June 7, 1938. V. BRESSI ET AL 2,119,664

CANAL AND ROAD SUBGRADER

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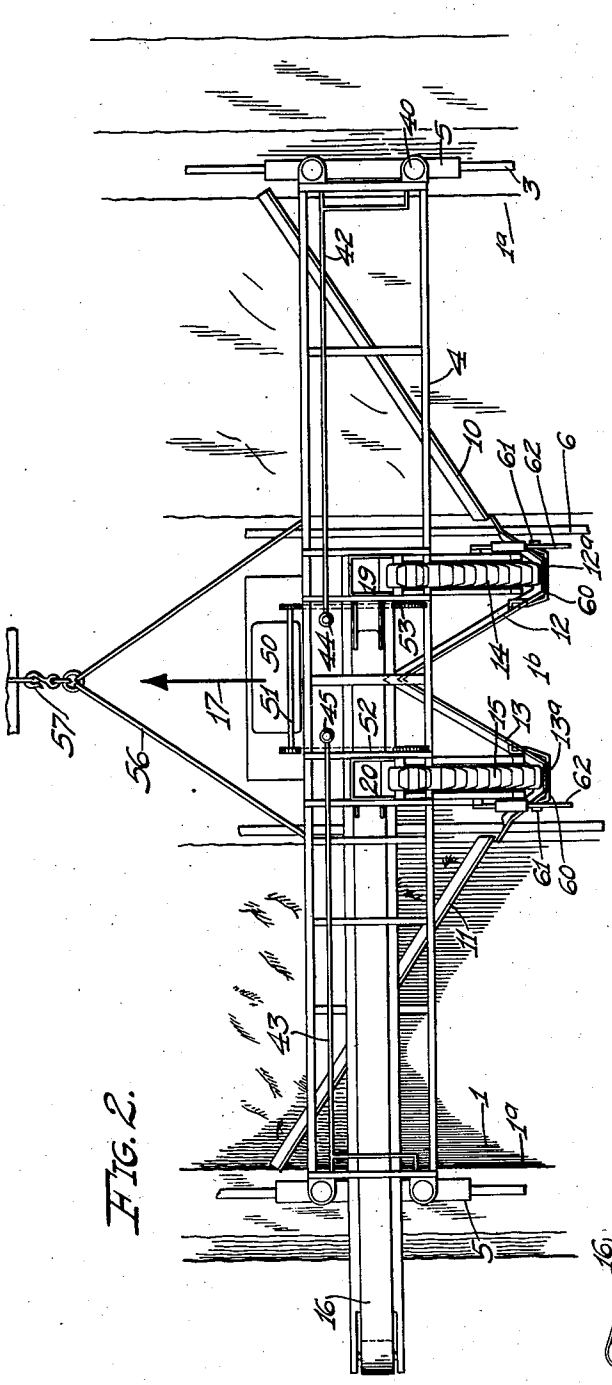


FIG. 2.

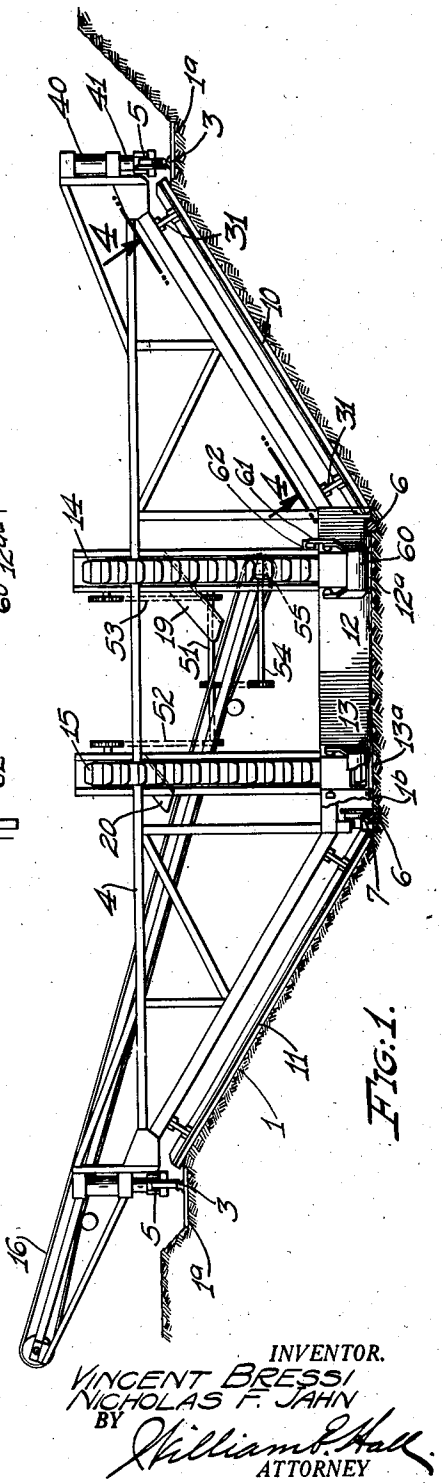


FIG. 1.

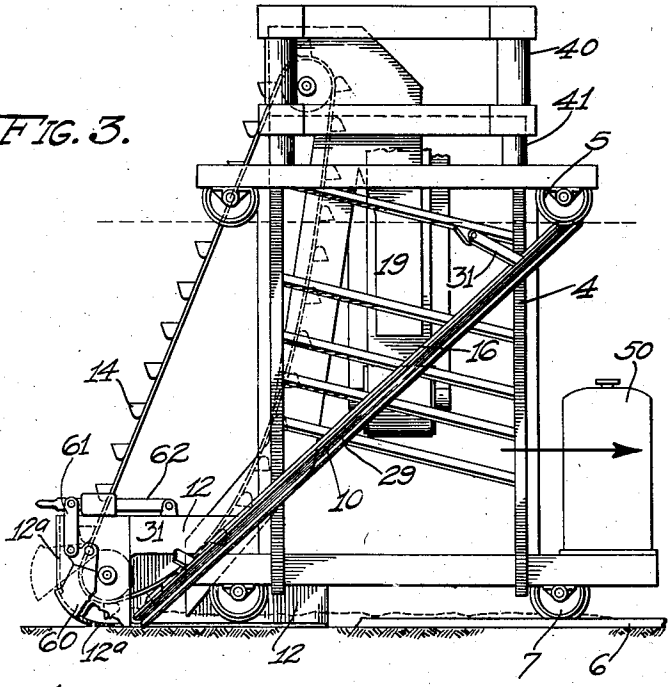
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FIG. 3.



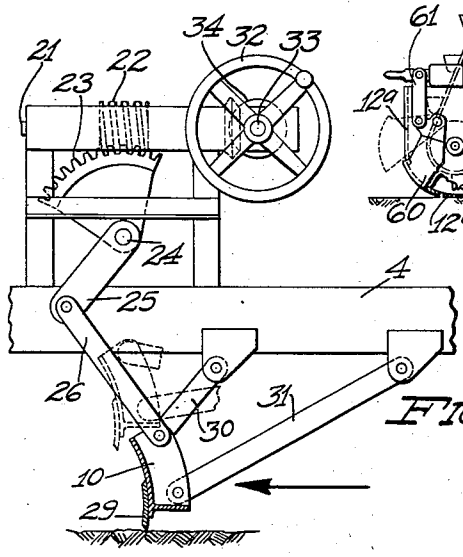
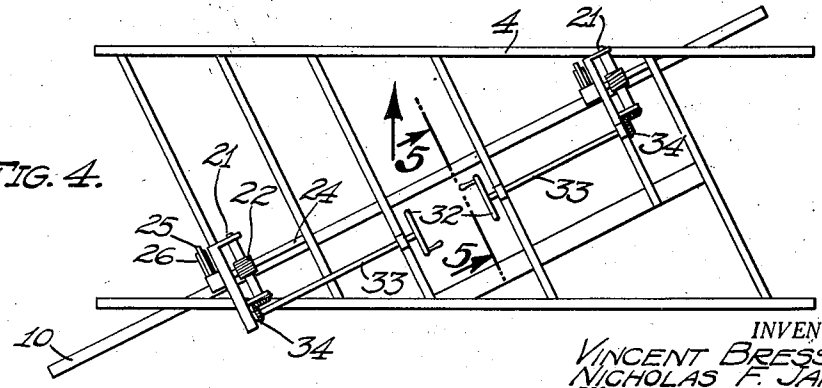


FIG. 5.

FIG. 4.



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CANAL AND ROAD SUBGRADER

Vincent Bressi and Nicholas F. Jahn, Beverly Hills, Calif.

Application May 14, 1935, Serial No. 21,370

5 Claims. (Cl. 37—102)

This invention relates to the grading of roads, canals or large ditches and refers to improved means for performing some of the important operation in connection with such grading.

In cutting roads through banks and in undercutting for canals or ditches it is common practice to remove the greater portion of the dirt by means of steamshovels or similar power driven devices. The surface of the cut produced by such means is necessarily quite rough and uneven, and it is required to level up and smooth the road way as well as the side cuts preparatory to applying the required surface covering. Such subgrading may be done by manual labor, and road scrapers of various types have been built for facilitating and expediting such subgrading operations.

It is the principal object of this invention to provide improved means for quickly, economically and effectively subgrading both the bed and sides or side slopes of road or canal cuts in one operation.

It is a further object of the invention to provide means for correctly directing and guiding the subgrading devices of the invention.

Another object is the provision of means for continuously directing dirt gathered from the subgrading operation into intermediate receptacles and means for uninterruptedly carrying such dirt away from the subgraded cut.

Another object is to provide novel means for arranging scraping elements to carry such surplus dirt into the said intermediate receptacles.

A further object is to provide a simple, strong and durable apparatus capable of supporting the various instrumentalities of the invention in perfectly balanced condition.

The further objects and the many important features which coact to produce the structure of the invention are hereinafter fully described, and drawings are hereto appended in which a device embodying the invention is illustrated.

In the drawings:

Fig. 1 represents a cross sectional elevation through a road or canal cut, illustrating the relation of the structure of the invention to such cut, the view being taken from the rear of the structure;

Fig. 2 is a plan view thereof;

Fig. 3 is a side or end view thereof;

Fig. 4 is a section partially in plan showing particularly the arrangement of the moldboard control, the section being taken thru 4—4 of Fig. 1; and

Fig. 5 is an enlarged section thereof taken thru 5—5 of Fig. 4.

Referring in the first instance to Fig. 1, the numeral 1 denotes the surface level of the land through which the cut is made. As stated, the bulk of the dirt has been removed preparatory to the subgrading operation, and a shoulder, 1^a, has been suitably provided at each side, near the top of the cut. This shoulder is properly leveled in any well known manner, whereupon a rail, 3, is laid longitudinally of each shoulder to form a track for the device of the invention.

The structure of the invention is here shown to comprise a skeletonized frame 4, the transverse outline of which substantially follows the shape to which the cut is to be graded. Wheel trucks 5 are mounted at each side of the frame to support the device on the track rails 3, in a manner which will presently be described.

The bed of the cut, 1^b, is preferably made low enough to clear the bottom of the frame of the subgrading device, in order that no solid obstructions, such as rocks or the like, may be present to interfere with the continuous operation of the device, and a suitable track 6 may be laid on this level bed, if desired, to help carry the weight of the structure. Where such track is employed, the device should be equipped with wheels 7 to ride on the track 6. But ordinarily such bottom track and additional wheel trucks are dispensed with and the whole load carried by the trucks 5.

The principal features of the structure, as assembled on the main frame 4, comprise a pair of side cut scrapers or moldboards, 10, 11, a pair of bed scrapers 12, 13, elevators 14, 15, and a belt conveyor 16. These moldboards, which may be in the form of curved blades, operate to finish off the inclined sides of the cut, and they permit the surplus dirt to roll down the incline into the bed, there to be gathered up by bed scrapers 12, 13, as the device is slowly pulled along in the direction of the arrow 17 by a tractor or other suitable means. The bed scrapers 12 and 13 are scoop shaped and they are positioned side by side to cause their front edges to form a continuous flat surface over the entire width of the bed. As this front edge is drawn along the bed of the cut, it scrapes the surface entirely smooth and level and picks up all the surplus dirt, which gradually is forced toward the rear walls 12^a and 13^a of the scrapers, there to be picked up by the bucket elevators 14, 15, positioned beyond the rear of the frame and near the opposite sides of the bed or bottom of the cut. In substance each of the scrapers 12 and 13 scrapes one half

of the bed and collects the loose dirt at such half of the bed to be elevated by its respective elevator. The opposite ends or portions of each scraper converge backwardly from the lower ends of the scrapers 10 and 11 and from the median line of the bed to the back walls 12a, 13a immediately adjacent the lower ends and rear sides of the elevators. Hoppers 19, 20 are mounted at the top of the elevators to receive the dirt as it reaches the top and to direct it into the belt conveyor 16, which carries it well over the edge of the cut, there to be suitably disposed of.

The moldboards extend diagonally upward and forward from the front edge and extreme opposite lateral portions of the bottom scrapers. They are shown pivotally hung on the main frame for manual adjustment relative to the side banks of the cut. The adjusting means for one moldboard is preferably exactly like that of the other; it is therefore thought sufficient fully to illustrate and describe the adjusting mechanism of one of them. Attention is, to this end, directed to Figs. 4 and 5, where the moldboard 10 is, near its ends, shown connected to the main frame 4 for independent manual adjustment at such opposite ends. Because the mechanism at one end of the board preferably is identical with that at the other end, the same reference numerals are applied to each mechanism and the following description applies to both.

On the main frame are mounted jack shafts 21 to carry worms 22, and the worm at each end of the moldboard is in mesh with a worm gear segment 23 mounted on a jack shaft 24. A radial arm 25 of this shaft is, by a link 26, pivotally connected to the upper end of the moldboard 10. Links 30 and 31 are shown pivotally hung on the main frame 4, and they are connected to the top and bottom of the moldboard 10, respectively. A hand wheel 32, one for operating each adjusting mechanism, is rigid on a shaft 33 which, through the medium of bevel gears 34, is connected to turn the worm 22 and therethrough to adjust one end of the moldboard. The links 30, 31 are set at an angle substantially perpendicular to the thrust against the board; and are positioned to provide substantially parallel movement to the moldboard as it is raised and lowered. In such manner, a strong and durable side grading combination is provided, at each side of the machine frame, and each moldboard may be independently adjusted at each end. Because of the constant wear on the grading edge, separate teeth or a blade 29 is preferably detachably bolted to the body portion of each moldboard for convenient replacement.

In addition to the moldboard adjustment, it is also desirable to provide vertical adjustment of the main frame, as a whole, in order correctly and conveniently to position the bed scrapers 12, 13, which form the bottom of the machine, relative to bottom of the cut. To this end, the wheel trucks 5 are suitably mounted in the ends of the main frame 4 for vertical adjustment relative to the frame. The specific construction shown comprises pistons 41, one at each end of each wheel truck, which pistons are seated in cylinders 40, a pair at each end of the frame 4, to form four hydraulic jacks. From each pair of jacks at the opposite ends of the frame extends a conduit 42, and 43. The controlling means for these jacks is, for the sake of simplicity, conventionally shown in the form of simple hand pumps 44, 45, cut into the conduits 42, 43.

The jacks at the opposite ends of the frame supplement the adjustment of the moldboards in that the elevation is first adjusted by the jacks and subsequently by the moldboard adjusting mechanism. These jacks also raise the frame so that it may be readily conveyed from place to place without the subgrading operation.

The elevators 14, 15 are preferably of the ordinary bucket type and they are preferably fixed on the machine frame. The belt conveyor 16 is also shown rigidly mounted on the machine frame to extend diagonally over one edge of the cut; but it may, of course, be pivotally fixed at its lower end for vertical adjustment of its upper and outer end to suit the height of the bank. Suitable means must be provided for operating these three dirt carriers, and such means is here shown to comprise an engine 50, from which drive connections 51, 52, 53 extend to the top of the elevators, while drive connections 54, 55 serve the belt conveyor. The engine is shown placed in front of the frame center to balance the elevators at the opposite side of the frame.

After the machine has been properly placed in the cut to be subgraded, it is suitably connected to be drawn forward at a slow, uniform speed. For the purpose of such connection, a cable or other draft element 56 is shown terminating in a hook, or coupling 57, for attachment to a tractor or other convenient propelling means.

In the event large rocks or other objects accumulate in the scoop shaped scrapers 12, 13 and tend to be wedged between the bucket elevators 14, 15 and the rear walls 12a, 13a of the scrapers 12, 13 the rock or other objects are ejected through openings in such walls. These openings are normally covered by gates 60 which are pivotally hung on the sides of the scrapers. These gates are pivotally connected, by links 61, to weighted levers 62. Thus, when the operator sees a large rock he may merely raise the lever, or the gate will open automatically against the weight of the lever.

Though we have shown and described a particular construction of our apparatus and a particular method of operation, we do not wish to be limited to the same, but desire to include in the scope of our invention the construction combination, and arrangement substantially as set forth in the appended claims.

We claim:

1. In a subgrader for an earth cut having a flat bed and sloping sides, a frame having at the bottom a pair of forwardly converging scrapers to level off the bottom of the cut, side scrapers upwardly and forwardly extending from said bottom scrapers, each of the bottom scrapers forming with the adjacent side scraper a backwardly converging pocket for receiving dirt from both of the latter scrapers, manual means for adjusting said side scrapers, means for carrying the surplus dirt from said bottom scrapers over the side of the cut, and power means for operating said dirt disposing means.

2. In a subgrader for a canal having inclined sides and shoulders at the top of the inclined sides, tracks on the shoulders, a carriage on the tracks, scrapers on the carriage, one for each inclined side, each scraper extending diagonally from the top of the inclined side backwardly to the bottom thereof, elevators for raising accumulated dirt from the lower end of each scraper, and conveyor means for conveying the dirt from the elevators beyond the inclined sides.

3. In a subgrader, a carriage, an elevator mounted at the back of the carriage, a deflector

on the carriage extending toward the rear of the carriage behind the elevator, the wall of the deflector behind the elevator having an opening, and a gate mounted over said opening and adapted to be opened for permitting large objects freely to pass through the opening.

4. In a subgrader for a canal having inclined sides and shoulders at the top of the inclined sides, a carriage having wheels adapted to ride on the shoulders, scrapers on the carriage, one for each inclined side, each scraper extending diagonally from the top of the inclined side backwardly to the bottom thereof, elevator means for raising accumulated dirt from the lower end of each scraper, and conveyor means for conveying the dirt from the elevator means beyond the inclined sides.

5. In a subgrader for a canal having inclined sides and shoulders at the top of the inclined sides, a carriage having wheels adapted to ride on the shoulders, scrapers on the carriage, one for each inclined side, each scraper extending diagonally from the top of the inclined side backwardly to the bottom thereof, means for forming the bed of the canal and accumulating the dirt from the lower end of each scraper, elevator means for raising the dirt accumulated by said means, and a conveyor means for conveying the dirt from the elevator means beyond the inclined sides.

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