W. COLLATZ.

EXCAVATING MACHINE.

APPLICATION FILED JULY 12, 1920.

1,412,922.

Patented Apr. 18, 1922.

3 SHEETS—SHEET 1.

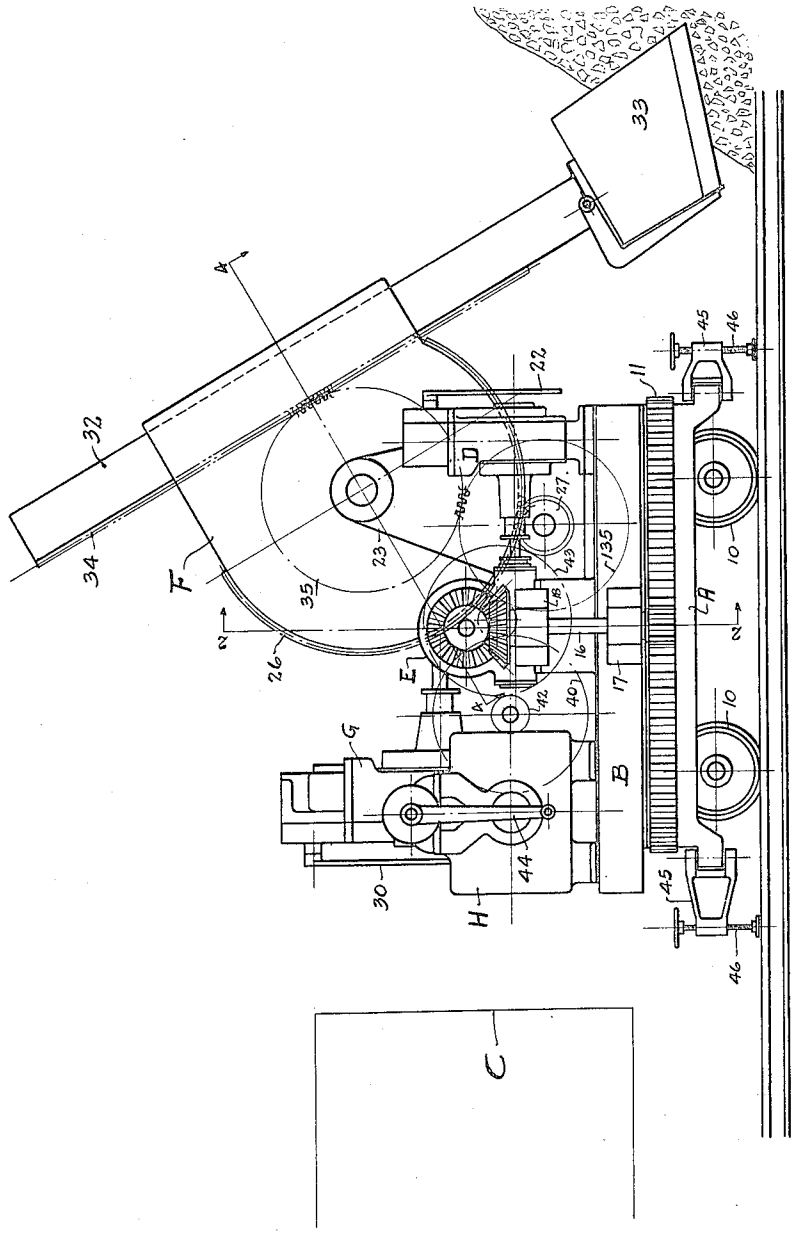


Fig. 1

INVENTOR.

William Collatz

BY

Geo. F. Haight

his ATTORNEY

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3 SHEETS—SHEET 2.

Fig. 4

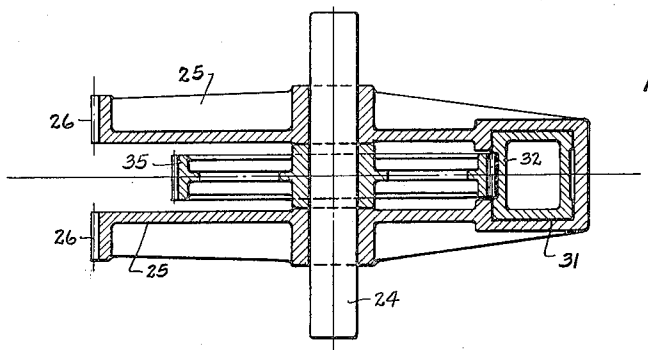
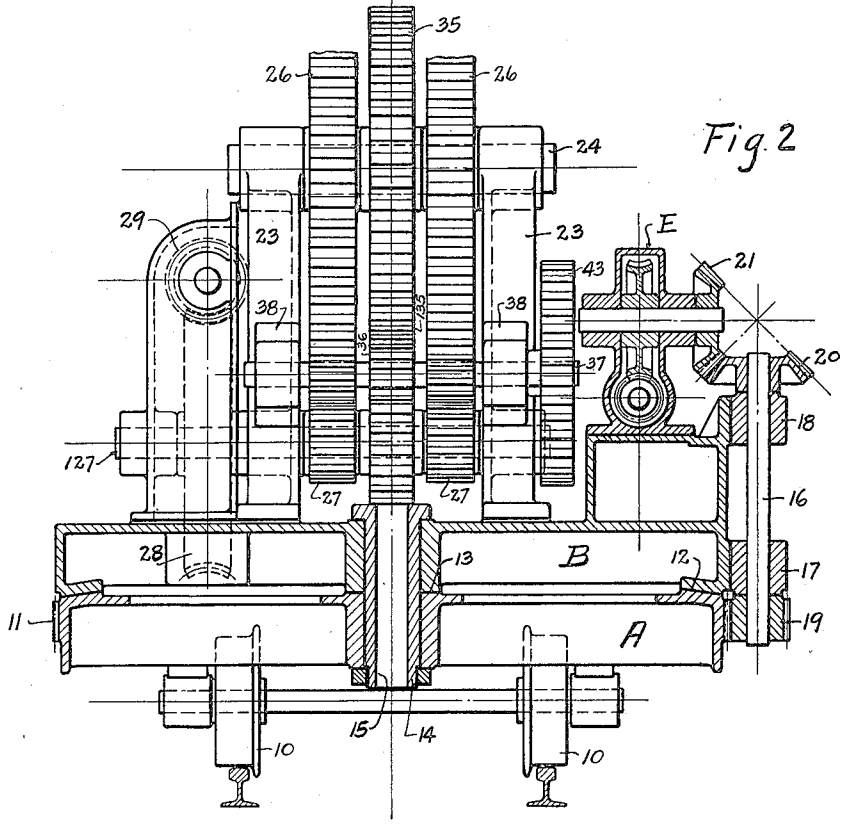


Fig. 2



INVENTOR.

William Collatz

BY

Geo F. Haight

his ATTORNEY.

W. COLLATZ.

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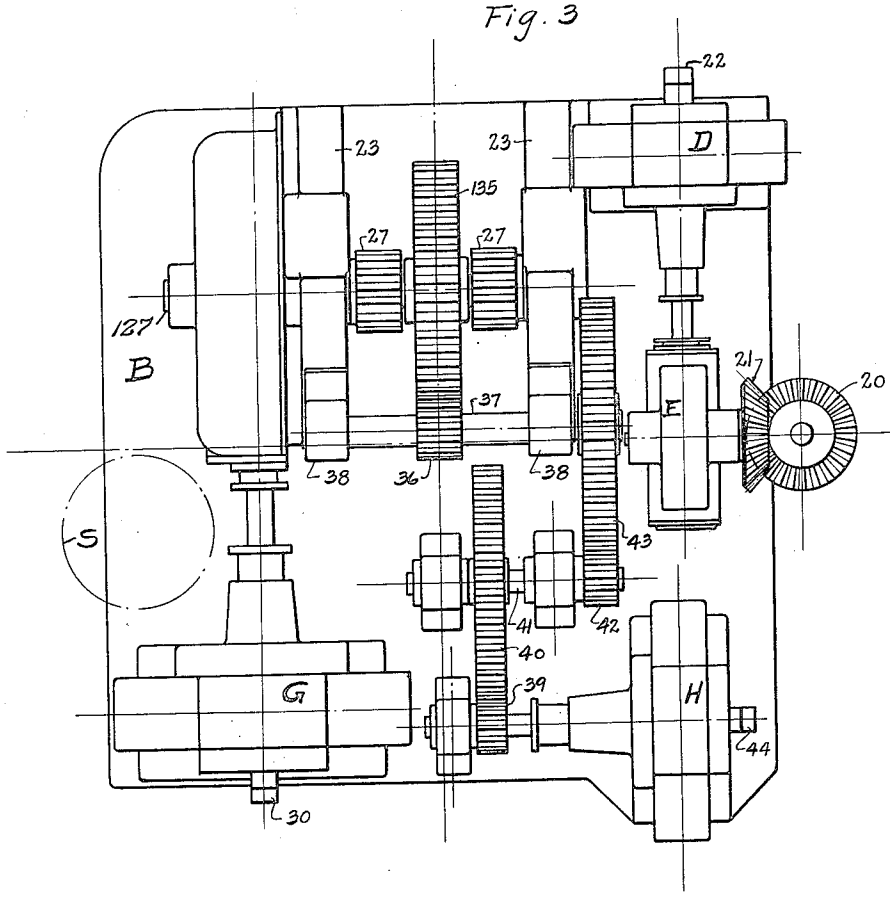
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3 SHEETS—SHEET 3.

Fig. 3



INVENTOR.

William Collatz

BY

Geo T. Haight

his ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM COLLATZ, OF CHICAGO, ILLINOIS.

EXCAVATING MACHINE.

1,412,922. Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed July 12, 1920. Serial No. 395,443.

To all whom it may concern:

Be it known that I, WILLIAM COLLATZ, a citizen of United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Excavating Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in excavating machines.

One object of the invention is to provide a compact, substantial, easily controlled, simple excavating machine arranged to scoop up the material at one place and deposit it in a car or other receptacle, the machine being particularly adapted for use in making drifts in mines where the working space available for operations is very restricted both as to height and width. Another and more specific object of the invention is to provide an excavating machine wherein is employed a scoop universally mounted.

The invention furthermore consists in the improvements in the parts and devices and in the novel combinations of the parts and devices herein shown and made the subject matter of claim.

In the drawing forming a part of this specification, Figure 1 is a side elevational view of an excavating machine showing my improvements in connection therewith. The position of the machine is shown in the drawing in Figure 1 as it would appear in a mine when employed in drifting. Figure 2 is a vertical sectional view corresponding substantially to the line 2—2 of Figure 1. Figure 3 is a part horizontal sectional view, part top plan view of the machine illustrated in Figure 1, certain parts being omitted in order to more clearly indicate the structure. And Figure 4 is a detailed sectional view, upon an enlarged scale, corresponding substantially to the line 4—4 of Figure 1.

In the said drawing, the improved machine is shown as it would be designed for use in mine drifting where it can be run on tracks and the dirt, gravel, or ore, excavated from in front of the machine and dumped into a suitable car C at the rear thereof. As shown, the machine comprises a base A and a table B pivotally mounted thereon. The base A is suitably mounted on a truck having wheels 10—10 to facilitate movements of the machine from one place to another. The base A of the machine will be made in the form of a heavy casting and is circular, the same being provided around its periphery with a circular rack 11. The table B is also in the form of a casting and is pivoted on the base A, the two members A and B being provided with suitable preferably machined bearing surfaces 12 near the periphery and with corresponding bearing surfaces 13 near the pivot or king pin 14. The latter is made hollow as indicated at 15 so as to permit the supply of compressed air to the operating motors, hereinafter described, regardless of the position of the table B with respect to the base A. As will be understood by those skilled in the art, the compressed air is introduced through a pipe which passes up within the pivot pin 14 and has a swivel connection at the top thereof from which lead the branch pipes to the various motors.

In order to swing the table B into any desired angular position with respect to the base A, I mount a vertical shaft 16 in suitable bearings 17 and 18 carried by the table B, the shaft 16 having a pinion 19 at its lower end which meshes with the circular rack 11. The upper end of the shaft 16 carries a beveled gear 20 with which co-operates a beveled gear 21 mounted to rotate about a horizontal axis, said beveled gear 21 being driven from a compressed air motor indicated generally by the reference D in the drawings. The air motor referred to is only shown diagrammatically as it is believed that this is sufficient for an understanding of the invention. Any suitable motor may be employed as for instance the well known Dake engine, the specific type of motor forming no part of my invention. As clearly indicated in Figure 1, the motor D has a controlling lever 22 by which it may be started and stopped. As will be understood by those skilled in the art a suitable reduction gear is interposed between the motor D proper and the beveled gear 21, such reduction gear being indicated generally by the reference E in Figures 2 and 3. As will be obvious, by rotating the shaft 16, the table B will be compelled to revolve with respect to the base A and the arrangement is such that the table can effect a complete revolution with respect to the base A.

The table B carries a pair of upwardly extending relatively heavy bearing standards 23—23. The latter, at their upper ends,

carry a journal or shaft 24 of sufficient strength to support the bucket and bracket which carries it. Keyed or otherwise secured to said shaft 24 is a heavy bracket F having a pair of arms 25—25. The latter are provided with segmental racks 26—26 with which co-operate pinions 27—27 fixed on a shaft 127, the latter being mounted in suitable bearings provided by said standards 23. The shaft 127, at its left-hand end as viewed in Figure 2, has secured thereto a worm gear 28 driven by a worm 29, the latter being operated from another compressed air motor indicated diagrammatically most clearly in Figure 3 and referenced G. The control of said motor G is effected through a control lever 30 indicated in Figures 1 and 3. As will be understood by those skilled in the art, suitable bearings and housings are provided for the worm gear and worm and shaftings on which they are carried. As will be evident from the preceding description, the angular position of the heavy bracket F can be varied by means of the train of gears just described. It will also be noted, from an inspection of Figure 1, that the axis of the bracket F is in a vertical plane disposed within the periphery of the base 11 so as to keep within a suitable relatively short radius, the circle through which the said heavy bracket F moves during the rotation of the table B.

The bracket F, as clearly indicated in Figures 1 and 4, is provided on its outer side with a substantially rectangular opening indicated at 31 which forms a slide-way or guide for a correspondingly shaped hollow arm 32, the lower end of which carries a dipper 33 of well known form having a hinged bottom adapted to be tripped to release the contents. The inner or under side of the arm 32 is provided with a longitudinally extending rack 34 with which co-operates a gear 35 loosely rotatably mounted on said shaft 24. The gear 35 is driven by a grear 135 loosely mounted on the shaft 27, said gear 135 being driven from a pinion 36 fixed on a horizontally extending shaft 37 suitably mounted in supplemental bearings 38—38 carried by said standards 23. The shaft 37 is in turn driven from a third compressed air motor indicated diagrammatically and referenced H by means of gear 39, gear 40, shaft 41, gear 42, and gear 43. As will be evident from an inspection of the drawing, the train of gears very materially reduces the speed of rotation so that the movements of the arm 32 within the bracket F are under easy control. The motor H is started and stopped by any suitable means as for instance by the control lever 44 indicated in Figures 1 and 3.

In Figure 3 is diagrammatically indicated a station S where the operator may be positioned and who will have in front of him suitable control levers for individually controlling each of the three motors, D, G and H. It will be understood that suitable piping is employed to deliver the compressed air to each of the motors and all under the control of a single operator located at the station S.

During the scooping up of the dirt, ore or other material, it is of course essential that the machine be prevented from movement and to accomplish this result, I preferably provide the base A with a plurality of rigidly attached brackets 45 located at the corners or at other suitable places, each of said brackets 45 having an adjustable heavy screw 46 therein extending vertically and adapted to be adjusted so as to lift the weight of the machine from the wheels 10 and have the entire weight sustained by said screws 46.

In operation, assuming the machine in the position shown in Figure 1 where the dipper 33 is in position to scoop up the material, the operator will cause the bracket F to be oscillated by starting the motor G which will swing the dipper 33 upwardly and collect the material. It will also be understood that, under some conditions, the oscillating movement of the bracket F may be dispensed with at this step in the operation, and the material be scooped up by operating the arm 32 from the motor H or, under some conditions, there will be the combined movements of the bracket F and sliding movement of the arm 32. The material having been scooped into the dipper 33, the operator then causes the table B to rotate on the base A by throwing the motor D into operation. The dipper is thereby swung to the rear of the machine and at the same time the dipper 33 will be gradually elevated so as to bring it to a level above the dump car C or other receptacle and permit the material to be dumped therein. By suitably manipulating the bracket F and the arm carrying the dipper, the latter can be swung within a relatively small circle because of the compact arrangement illustrated, thereby adapting the machine particularly for use in drifting of mines where the dimensions of drifts average about 7½ feet in height and 9 feet in width.

I have herein shown and described what I now consider the preferred manner of carrying out the invention but it will be understood by those skilled in the art that various changes and modifications may be made without departing from the spirit of the invention and I contemplate such changes and modifications as come within the scope of claims appended hereto.

I claim:

1. In an excavating machine, the combination with a base; of a table rotatably mounted with respect to said base about a vertical

axis and adapted to make a complete rotation with respect to the base; means for effecting relative rotation between said base and table; a heavy bracket oscillatably mounted on said table about a horizontal axis, said bracket including a pair of laterally spaced segmental racks extending between said axis and the bottom part of the table; means for oscillating said bracket including pinions engageable with said segmental racks; an arm mounted on said bracket to slide back and forth thereon in a plane perpendicular to said horizontal axis; means for effecting said sliding movements of said arm in any position of the bracket and including a gear rotatable about said horizontal axis and located between said segmental racks; and a bucket carried by one end of said arm.

2. In a machine of the character described, the combination with a relatively stationary base; of a table above said base; means pivotally connecting said base and table including a hollow pivot pin through which a source of motive power is adapted to be conducted; means for rotating said table on said base including a motor mounted on the table; a bracket oscillatably mounted about a horizontal axis and carried by said table; means for oscillating said bracket about its axis including a second motor mounted on the table; a scoop-carrying arm slidably mounted on said bracket in a plane perpendicular to said axis; and means for adjusting said arm with respect to the bracket in any position of the latter including a third member also mounted on said table, all of said three motors being adapted to be supplied with a motive power conducted through said hollow pivot pin.

3. In a machine of the character described, the combination with a base; of a table rotatably mounted with respect to said base about a vertical axis; means for effecting relative rotation between said base and table including a motor mounted on the table; a bracket oscillatably mounted on said table about a horizontal axis; means for oscillating said bracket including, a segmental rack on said bracket located between said axis and the bottom of the table and a gear rotatably mounted on the table about a horizontal axis co-operable with said rack; a scoop-carrying arm slidably mounted on said bracket; and independently controllable means mounted on the table for effecting the sliding movements of said arm on said bracket in any position of the latter.

4. In a machine of the character described, the combination with a base; of a table rotatably mounted on said base about a vertical axis; means for effecting rotation of said table with respect to the base including a motor mounted directly on the table; a bracket oscillatably mounted on said table about a horizontal axis; means for oscillating said bracket; an arm mounted on said bracket to slide back and forth thereon in a plane perpendicular to said horizontal axis; independently controllable means for effecting said sliding movements of said arm including, a rack on said arm, a gear co-operable therewith and loosely mounted about said horizontal axis of the bracket, a motor, and reduction gearing between said motor and loose gear; and a member for containing material carried at one end of said arm.

5. In an excavating machine, the combination with a base; of a table rotatably mounted on said base about a vertical axis; means for effecting rotation of said table on said base; a bracket oscilatably mounted about a horizontal axis on said table; means for oscillating said bracket; a scoop-carrying arm mounted on said bracket to slide back and forth thereon; and means for effecting said sliding movements of said arm, each of said means for effecting the movements of the table, bracket and arm including an independently controllable motor directly mounted on the table.

6. In a machine of the character described, the combination with a base; of a table; means for pivotally connecting said base and table including a hollow pivot pin through which a compressed air supplying pipe is adapted to be extended; means for rotating said table on said base including a compressed air motor; a bracket oscillatably mounted about a horizontal axis and carried by said table; means for oscillating said bracket including a segmental gear thereon, a second compressed air motor and gearing between said motor and rack; a scoop-carrying arm slidably mounted within said bracket; and means for adjusting said arm with respect to the bracket in any position of the latter including, a rack on said arm, a third compressed air motor and reduction gearing between said motor and rack.

In witness that I claim the foregoing I have hereunto subscribed my name this 29th day of June, 1919.

WILLIAM COLLATZ.

Witness:
META SCHMIDT.