boring-bar having relative rotary and longitudinal movements, cutting means detachably secured to said boring-bar, a longitudinally-grooved carrier of a diameter nearly equal to said cutting means and secured on said boring-bar at the rear thereof, and a blast-tube movable with said boring-bar and having its delivering end at the rear of said carrier.

2. A boring device comprising a tubular chuck, means for centering a pipe therein, an enlarged end on said chuck having a lateral recess adapted to receive a lateral lug on the bell end of a pipe, in combination with means adjacent said enlarged end for retaining said pipe in said chuck with such lateral lug engaged in said recess.

3. A boring device comprising a tubular chuck, means for centering a pipe therein, an enlarged end on said chuck having a lateral recess adapted to receive a lug on the bell end of a pipe, and an annular clamping-plate detachably securable to the enlarged end of said chuck and adapted to retain said pipe therein with such lateral lug engaged with said recess.

4. In a pipe-boring machine, a boring-bar and a chuck movable relatively to each other, cutting means operatively connected with the boring-bar, a longitudinally-grooved carrier, of diameter nearly equal to said cutting means, and a blast-tube connected with said bar and having its delivery end at the rear of the carrier.

5. In a pipe-chucking device, a hollow tubular chuck, means for revolving the same, suitable bearings therefor, devices for centering the pipe to be bored in said chuck, and interlocking means upon said chuck adapted for engagement with a device upon said pipe, leaving the ends and inside of the pipe free for operation thereon.

6. A tubular chuck for chucking bell-ended pipes comprising a tube flaring at one end, interlocking means within the bell end, suitable bearings near the ends thereof, centering means for the pipe near the ends thereof, means intermediate its ends for rotating the tube and a collar at one end of the tube coacting with the bell end of the pipe to force it against said interlocking means.

7. In a pipe-boring machine, a rotary tubular chuck of sufficient length to approximately inclose a pipe to be bored, centering devices adjacent each end of said chuck and an annular clamp engageable with the rear end of the pipe for preventing its longitudinal movement and apertured to permit the passage of a cutting-tool.

8. A pipe-chucking device comprising a tube having a bell-shaped mouth, radial means near each end of the same for centering and retaining the pipe, bearings near each end of the tube, a collar secured to the bell-shaped end of the tube and holding the work therebetween and means intermediate the ends of the tube for revolving the same.

9. In a pipe-chucking device, a chucking-tube, radial means near each end of said tube for centering and retaining the pipe to be bored, bearings for said tube located near each end thereof, a clamping device secured to an end of said chucking-tube for holding the work therebetween and means intermediate the ends of said chucking-tube for revolving the same.

10. In a pipe-chucking device, a tubular chuck, bearings for the same, means for revolving the same, means for centering and supporting the pipe within the chuck and engaging means near the end of said tubular chuck interlocking with said pipe to drive the same.

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