Jan. 23, 1951

W. C. HITE

SURFACE CRUSHER

2,539,136

Filed Jan. 10, 1947

2 Sheets-Sheet 1

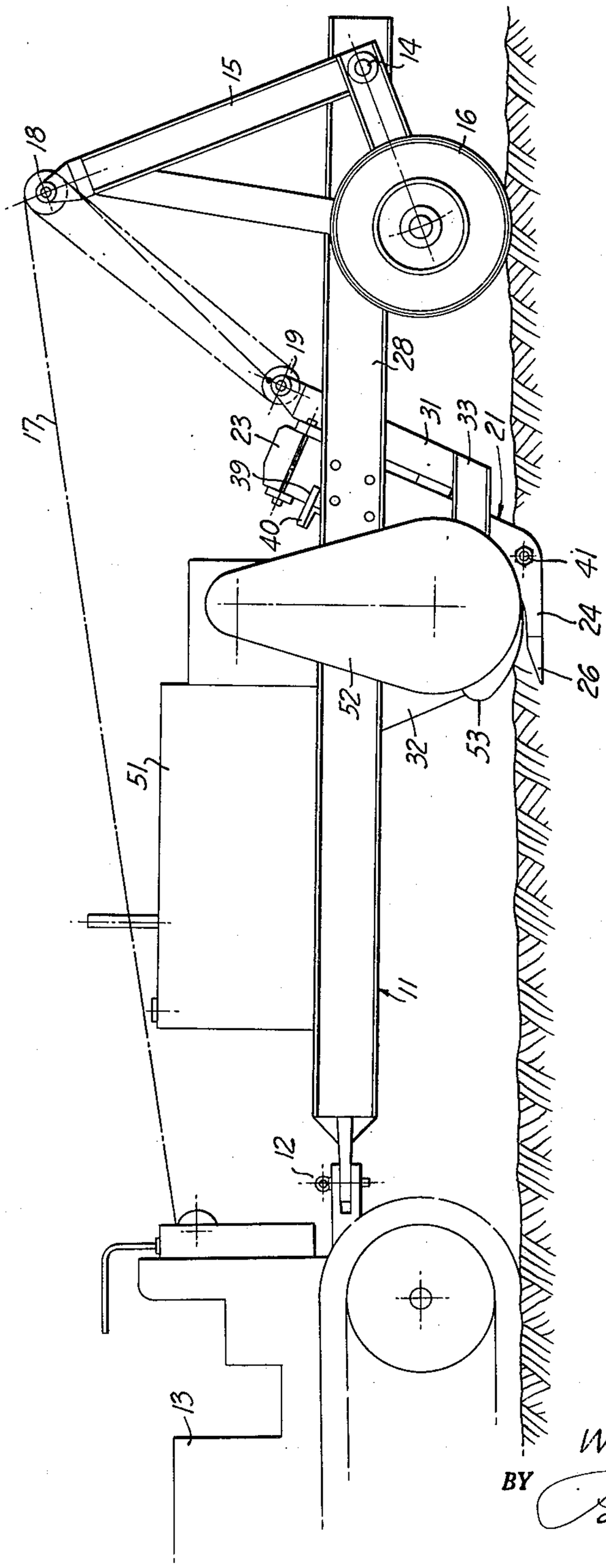

FIG. 1

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FIG_2_

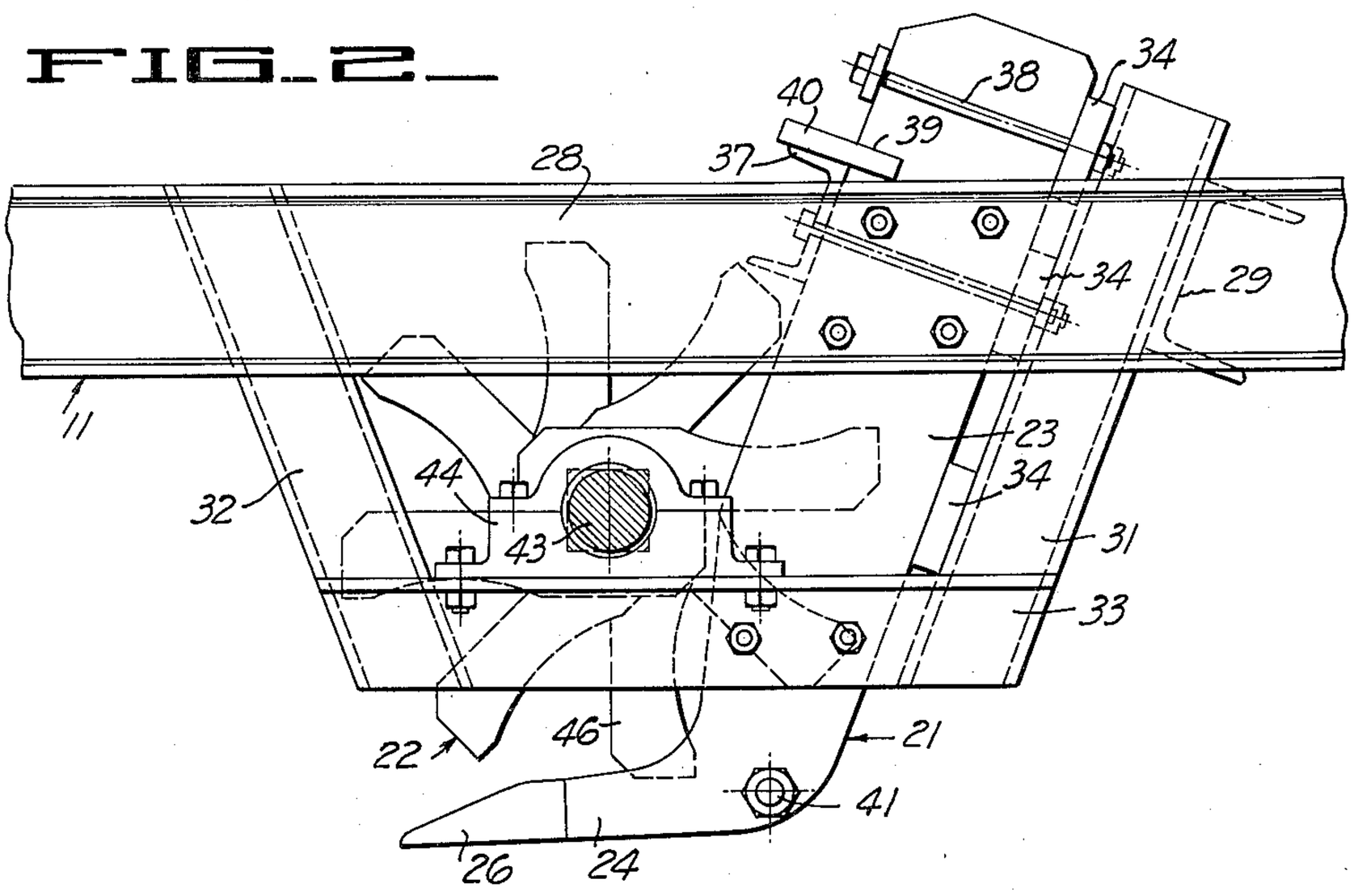
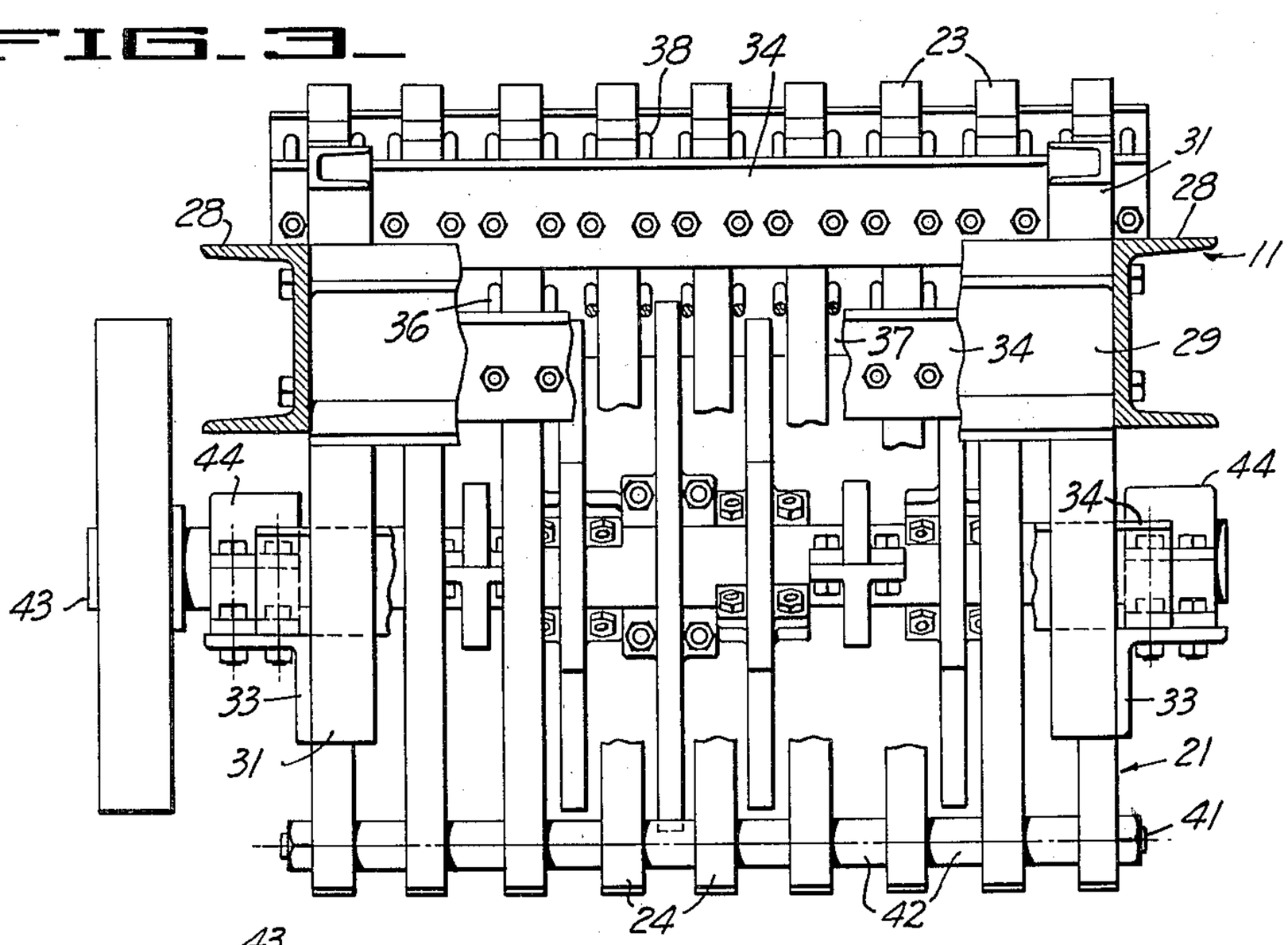


FIG_3_



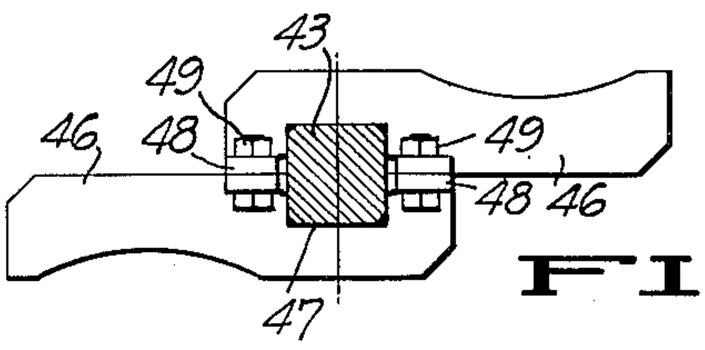


FIG_4_

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Patented Jan. 23, 1951 2,539,136

UNITED STATES PATENT OFFICE

2,539,136

SURFACE CRUSHER

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Application January 10, 1947, Serial No. 721,390

2 Claims. (Cl. 262—2)

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This invention relates generally to machines adapted for carrying out crushing operations along a ground surface, and in particular is useful for road construction work.

As is well known to those familiar with road construction various grading requirements are specified by government, state, county and city departments, dealing with the rock sizes to be used in various stages of the construction, including the preparation of the original road bed, sub-surfacing and final surfacing. Considerable expense is involved in complying with such regulations, because it is necessary at the present time to crush rock according to the specifications and by use of conventional crushing equipment, and then transport this rock to the roadway.

The object of the present invention is to provide a relatively simple machine capable of carrying out surface crushing operations, that is crushing operations directly upon the roadway.

A further object of the invention is to provide a crushing machine which is operated by moving the same along a roadway, and which will pick up oversized rocks, crush the same, and immediately redeposit the crushed rock upon the roadway.

Further objects of the invention will appear from the following description in which the preferred embodiments have been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawing:

Figure 1 is a side elevational view showing a machine incorporating the present invention.

Figure 2 is a side elevational detail on an enlarged scale, and illustrating the crushing teeth and rotor.

Figure 3 is a sectional view illustrating the manner in which the crushing teeth are mounted.

Figure 4 is a detail in section showing how the crushing blades are mounted.

The embodiment of the machine illustrated in the drawings comprises a main frame 11 which is adapted to be moved along a ground surface or roadway, and which for example may be provided with a hitch or clevis coupling 12 to a power tractor 13. A secondary frame 15 is pivotally attached to the main frame at 14 and carries the ground engaging wheels 16.

In order to adjust the position of the secondary frame 15 to thereby raise or lower the main frame with respect to the ground surface, a cable 17 extends from a winch provided on the tractor 13, and is reeved through the sheaves 18 and 19. Sheave 18 is carried by the frame 15 and sheave 19 by a part of the main frame. The dead end of the cable can be anchored to the main frame.

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The main frame carries a plurality of teeth 21 which cooperate with a crushing rotor 22. Each of the teeth 21 is provided with a shank portion 23 and a lower forwardly directed extension 24. These extensions have wedge or chisel-shaped end portions 26 which can be made separable from the main body of the teeth, and of relatively hard wear-resisting alloy.

The main frame is formed in such a manner as to form a suitable rigid mounting for the teeth 21. Thus this frame is formed of two side beams or rails 28, which are connected by the cross beam 29. On each side of the machine downwardly extending structural members 31 and 32 are provided, which are attached to the adjacent side beam 28, and which are connected at their lower ends by the structural member 33. Horizontal and laterally extending bars or beams 34 connect the structural member 31, and serve to seat the shanks 23 of the teeth. Clamping bolts 36 extend between the teeth and engage a laterally extending clamp bar 37 whereby all of the teeth are firmly clamped against the bars 34. Additional clamp bolts 38 are shown for clamping the upper ends of the teeth. The teeth are also provided with notches 39 engaged by the laterally extending lock bar 40. The shank portions 23 can be formed with a slight taper toward their upper ends to enable them to be tightly held against upwardly applied force components. The end teeth of the series can be clamped or bolted directly to the side rails 28 and members 33 as illustrated.

The teeth are all spaced apart laterally a uniform distance, the amount of which is dependent upon the size of rock desired. Thus a tie rod 41 is shown extending through all of the teeth, and carries spacing collars 42 whereby the teeth are spaced a predetermined distance.

The crushing rotor consists of a suitable shaft 43 carried by the journals 44, which in turn are mounted upon the structural members 33 of the frame. An intermediate portion of the shaft can be formed square as illustrated in Figure 4, and serves to mount the crushing blades 46. These blades are formed of relatively hard wear-resisting alloy, and can be provided with notches 47 to fit upon the square portion of the shaft, and with flanges 48 for receiving the clamping bolts 49. The blades extend at various angles from the axis of the shaft, and are so positioned that each blade passes through a space between corresponding teeth. The advancing edges of these teeth are preferably concave as illustrated.

In order to drive the rotor suitable means such as an internal combustion engine 51 is shown mounted upon the main frame. This engine can

be connected by suitable means such as a belt and pulley enclosed with the guard housing **52**, for rotating the shaft **43** at a suitable speed. Other means for this purpose can be used such as gears or sprockets and drive chains. The guard housing can have a forward plow shaped attachment **53** to protect the same.

Operation of the machine described above is as follows: Assuming that one wishes to carry out rock crushing in connection with the building of a roadway, a layer of rock which has not been reduced to proper size specifications is provided on the roadway, and then my machine is moved along the roadway with the crushing rotor in operation. The end portions of the teeth **26** are caused to pass through the upper surface layer of rock, whereby oversized rock is caused to be elevated upon the teeth extensions **24** whereas undersized rock passes between the teeth without material disturbance from its original position on the roadway. As the oversized rocks are carried upwardly upon extensions **24** they pass to a crushing zone, or in other words are impacted by the blades **46** of the crushing rotor **22**. Thus the oversized rock is reduced in size until the fragments pass between the teeth and return to the road bed. The depth of operation of the teeth can be adjusted to suit conditions, by operation of cable **17**.

It will be evident that my machine is capable of saving considerable time and expense in the construction of roads. By use of my machine during the various stages of road construction, grading requirements and specifications can be fully met, without the necessity of crushing rock to final size specifications in conventional centrally located crushing equipment, and then hauling and depositing the crushed rock on the roadway. Surfacing, subsurfacing and preparation of the original ground can be carried out by the use of my machine.

It will be evident that my machine is capable of various modifications within the spirit of the invention. For example instead of utilizing the machine in such a manner that it is drawn by a power tractor, it can be made self propelled, or it can be mounted on a motor grader or like conventional machine. Likewise if desired the power for operating the crusher rotor can be obtained from the power take-off provided on conventional types of tractors. More than one crusher can be used at the same time by coupling them in parallel or tandem, with like or different spacing of the teeth.

In addition to its usefulness as a rock crusher my invention can be used for agricultural purposes, as a combination plow, disc and harrow to break up clods of earth.

I claim:

1. In a rock crushing machine for carrying out surface crushing operations, a frame adapted to be traversed along a ground surface, a plurality of laterally spaced rigid teeth carried by the frame, said teeth including upwardly extending spaced rigid shank portions adapted for attachment to the frame and lower forwardly extending extensions adapted to pass substantially horizontally and comb-like through the layer of material upon the ground surface, whereby undersized material passes between said extensions and oversized material is elevated upon the extensions, and a crushing rotor mounted in conjunction with the teeth and adapted to crush oversized material elevated upon said extension, said rotor comprising a plurality of radially extending blades disposed to pass between said extensions and between said shank portions.

2. A machine as in claim 1 together with means for adjusting the elevation of the teeth with respect to the ground surface.

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