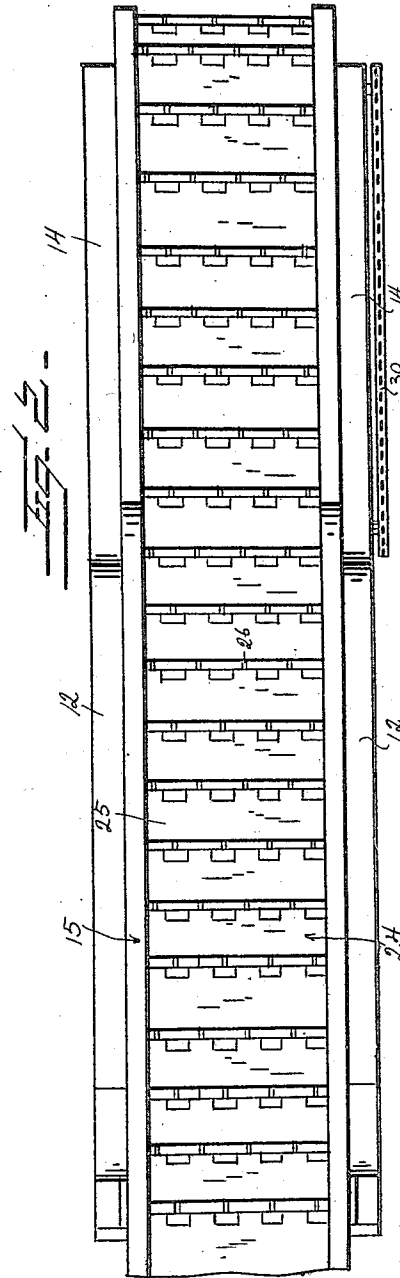
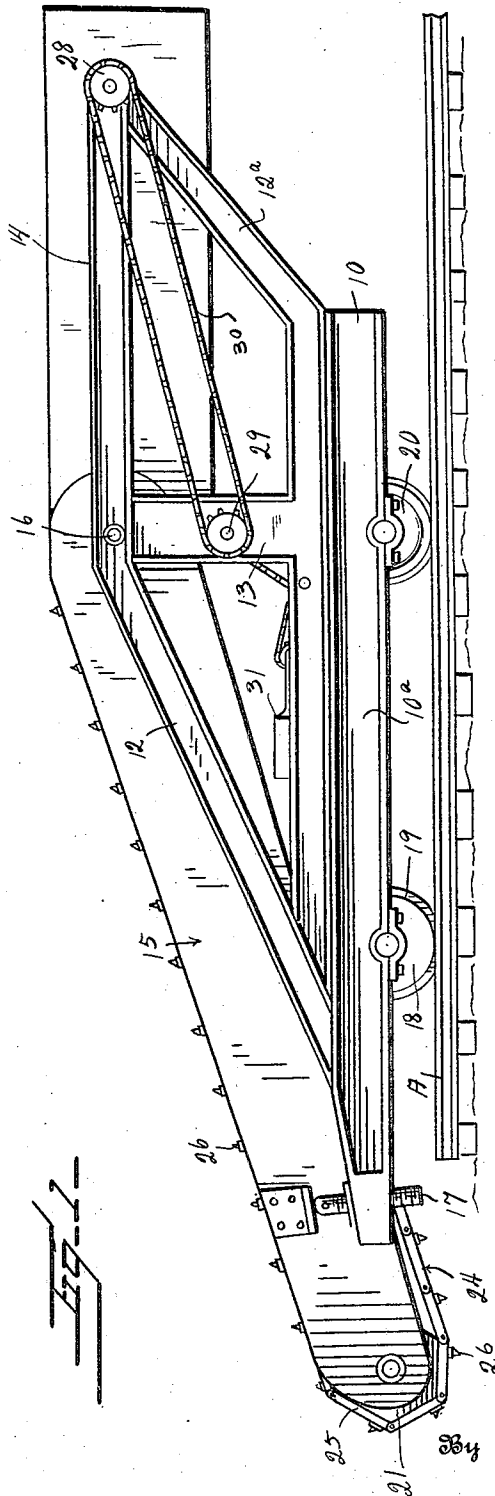


1,410,503.

B. C. PORTER.
EXCAVATING MACHINE.
APPLICATION FILED APR. 7, 1919.

Patented Mar. 21, 1922.

3 SHEETS—SHEET 1.



Inventor

B. C. Porter

Watson E. Coleman

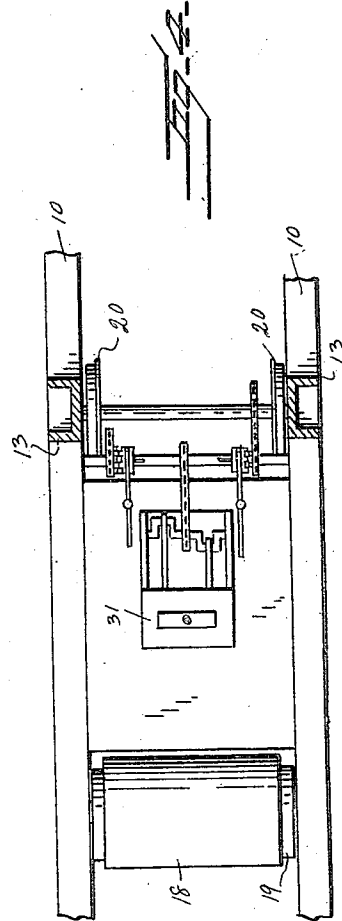
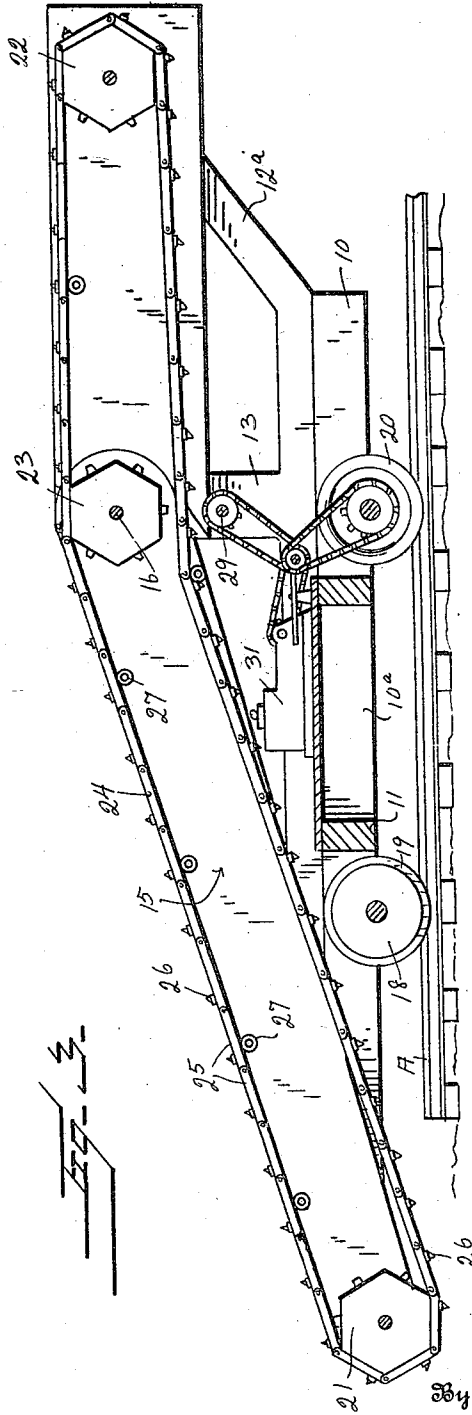
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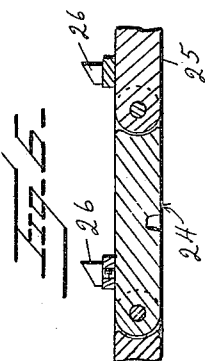
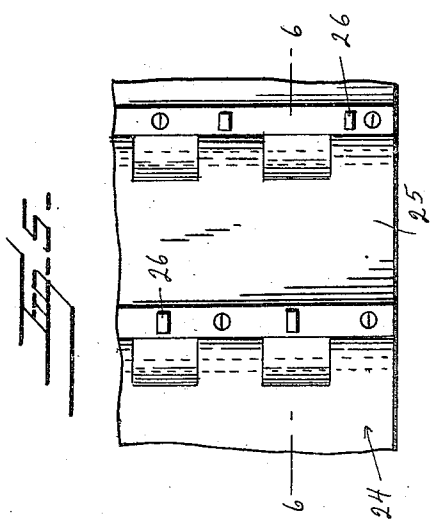
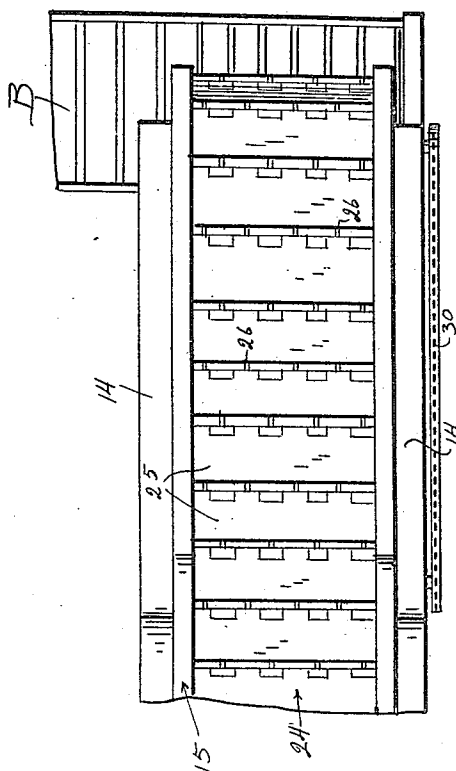
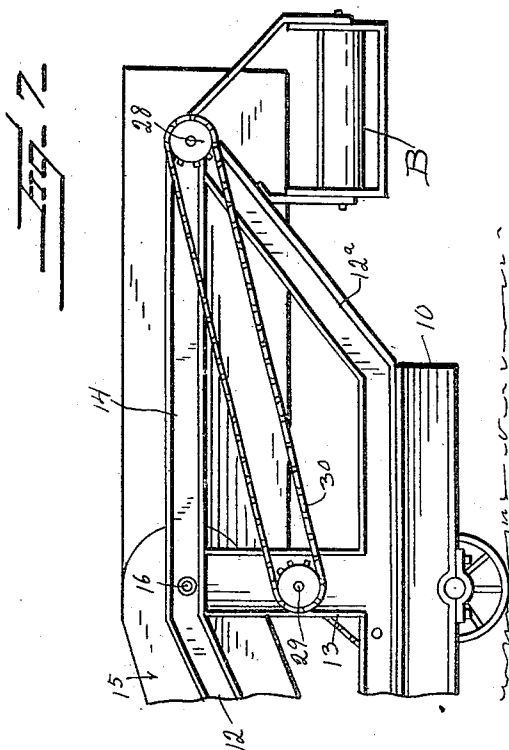
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3 SHEETS—SHEET 3.



Inventor

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By *Watson E. Coleman*
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UNITED STATES PATENT OFFICE.

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EDWIN L. BARR, OF CLOVIS, CALIFORNIA.

EXCAVATING MACHINE.

1,410,503.

Specification of Letters Patent. Patented Mar. 21, 1922.

Application filed April 7, 1919. Serial No. 288,037.

To all whom it may concern:

Be it known that I, BURTON C. PORTER, a citizen of the United States, residing at Groveland, in the county of Tuolumne and State of California, have invented certain new and useful Improvements in Excavating Machines, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to excavators, and particularly to excavators of that type in which an endless element is used having thereon excavating teeth or cutters which bear against the work and cut away the same.

15 The general object of my invention is to provide an excavator particularly designed for tunnelling or work of like character in which the overhanging wall at the breast of the tunnel is cut away by the endless excavating element and in which the material thus cut away is carried back and discharged at the rear of the machine.

20 A further object is to provide a construction of this character including a supporting frame designed to run upon the floor of the tunnel or upon tracks laid on said floor, this frame supporting an endless excavating element and a carrier, the forward portion of which is inclined downward and forward, the upper flight of the excavator and carrier running up this inclined portion and then moving horizontally over the rear end of the frame and then moving back to its starting point so that the dirt or other material cut away by the inclined portion of the upper flight of the endless excavating element will be carried rearward and discharged into cars.

30 A further object in this connection is to so form the supporting frame that the rear end of the elevator extends outwards beyond the supporting frame so that one or more cars may be disposed beneath the rear end of the elevator so that the elevator may discharge thereinto.

40 Still another object is to so construct the mechanism that the endless elevator may be supported at any desired inclination, and further so that the forward wheels of the supporting frame may run either upon a track or directly upon the floor of the tunnel, thus permitting the machine to move forward into the tunnel upon a track and

55 permitting the forward wheel or wheels to leave the track and rest upon the floor to thus permit the rails to be laid in front of the rear wheels of the supporting frame as the tunnelling progresses.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of an excavator constructed in accordance with my invention;

Figure 2 is a top plan view of the construction shown in Figure 3;

Figure 3 is a longitudinal section of the construction shown in Figure 1;

Figure 4 is a fragmentary top plan view of the supporting frame, the upright members 13 being in section;

Figure 5 is a fragmentary top plan view of the endless carrier;

Figure 6 is a section on the line 6—6 of Figure 5;

Figure 7 is a fragmentary side elevation of the rear end of the excavator provided with a lateral carrier; and

Figure 8 is a top plan view of the construction shown in Figure 7.

Referring to these drawings, it will be seen that the frame of the machine consists of the parallel sills 10, these sills being connected by cross braces 11 of any suitable character. Mounted upon these sills is the superstructure of the frame including longitudinally extending, upwardly directed members 12 and 12^a, the upright members 13, and the horizontal members 14. The length of the frame and its width will depend upon the circumstances of its operation, but generally speaking the sills will have a length of 20 feet over all and the rear portion of the superstructure will be from 6 to 8 feet high, while the frame will be 6 or 8 feet wide. Pivotaly mounted at the junction of the horizontal portion 14 of the supporting frame with the inclined portion 12, is the adjustable elevator frame, designated generally 15. The rear end of this elevator frame is rotatably supported upon a shaft 16 supported in suitable bearings on the supporting frame. The sills 10 project laterally beyond the superstructure of the supporting frame and carry at their forward ends the jack screws 17 which en-

gage the elevator frame so that when these jack screws are turned in one direction or the other, the inclination of the elevator frame will be changed and the forward end of the elevator frame be raised or lowered.

The supporting frame is carried by wheels or rollers, and I have illustrated the middle portion 10^a of the supporting frame (it being understood that the middle portion 10^a is integral with the portion 10) as being provided at its forward end with a transversely extending roller 18, the extremities of which are reduced in diameter, as at 19 (see Figure 4,) so as to rest upon the rails 15 A when this forward portion of the frame is running upon rails. This construction permits the roller 18 to drop when it reaches the ends of the rails so that the middle and relatively enlarged portion of the roller will rest upon the ground or floor of the tunnel. I do not wish to be limited to this, as wheels might be used in place of a roller for the purpose, or the roller might have any other desired form. The extremities of the roller will, of course, be mounted in suitable bearings in the sills 10. The rear end of the section 10^a of the supporting frame is to be provided with wheels 20 which are adapted to run upon the rails A, the wheels being flanged for this purpose. This middle section 10^a will be approximately 12 feet long and the sills will project forward and rearward from this middle section a distance of about 4 feet, making, as before remarked, the sills about 20 feet long.

A many-sided roller 21 is mounted upon the forward end of the elevator frame 15 and a like roller 22 is mounted at the extreme rear end of the portion 14 of the superstructure. It will be seen that the rear end 12^a of this superstructure is upwardly and rearwardly inclined so that this roller 22 is disposed approximately 8 feet from the shaft 16, that is from the joint between the inclined portion of the frame of the elevator and the horizontal fixed portion 14. The shaft 16 may carry a roller 23, and this roller will be preferably many-sided.

Mounted upon the rollers 21, 22, and 23 is an endless excavating, elevating and conveying element 24 which is illustrated as composed of a plurality of link sections, each section being approximately 6 inches wide and designated 25. Each section is made of iron or steel, the sections being linked to each other in any suitable manner so as to form a supporting surface and each section is provided with upwardly extending teeth or cutters 26, these cutters being arranged in staggered relation. These sections may be connected to each other by transverse bolts forming pintles upon which the sections hinge or swing, or any other suitable flexible connection may be secured between the sections. The belt is supported

along its entire upper flight so that it will not sag or yield downward, and preferably the belt moves over rollers or wheels 27 which support the belt and allow it to have free movement. As illustrated, the shaft which carries the upper roller 22 carries upon it sprocket wheels 28 which connect it to a shaft 29 by means of a sprocket chain 30, this shaft 29 being operatively connected to any suitable motor 31 mounted in the central section 10^a of the machine. Preferably, this motor will be operated by compressed air, though the motor might be an electric motor, an internal combustion engine, or a steam engine. This motor is operatively geared to the driving wheels 20 of the machine in any suitable manner so as to secure a forward movement and rearward movement of the machine, and it is to be understood, of course, that the gearing for driving the machine forward or rearward is separate of and independent from the gearing whereby the endless excavating and carrying element is driven so that the excavating and carrying element may be driven while the supporting wheels or traction wheels are stationary or while the machine is moving forward or backward.

It is to be understood, of course, that I do not wish to be limited to any particular manner of gearing the endless excavating element or to the particular construction of the machine supporting it, or to the materials employed, inasmuch as the details of the construction may be modified in many ways without departing from the spirit of the invention.

The operation of the device will be obvious from what has gone before. The machine may be used wherever it is desired to undercut a bank of earth so that the earth, rock, or other material so undercut will be discharged onto the combined excavator and carrier and be carried rearward for discharge onto a wagon or car disposed beneath the rear end of the supporting frame.

In the use of the invention, the machine is driven forward at a very slow speed and the endless excavator and carrier scrapes away the material immediately beyond the inclined upper flight of the carrier and carries the material backward and discharges it over the overhanging rear end of the machine into the cars which are disposed beneath the scraper. The inclination of the endless excavating element may be varied by adjusting the jack screws which support the frame of the endless carrier and excavator. Thus, the nuts of the machine may be readily forced into place beneath the overhanging wall of material and then the jack screws adjusted so as to raise the excavator and carrier until its forward end bears against the overhanging wall of material. As the cutting progresses, the machine moves

forward and the material is carried backward so that the machine will cut a tunnel automatically.

The distance between the forward and rear supporting wheels is approximately 12 feet more or less, so that rails may be laid down in front of the rear wheels as the machine progresses, the front wheels or roller 18 travelling upon the ground. If it is desired to retract the machine, however, it may be run backward and then this front roller 18 will ride up on the rails A and the machine will then be in condition to be drawn backward on the rails. When it is advanced, the forward roller 18 will travel along the rails until it reaches the end of the rails and will then drop down upon the body of the roller and will move forward in the manner described.

It will be noted that the horizontal flight of the elevator is about from 6 to 8 feet above the ground and that it projects rearward of the middle section of the machine about 8 feet, thus permitting two cars to be disposed under the rear end of the machine, while a third car is being loaded, which third car will stand at the extreme rear end of the machine. As fast as the cars are loaded, they are pulled out until a string of three cars are loaded and switched to a side track. Then another string of three cars is disposed within the upper end and rear end of the supporting frame and the operation repeated.

In operation, my machine will require the services of one man to handle and switch the cars, a man on each side of the machine to adjust the elevator and to throw any rock or material which may have fallen off the sides of the elevator back onto the elevator, and, of course, will also require an engineer to attend to the engine or motor.

The machine will be, of course, very rigidly and solidly constructed and will be about 28 feet long over all and from 6 to 8 feet wide. Of course, it will be obvious that the size of the machine, however, will be varied to fit the needs of prospective buyers and the different sizes of tunnels.

It is to be understood that my machine might also be used in road building, and in this case traction wheels would be substituted for the wheels illustrated, and a trans-

versely extending chute or elevator B would be swung from the rear end of the machine, as illustrated in Figure 8 to carry rock or other material over to one side, as, for instance, onto a bank or into cars to be conveyed to the end of side fills of the road. This machine is also intended to be used in tunnels or as an excavator working in piles of muck or other material which has been cut away from the face of the excavation or from the breast thereof. It is obvious that the machine may also be used for trench digging, the walls being, of course, higher than the trench to be dug and under-cutting the end of the trench as it advances so that the roof of the trench will fall in onto the elevator and will be carried rearward and discharged.

While I have illustrated the excavating carrier 24 as being in one entire section extending from front to rear of the machine, it will be understood that this carrier might be formed in two or more sections or flights and that I do not wish to be limited to a carrier constructed entirely in one section.

I have illustrated in Figure 4 a conventional means for engaging the traction wheels with the engine 31 of the machine. It will be understood that any desired mechanism may be used for driving the excavator forward.

I claim:—

An excavating machine of the character described including a supporting frame, a carrier, an excavator operatively mounted upon said frame, supporting wheels mounted upon the frame at the rear thereof and flanged to engage the rails of a track, and a roller mounted upon the forward end of the supporting frame, the ends of the roller being reduced in diameter to engage said rails, the middle portion of the roller being of uniform diameter between said reduced portions whereby the forward end of the machine may be run off the rails of the track and the roller engaged with the ground.

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

BURTON C. PORTER.

Witnesses:

ED. G. COBDEN,
J. C. DE FERRARI.