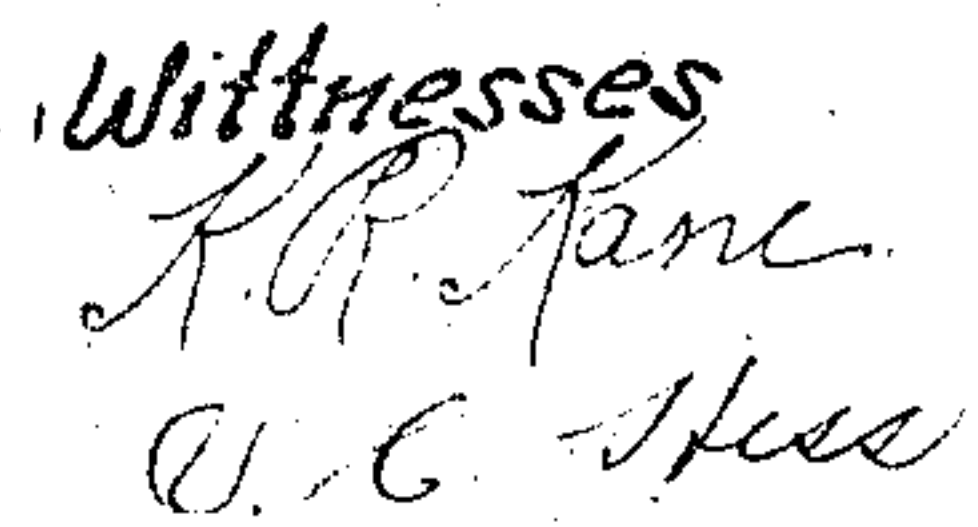


956,463.

3 SHEETS—SHEET 1.



Inventor
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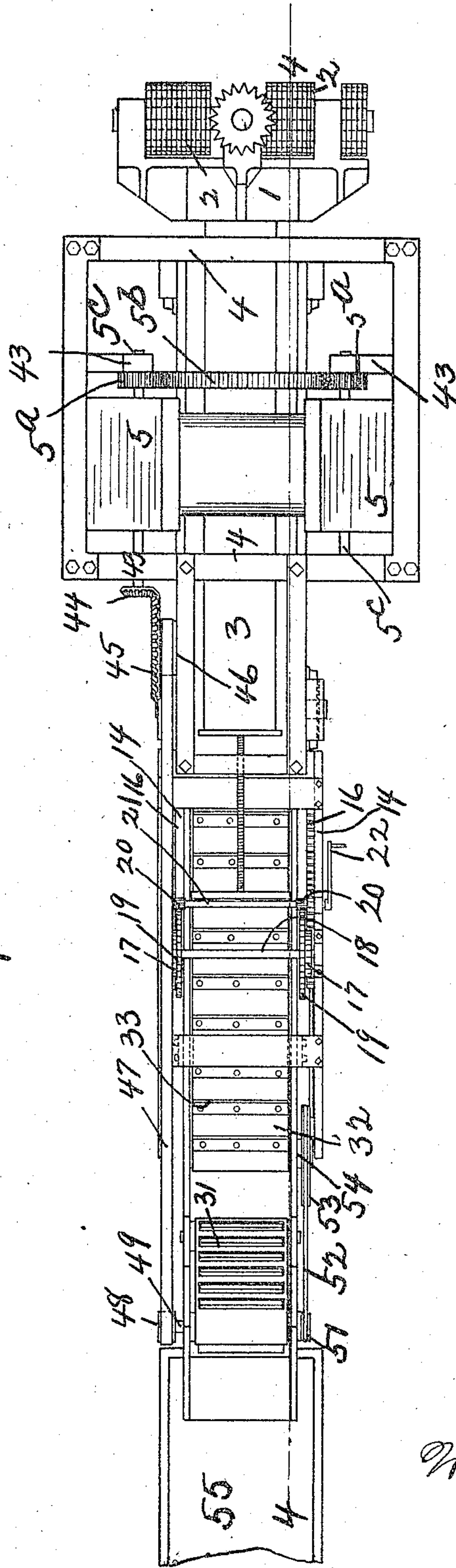
W. F. WITTICH.
TUNNELING MACHINE.
APPLICATION FILED JUNE 18, 1908.

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Patented Apr. 26, 1910.

3 SHEETS—SHEET 2.

Fig. 3.



Witnesses
R. P. Kane
C. C. Hess

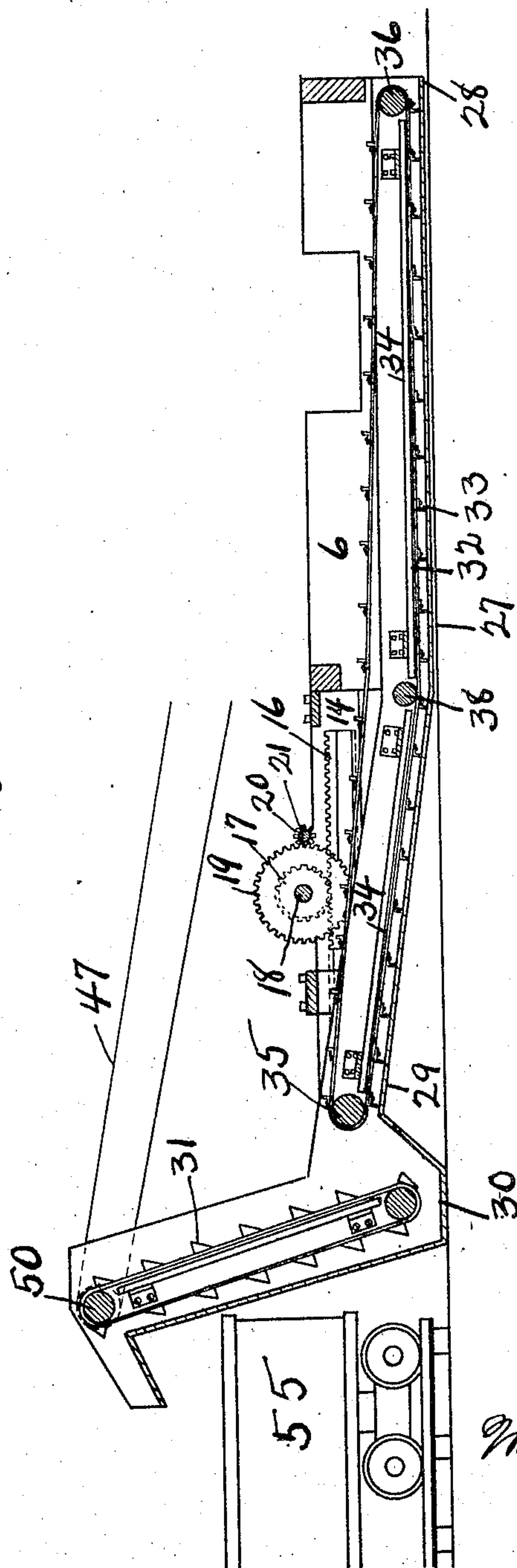
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Fig. 4.



Witnesses
R. R. Kane.
V. C. Huse.

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UNITED STATES PATENT OFFICE.

WILLIAM F. WITTICH, OF ERIE, PENNSYLVANIA, ASSIGNOR TO THE WITTICH SUCCESS
SHAFT SINKING AND TUNNELLING MACHINE COMPANY, OF ERIE, PENNSYLVANIA,
A CORPORATION OF ARIZONA TERRITORY.

TUNNELING-MACHINE.

956,463.

Specification of Letters Patent.

Patented Apr. 26, 1910.

Application filed June 18, 1908. Serial No. 439,126.

To all whom it may concern:

Be it known that I, WILLIAM F. WITTICH, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Tunneling-Machines, of which the following is a specification.

This invention relates to tunneling machines, and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

More particularly the invention is adapted to that type of tunneling machines wherein the cutting is accomplished by rotating a cutting head, the head being carried by a frame which is advanced as the cutting proceeds.

Among the objects of the invention is providing a continuous means for removing the muck as it is formed, and a convenient means for forcing the machine forward as the cutting proceeds.

The invention is illustrated in the accompanying drawings as follows:

Figure 1 shows a side elevation of the machine. Fig. 2 is a section on the line 2—2 in Fig. 1. Fig. 3 a plan view of the machine. Fig. 4 a section of the muck mechanism on the line 4—4 in Fig. 3.

1 marks the cutter head. This is provided with the rotative cutters 2. The cutters are rotatively mounted in the head and revolve as the head is revolved by traction. The head is carried by the shaft 3. The shaft extends through the frame 4 which forms a bearing for the shaft and is driven from the motors 5 through the gears 5^a and 5^b, the gears 5^a being mounted on the armature shaft 5^c and the gears 5^b being fixed on the shaft 3. The frame 4 has the longitudinally extending beams 6. The wheels 7 are journaled on the shafts 8, and these shafts extend from the frame pieces 6 through the wheels into ears 9 which extend downwardly from the frame 4. The cutter is forced to feed forwardly by the screw 10 which operates through the nut 11 and against the end of the shaft 3. The nut 11 is held in place by the frame 12 extending from the frame 4, and the screw 10 is provided with a wheel 13 by which it may be operated.

Extending from the longitudinal frame pieces 6 are the extensions 14. These extensions having the dovetailed grooves 15 in which the dovetail slides 16^a of the racks 16 operate. One of these racks is arranged at each side of the frame there being an extension 14 at each side as clearly shown in Fig. 3. Gears 17 mesh these racks. These gears are both fixed on the shaft 18 which extends across the machine, so that the racks are forced to move together. Gears 19 are also fixed on the shaft 18. Gears 20 mesh the gears 19. The gears 20 are mounted on the shaft 21. The shaft 21 is provided with a crank 22 by which it may be operated. The shaft 18 is journaled on the frame by means of the bearings 23 on the extensions 14, and the shaft 21 is journaled in the bearings 24, also arranged on the extension 14. Swinging thrust bars 25 are pivotally mounted on the racks 16. These are provided with the sharp points 26 which can be forced into the walls of the tunnel, so as to anchor the bar. In operation after the bars 25 are forced into engagement with the walls of the tunnel, the frame may be forced forward by turning the crank 22. This turning of the crank forces the racks 16 through the action of the intermediate gears along the groove 15, and as the shaft 18 is fixed against longitudinal movement on the frame, the frame must move along the tunnel by this action.

A conveyer trough 27 extends along the bottom of the tunnel, and is carried below the frame. The front end 28 of this trough is in close proximity to the cutter head, and so shaped in cross section as to most readily receive the muck as it accumulates. Ordinarily the shape of the trough will conform to that of the tunnel. The rear end of the trough is inclined so as to elevate the delivery of the muck sufficiently to drop it into the boot 30 of an elevator 31. A belt conveyer 32 is provided with the scrapers 33 which operate upon the trough 27 to force the muck along the trough and into the elevator boot. The belt is carried by the end wheels 35 and 36 and is deflected by the wheel 38 so as to follow the trough in a horizontal direction under the frame and along the incline 29. The guides 34 are arranged just above the belt between the

wheels 36 and 38, and the wheels 38 and 35 for holding the scrapers in contact with the trough.

The armature shafts 5^c are mounted in the bearings 43 on the frame 4. A beveled gear 44 is arranged on one of these shafts, and meshes a gear 45. A pulley 46 is carried with the gear 45. A belt 47 runs from this pulley to the pulley 48. The pulley 48 is mounted on the shaft 49. The shaft 49 carries the upper wheel 50 of the elevator 31. A pulley 51 is arranged at the opposite end of the shaft 49, and a belt 52 extends from this pulley to a pulley 53. The pulley 53 is carried by the shaft 54 on which the wheel 35 is mounted. It will be readily seen that the motion from the motor is thus communicated to the elevator and conveyer. The material is dropped onto a car 55, or any convenient means for carrying the muck from the machine.

It will be noted, that the belt conveyer permits of the use of a trough of any shape that will most readily receive the muck. In this way it is an improvement over other forms of conveyers in which the trough must conform to some arbitrary shape.

What I claim as new is:

1. In a tunneling machine, the combination of a frame; cutters rotatively mounted on the frame; means for rotating the head; a sliding rack mounted on the frame; a swinging thrust bar mounted on the rack; and means for moving the rack relatively to the frame for forcing the frame forward.

2. In a tunneling machine, the combina-

tion of a frame; cutters rotatively mounted on the frame; means for rotating the head; racks slidably mounted at each side of the frame; swinging thrust bars mounted on the racks; gears meshing the racks; and a common shaft for said gears whereby both racks are moved equally.

3. In a tunneling machine, the combination of a frame; an extension 14 thereon having a groove therein; a rack slidably mounted in the groove; a gear meshing the rack; means for rotating the gear; and a thrust bar swingingly mounted on the rack.

4. In a tunneling machine, the combination of a frame having extensions 14 in which are guide grooves, racks mounted in the grooves; gears meshing the racks; a shaft for compelling equal movement of the gears and racks; means for rotating the gears; and thrust bars swingingly mounted on the racks.

5. In a tunneling machine, the combination of a frame; a cutter mounted on the frame; extensions 14 on the frame having guide grooves therein; racks slidably mounted in the grooves; gears meshing the racks; pinions meshing the gears; a crank for operating the pinions; and thrust bars swingingly mounted on the racks.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM F. WITTICH.

Witnesses:

K. R. KANE,
H. C. LORD.