Sept. 10, 1935. H. L. MYERS 2,014,186

ROAD SURFACING MACHINE

Filed Jan. 10, 1934 8 Sheets-Sheet 1

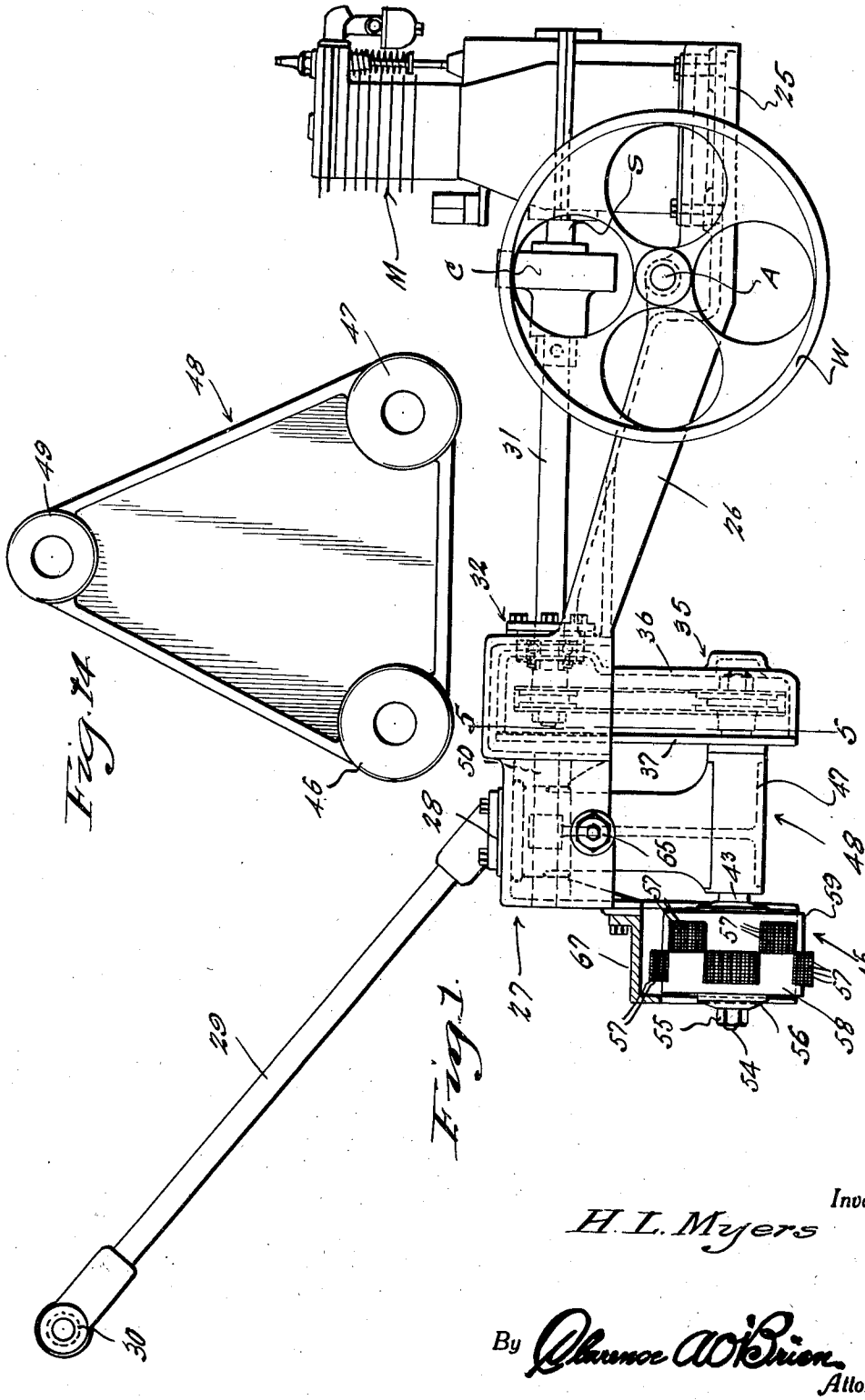

Fig. 1.

Fig. 1A.

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ROAD SURFACING MACHINE

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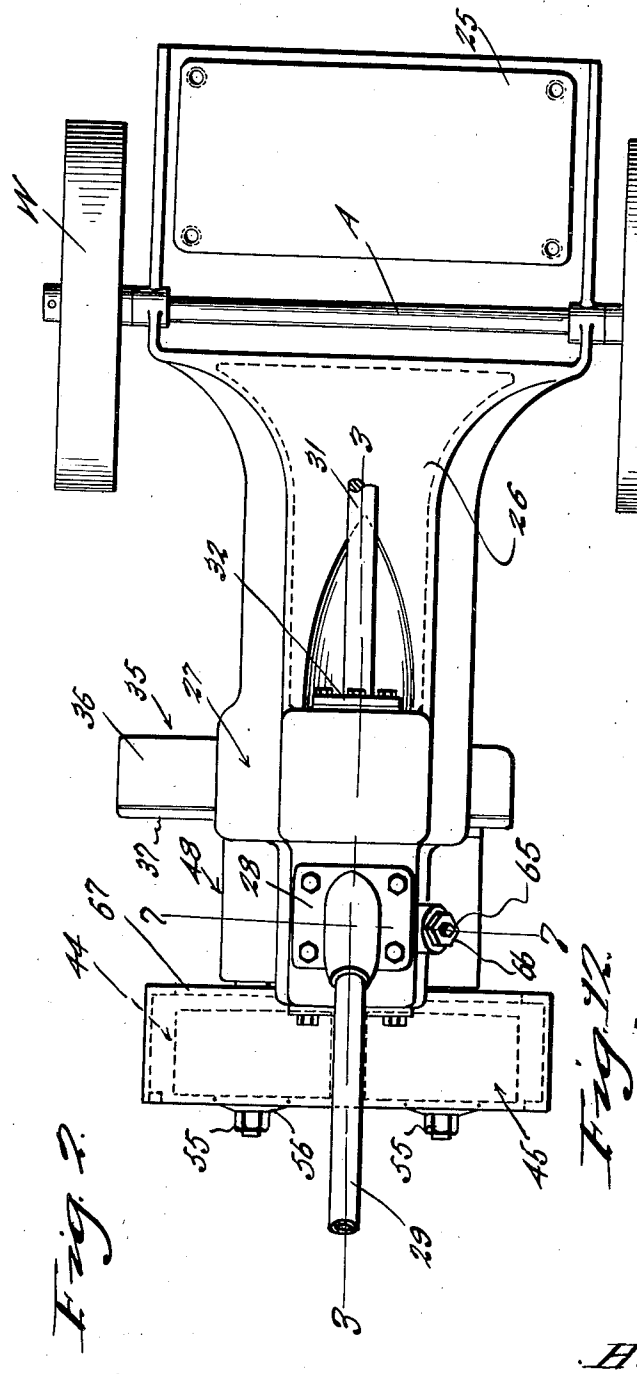

Fig. 1.

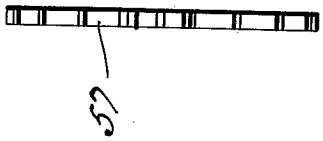

Fig. 13.

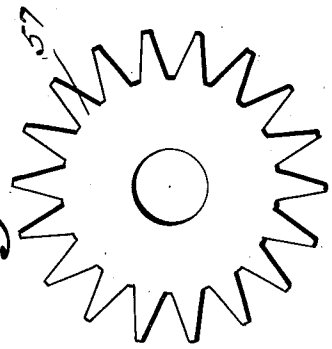

Fig. 12.

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ROAD SURFACING MACHINE

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Fig. 3.

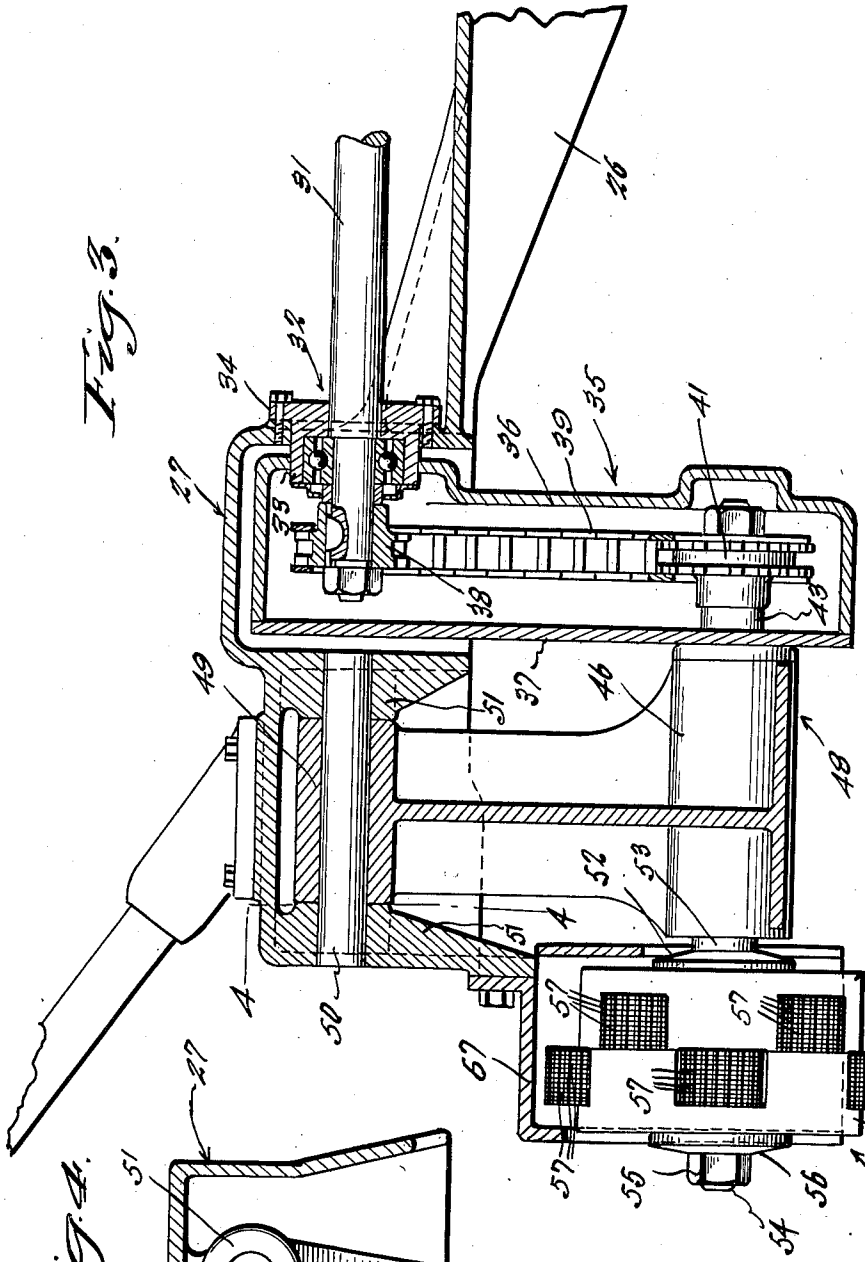

Fig. 4.

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Fig. 6.

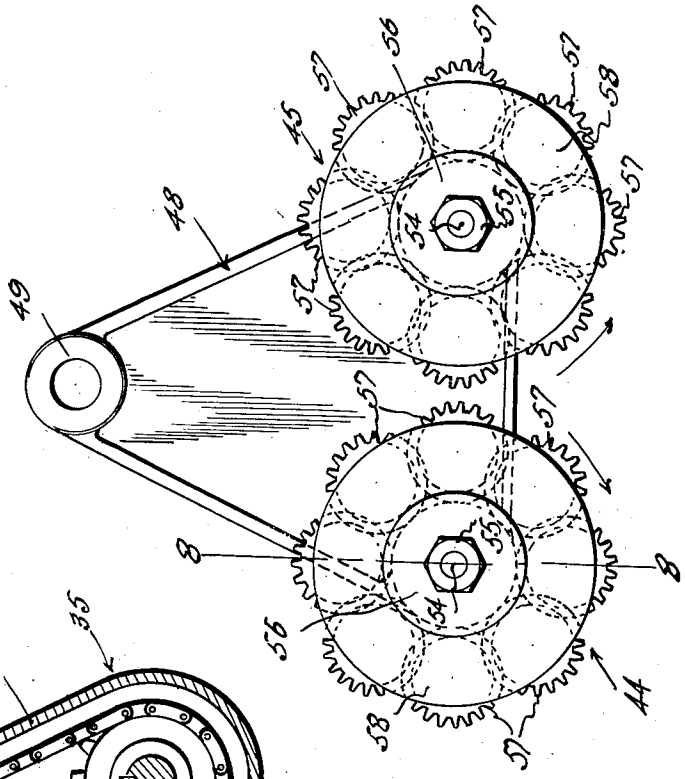


Fig. 5.

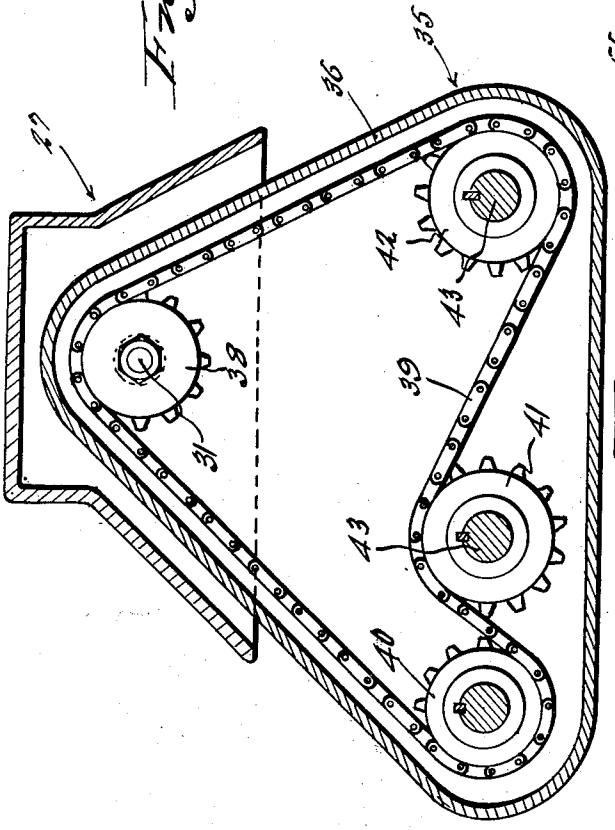
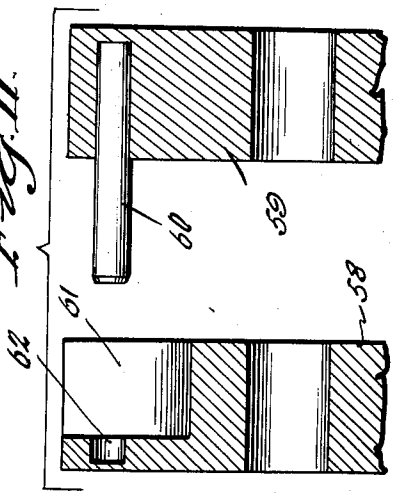


Fig. 11.



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ROAD SURFACING MACHINE

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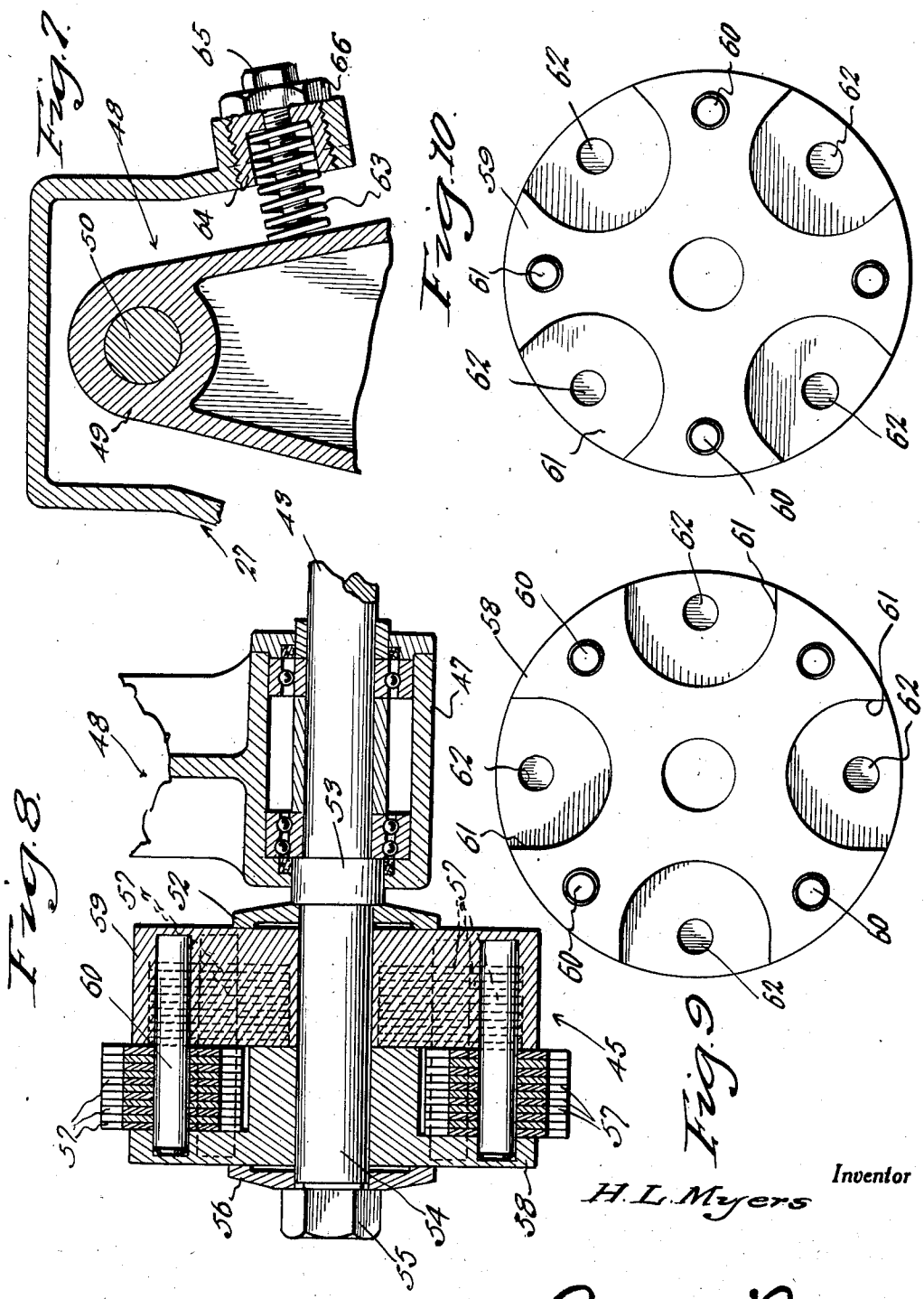

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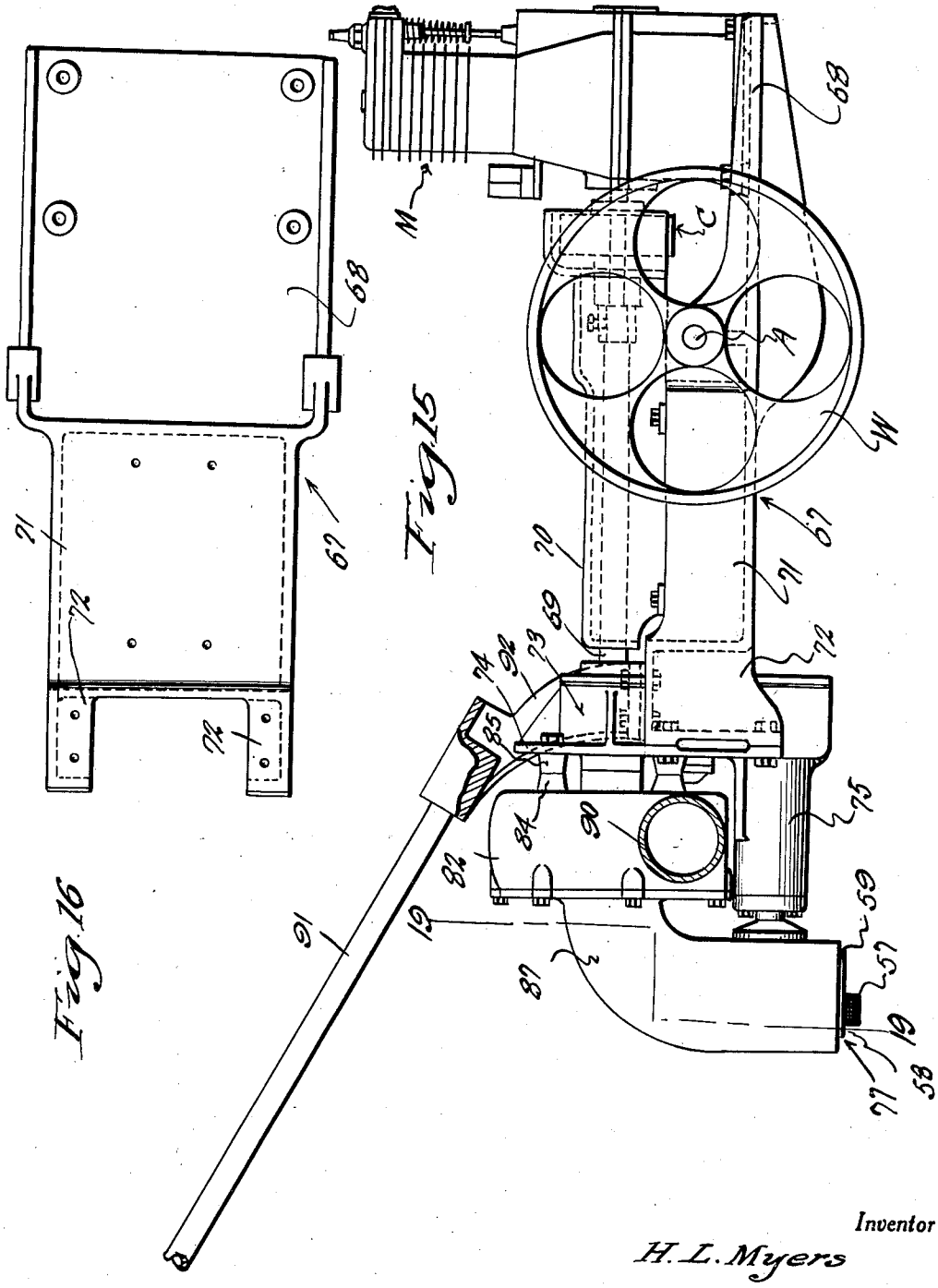

Fig. 15

Fig. 16

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ROAD SURFACING MACHINE

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Fig. 17.

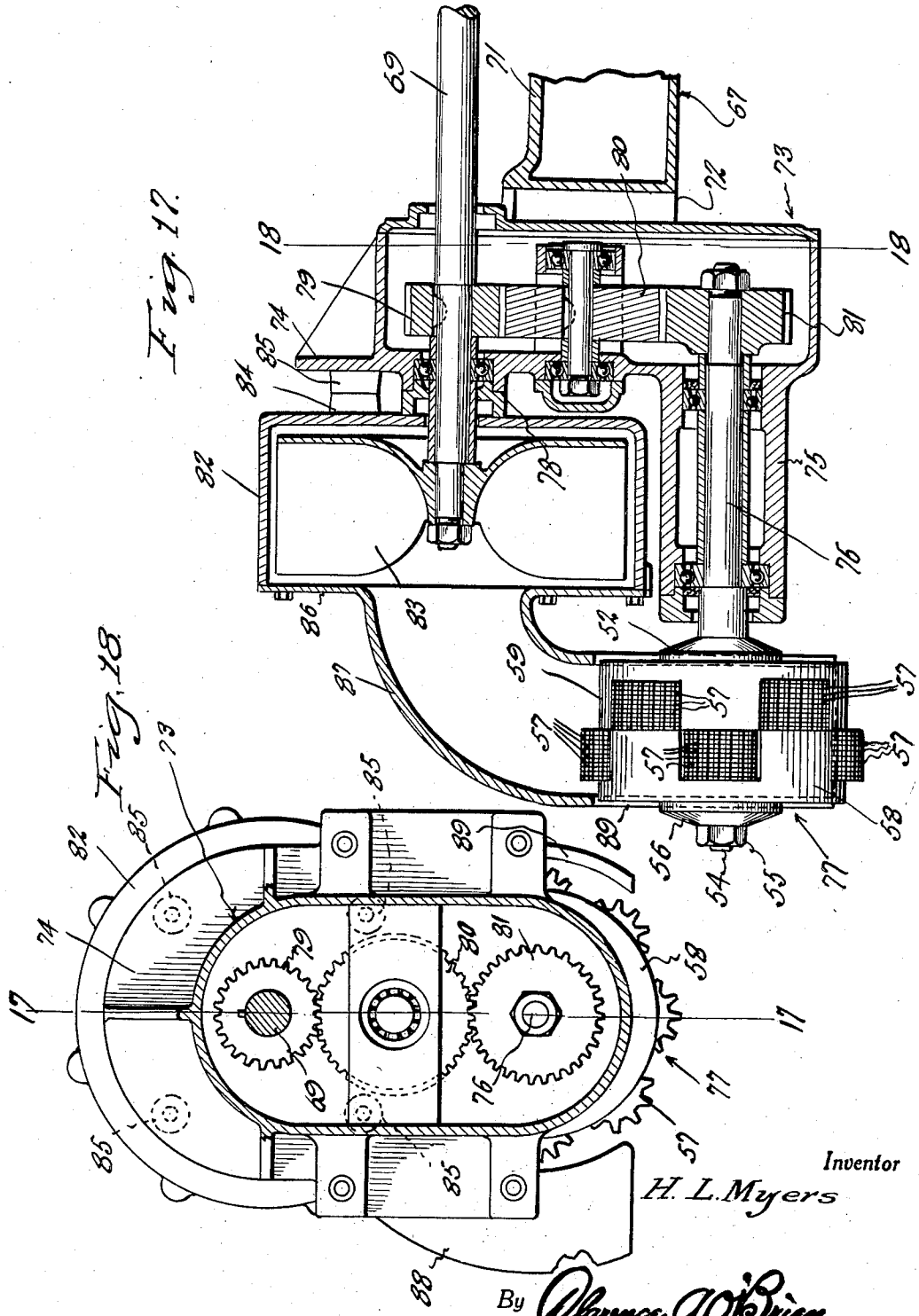

Fig. 18.

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Fig. 20.

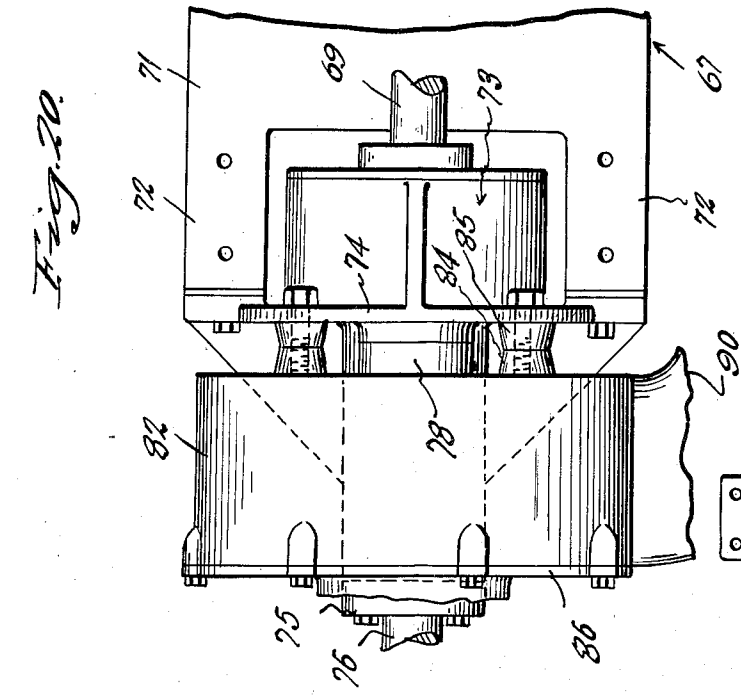


Fig. 21.

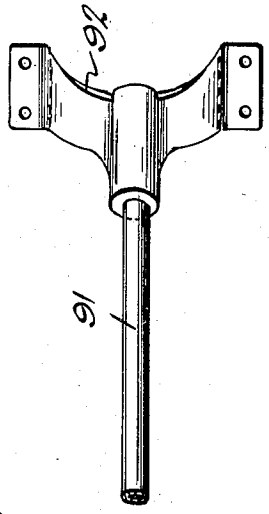
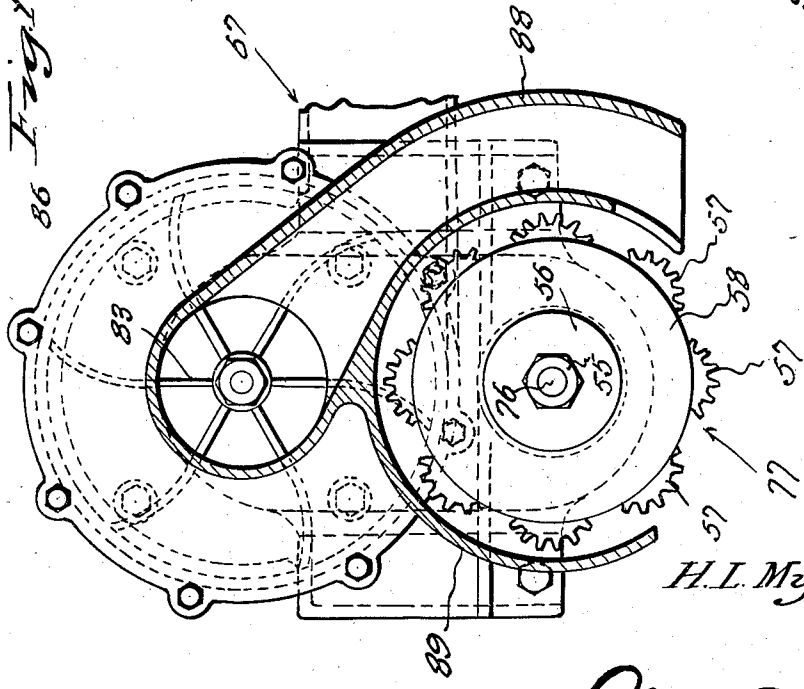


Fig. 19.



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Patented Sept. 10, 1935 2,014,186

UNITED STATES PATENT OFFICE

2,014,186

ROAD SURFACING MACHINE

Harry L. Myers, Toledo, Ohio, assignor to The American Floor Surfacing Machine Company, Toledo, Ohio

Application January 10, 1934, Serial No. 706,133

26 Claims. (Cl. 262—19)

This invention relates to the broad class of grinding and abrading machines and has more particular reference to a form and style of machine which is especially adapted for road surfacing work for both newly laid and used highways having concrete and bituminous surfaces.

Those familiar with concrete road construction and highway work are aware of the problems met in the surfacing and maintenance phase of this line of endeavor. Under practically all conditions, roads are carefully inspected by State inspectors who subscribe to and permit a tolerance of unevenness of approximately one-quarter of an inch. The finished road surface must come within this tolerance or it becomes necessary for the contractor to grind off the uneven and high spots before approval is given.

These same requirements must be frequently overcome in road patching and reconditioning work. Therefore, certain types of surfacing machines have been expressly designed and used to accomplish these tasks. At the present time, the two or three different types now endorsed by the trade are principally designed with the thought in mind of providing for surfacing work while the construction material or concrete is still green. Hence these machines are generally not practicable or satisfactory for resurfacing and leveling old roads requiring patching or other repair work.

The aforesaid types of machines now marketed for this special line of duty are of a portable, motor-equipped type and embody a wheel-supported truck including a tiltable frame having a steering handle at the outer or forward end, a grinding head, and an operating connection between the source of power or motor and said head. The grinding head is similar to the horizontally disposed disk abrading head used in floor work and is, therefore, rotatable about a substantially vertical axis, that is, at right angles to the surface being acted on.

Being conversant with these types of machines and their limited degree of dependable performance, I discovered the need for the development and adoption of a new styled machine characterized by certain structural refinements and features susceptible of permitting it to obtain the desired result in a more satisfactory and practicable manner.

In reducing the improved machine to practice, I have evolved and produced a structural assembly of unequaled excellence in that it is especially useful in levelling humps and irregularities on both old and new concrete surfaces, is practical for maintenance and repair work, capable of grinding down uneven and high expansion joints, capable of conditioning cavities for reception of concrete patches, and possesses the ability to operate and work across joints and edges without spalling and unnecessarily fracturing ragged edges.

One object of the invention, as will be hereinafter appreciated, is to provide a machine which is expressly designed to fulfill the requirements under consideration and to accomplish this through the instrumentality of a simple two-wheeled low-built truck attached to the center of gravity of a horizontally elongated low-slung chassis frame and to provide a special built drum-type grinding tool at the working end of the frame wherein said tool is rotatable on a horizontal axis at right angles to the truck so that it may be brought into grinding as well as rolling contact with the surface, thus making it possible to shift the tool in a lateral sweeping manner with respect to the truck and to also adjust it in unison with the movements of the truck to regulate the grinding action in a progressive manner.

Another object is to provide a machine of the aforementioned type wherein the vertical and lateral movements of the tool on a counterbalanced frame and truck arrangement are such as to effectively respond to the natural impulse of the attendant due to the particular drum-type construction of the grinding head and the fact that by rotating it on a horizontal axis it literally "rolls" the working end of the frame in a limited arcuate and sweeping path, this being compensated for by the simple two-wheeled low-built truck support.

A further feature of the invention is predicated on an assemblage of the foregoing type wherein a steering handle is utilized, said handle embodying an upwardly and forwardly inclined reach rod or shaft attached to the frame inwardly of the tool and having its opposite upper end provided with hand grips located sufficiently in advance of the tool to permit the operator to work at a safe distance from the tool and, at the same time, to have positive control of the tool to swing it from side to side in an arcuate path and to produce the requisite downward physical thrust pressure necessary to regulate both coarse and fine grinding and pulverizing work.

A further object of the invention is to provide a truck-supported counterbalanced frame arrangement with the prime mover on one end and the tool on the opposite end wherein said

parts have the proper ratio in weight to provide sensitive balancing of the frame, and to further incorporate in such arrangement a dust-collecting system associated with the grinding tool and operated by the prime mover so as to carry off the dust and exhaust it toward the rear of the machine so that the working area will be clear to the attendant at all times.

More specifically and structurally stated, I aim to provide an expressly designed road surfacing machine particularly adapted for the purposes intended in that it includes an appropriate mobile support properly movable during transportation and while working on the surface being treated, there being a suitable frame on this support and said support being so constructed as to include means whereby the frame may be rocked on its transverse axis substantially parallel to the surface and at the same time swung on its substantially vertical or upright axis, and means being provided for rotatably mounting a cylindrical head on the frame so that the axis of the head extends in a direction substantially at right angles to said transverse axis and in a plane substantially parallel to said surface so that the grinding means on the periphery of the head may adequately and aptly engage the surface being worked, the arrangement being such that the operator may swing the frame on the aforementioned upright axis in such a way as to cause the head to move from side to side in an arc concentric to said upright axis.

The explicit details of construction and their relative mechanical co-ordination relied upon to render the machine aptly fitted for the purposes intended will become more readily apparent from the following description and drawings.

In the accompanying drawings wherein like numerals are employed to designate like parts throughout the views:—

Figure 1 is a side elevational view of one embodiment of the road surfacing machine which is hereinafter referred to as a duplex grinder.

Figure 2 is a top plan view of the assembly illustrated in Figure 1, with the motor or engine removed.

Figure 3 is an enlarged fragmentary sectional and elevational view taken approximately on the plane of the line 3—3 of Figure 2.

Figure 4 is a transverse vertical sectional view taken approximately on the plane of the line 4—4 of Figure 3.

Figure 5 is an enlarged vertical sectional view taken on the plane of the line 5—5 of Figure 1.

Figure 6 is an elevational view of the triangular hanger or adapter for the double acting or duplex grinding head.

Figure 7 is a section taken on the plane of the line 7—7 of Figure 2.

Figure 8 is a fragmentary detail section taken approximately on the plane of the line 8—8 of Figure 6.

Figures 9 and 10 are detail elevational views of the companion disk-like sections of the circular grinding and surfacing head.

Figure 11 is a group assembly sectional and elevational view disclosing the co-acting elements of said head sections.

Figures 12 and 13 are detail views of the toothed spur-wheels which serve as the grinding elements in the wheel or disk assemblies.

Figure 14 is an elevational view of the triangular adapter plate or hanger per se.

Figure 15 is a side elevational view, like Figure 1, showing a different embodiment of the invention hereinafter differentiated as the single grinder type.

Figure 16 is a top plan view of the tiltable platform or frame forming the chassis of the two-wheeled truck.

Figure 17 is a fragmentary sectional and elevational view detailing the gear and shafting drive for the dust collector fan and grinding head, said figure being taken approximately on the plane of the line 17—17 of Figure 18.

Figure 18 is a transverse vertical sectional view taken at right angles to Figure 17 on the line 18—18 of Figure 17.

Figure 19 is a section taken approximately on the plane of the irregular line 19—19 of Figure 15.

Figure 20 is a top plan view of the frontal portion of the machine, looking down on Figure 17, for example.

Figure 21 is a detail elevational view of the steering handle.

By way of introduction to the detailed description, it is to be pointed out that the accompanying drawings illustrate two distinct types or embodiments of the machine. The so-called duplex grinder type is shown principally in Figure 1 and its associated accessories and parts are depicted in Figures 1 to 14 inclusive. Then in Figures 15 to 21, inclusive, is shown the single grinder type for the simplified style of road surfacing machine. For sake of clearness of description, these figures, that is, 1 to 14 on the one hand and 15 to 21 on the other, will be successively described in the order in which they occur. It will be obvious, however, as the description proceeds, that the two forms of the invention possess many common or generic features of construction. Therefore, the language will be comprehensively used to compensate for this slight variance.

Reference is to be had first to Figures 1 to 14, inclusive. Directing attention initially to Figures 1 and 2, the general assembly can be easily discerned. Briefly, this comprises a two-wheeled truck with a prime mover or suitable power means on one end and on one side of the axle, and a forwardly and upwardly extending beam carrying at its outer end the duplex grinding means, said grinding means being suspended or hung by compensating means and there being an appropriate drive between the prime mover and grinding means. Specifically the truck is of simple type and comprises a pair of duplicate wheels W mounted on the opposite ends of an axle A which supports the frame or chassis. The frame or chassis embodies a suitable platform 25 to support a conventional gasoline engine or motor M. On the left hand side of the axle A and projecting forwardly and upwardly is a suitably shaped obtruding extension which may be conveniently described as a beam 26. The beam terminates in a box-like integral unit 27 which is hereinafter specifically referred to as suspension means. Bolted or otherwise secured, as at 28, to this suspension means is the steering handle embodying a shaft 29 and hand-grip 30. This arrangement expedites handling and maneuvering of the machine for working and transportation purposes. It will be noted that by placing the motor on one side of the axle and the grinding means on the forward or other side, proper uniform balance is established to promote expeditious handling of this otherwise cumbersome machine. Incidently, the drive shaft, which is horizontally disposed, is differentiated by the numeral 31 and is coupled to the motor shaft S through the in-

strumentality of a conventional automatically operable speed controlled clutch C.

I call attention now to Figure 3, wherein the configuration and form of the suspension means 27 is illustrated. Here it will be observed that the numeral 32 designates a drive shaft bearing which accommodates the left hand end portion of the shaft 31 and which includes a cup 33 to accommodate the ball race and an attaching flange 34 by means of which it is bolted to the suspension means 27. The cup 33 protrudes into said part 27 and constitutes a support for the swingable depending transmission case 35. That is to say, the body portion 36 of this case is rockably suspended from the shaft bearing or cup 33. The numeral 37 designates a detachable cover plate. Incidently, while this transmission case may be designed to accommodate gearing in this particular embodiment of the invention, it is shown constructed to accommodate a sprocket chain and wheel drive. Referring to Figure 5, it will be seen that the drive shaft is provided with a sprocket wheel 38 over which the sprocket chain 39 is trained. The numeral 40 designates an idler which is positioned to reverse the motion of the complemental sprocket wheels 41 and 42 carried by the shafts 43 which constitute the driven shafts and which serve to support and operate the duplex grinding heads 44 and 45.

The shafts 43 are journaled in individual bearings 46 and 47 (see Figure 14) integrated with the triangular hanger plate or adapter plate 48. At its apex portion, the plate is provided with a bearing 49 mounted for limited pendulus or swinging motion on a horizontal suspension pin 50 carried by the bearing 51 in the part 27, as shown in Figure 3. It is, of course, obvious that the sprocket-equipped ends of the driven shafts 43 extend through the cover plate 37 and into the transmission case so that the transmission case is coupled to the pendulus hanger 48, causing these parts 48 and 35 to operate in unison. The parts together constitute broadly compensating means, allowing the grinding heads 44 and 45 to adjust themselves to the irregularities in the surface being acted on.

Referring now to Figure 8 showing the detailed mounting of the grinder head, it will be observed that this head, as a unit, bears at its inner end against a stop washer 52 backed against the shoulder 53 on the shaft 43. The outer end spindle portion 54 is constructed to accommodate the head and threaded to take care of a clamping nut 55 clamping the retaining washer 56 in place. This promotes expeditious and practicable application and removal of the head as a unit.

Each grinding head is the same in construction and a description of one will suffice for both. To begin with, it will be observed that the head, as a unit, is of general circular form. Moreover, it is equipped with peripherally arranged cutting and grinding assemblies. Each assembly is composed of a gang of toothed or spur-wheels 57 of the type shown in Figures 12 and 13. These are transfixed on the periphery of the head to travel in an orbital path. Moreover, these spur-wheels are independently rotatable on their own axes. Thus we have a revoluble head having peripheral grinding and cutting elements of a self-accommodating type in that they have independent rotary action. Consequently, as the head is rapidly whirled, it virtually spins the rotatable cutting wheel 57 against the surface being ground. Because of this flexibility of action, the grinding head does not fracture or spall the ragged edges of depressions and elevated expansion joints, etc. It has been discerned that with the marketed types of machines where the complete grinding surface of the horizontally disposed disk is in contact with the concrete, it causes chipping, crumbling and flaking, thus hampering the accomplishment of the job in a satisfactory manner.

It is further to be noted in connection with these particular grinding heads that the gangs or assemblies of spur-wheels are located in staggered or alternating relationship on the periphery of the head. This permits them to serve their appointed share in the grinding action in an intermittent but continuous cutting operation. That is to say, it promotes the proper rasping contact action essential in grading the concrete down to a smooth and even finish.

In making up the heads, it has been found advisable to construct each one from a pair of companion duplicate disk-like sections 58 and 59, as shown in Figures 9 and 10. These sections are centrally bored and slipped over the spindle 54. They are provided with empaling pins 60 which serve to transfix the toothed spur-wheels 57 in the accommodation pockets 61 provided therefor. Each pocket has a socket 62 to accommodate the free end of the pin. Hence by simply separating the two parts 58 and 59, the toothed wheels can be slipped off of the pins and interchanged and replaced to promote satisfactory operation at all times. This is indeed a unique assembly and arrangement. It is, of course, evident that the pockets are of a depth to permit the toothed edge portions of the wheels to project beyond the peripheral surface of the grinding head. Also, the pockets and pins are properly inter-related to provide for the staggered disposition of the spur-wheels.

It has been observed that when the grinding heads are out of contact with the work and idling, there is a tendency to develop an unusual strain and torque on the shafting and features making up the sprocket drive. To compensate for this, I have evolved and produced a unique torque equalizing means which is illustrated in Figure 7. This has a tendency to stabilize and centralize the hanger 48 so that it occupies a substantially normal depending position. The preferred embodiment of the means comprises a coiled spring 63 bearing against the hanger and supported in a nut 64 threaded into one of the side flanges of the channel-shaped suspension means 27. The numeral 65 is merely a stop bolt also threaded to the nut and into the spring, and 66 is a lock nut. This is a highly necessary accessory in a machine of this type since without it the two shafts 31 and 43 are subjected to unusual wear and tear.

Some of the structural features to be emphasized in conjunction with the embodiment of the invention just concluded are these. First, I desire to emphasize the idea of utilizing the double-acting, oppositely rotating grinding heads spaced apart and supported on pendulus compensating means whereby to permit them to be substantially self-leveling to conform to irregularities in contour and to better perform their assignments. Incidently, if it is desired, a suitable guard 67 may be provided to accommodate these grinding heads.

Secondly, I desire to emphasize the particular construction of the heads themselves. Inasmuch as instead of rotating on a vertical axis, such as is generally done in this line of endeavor, they rotate on horizontal axes at right angles to the

truck axle and dispose the cutting peripheral surfaces in position to contact the surface being acted on. The intermittent grinding and cutting action is important. The equi-distant spacing of the grinding and cutting spur-wheels is important. The independent rotation of the spur-wheels themselves on the revoluble head is distinct and an unusual refinement.

The co-ordination of the hanger 48 with the transmission casing 35 is a practicable achievement. Moreover, the adaptation of the special box-like unit 27 to accommodate these interrelated parts 35 and 48 is unique.

Then too, the resilient pressure action of the torque equalizing device shown in Figure 7 to normalize the position of the part 48 is an innovation in a machine of this type. The uniform and well balanced arrangement of all the parts of the machine in relation to the motor and truck is practicable and efficient and the handle 29 on the forward portion thereof permits the machine to be transported and properly maneuvered.

The integrated formation of the entire frame tiltably mounted on the truck wheels and carrying the prime mover at one end and the grinding and power transmission means at the other end is well suited for the intended purposes. It is to be noted that the part 27, which serves as the suspension means for the transmission casing and adapter, is of hood-like construction. Thus made, it is aptly fitted for the purposes intended. In fact, it is thought that the parts as mutually connected, transcend in importance and performance similar parts found in prior art constructions.

Coming now to the single grinder type of the invention illustrated in Figures 15 to 21, attention is directed to Figure 16. Here the numeral 67 designates the chassis or frame having a platform 68 at its rear end to accommodate the gasoline engine or motor M. The automatic clutch is indicated at C in Figure 15 and the drive shaft is indicated at 69. This is housed in a shield 70 attached to the frontal plate or base portion 71 of the frame. The frame is fulcrumed to rock on a transverse axis, that is on the axle A supported by the wheels W. The frontal portion of the base is bifurcated and the furcations are denoted by the numeral 72. It is between these parts that the principal features of the invention are supported. The latter assembly of parts is shown better in Figure 17. Here the gear casing is indicated by the numeral 73 and provided at its front with an attaching flange 74 bolted or otherwise secured to the furcations 72. The gear casing is formed at its bottom with an extension defining a bearing 75 for the driven shaft 76 which operates the single grinding head 77. Incidently, this head is of the same construction as the heads already described and corresponding numerals are employed to designate like parts. At its upper portion, the gear casing is provided with a bearing 78 to accommodate the adjacent end portion of the drive shaft 69. This shaft is provided with a gear 79 meshing with an idler gear 80 which in turn drives a power take-off gear 81 on the driven shaft 76. Thus the motion is transmitted from the shaft 69 to the shaft 76 to operate the head 77.

In this arrangement, I utilize a dust collector system and guard for the grinding head. The dust collector means comprises a fan housing 82 to accommodate the suction fan 83 carried by the left hand end of the shaft 69. The shaft 69 projects through the gearing housing or casing into the fan casing. The fan casing is secured by spacing studs 84 and 85 and both to the attaching flange 74. The cover plate 86 is provided with a dust intake 87 embodying a communicating dust intake nozzle 88, as shown in Figure 19. This same casting which forms the nozzle and cover plate is fashioned to provide a segmental guard 89 for the grinding head. The dust discharge or outlet is shown at 90 in Figure 20.

The operating handle is indicated at 91 and is provided with a yoke 92 attachable to the frame for raising and lowering it for appropriate grinding and releasing action.

In the duplex arrangement, that is, the opposed oppositely operating grinding heads (Figures 1 to 14, inclusive), the heads stick to the surface in a self-accommodating manner. It has been observed, however, that with the single head arrangement, the operator can concentrate more readily on the high place on the road surface despite the additional effort and energy required. It is also evident that in the double type, the arrangement is slightly more complex, whereas in the single arrangement, simplification and economy prevail.

In comprehending the following claims, it is desired that the term "truck" be interpreted to comprehend any sort of a transportable vehicle or conveyance which is adapted to support the motor and grinding means and to facilitate its movement to and from the job, as well as its expeditious handling and maneuvering in the vicinity of the work. In both forms of the machine it will be observed that the drive and driven shafts are in vertically superposed parallelism in order to transmit the power from an elevated point to a point within the vicinity of the surface and to accomplish this either through direct gearing or a sprocket chain drive, as is desired. In both forms of the invention, the motor or prime mover is supported on one side of the axle and the entire weighted grinding means on the other side of the axle at a point remote and in advance of the axle, at which point the steering and maneuvering handle is attached. It will be observed in fact that there are many generic and common features existing between the two styles of machine. For example, it will be noted that in both forms of the invention the remote power means or prime mover drives one or more circular grinding heads, with the heads rotatable around the horizontal axes, that is, attached to a horizontal shaft and with the equi-distant or alternating, intermittently operating free rotating toothed disk on the peripheral portion of the head. Here is a continuity and co-ordination of features which, it is believed, will satisfy the requirements of the trade.

From the foregoing it will be seen that novelty is predicted on the adoption and use of a low-built portable gasoline engine-driven machine of a perfectly balanced type such as may be justly endorsed by the trade for concrete road surfacing and servicing work. As constructed in accordance with the invention, the machine is perfectly proportioned and easily controlled permitting the work to be done with utmost accuracy. The machine is of a self-contained power type wherein sufficient power is furnished by a simple economical power plant to operate the rotary grinding tool as well as the dust-collecting system, permitting the dust to be rapidly removed as it accumulates so that the cutting head is always working on a clean surface. This not only increases the efficiency of the machine but

enables the operator to see exactly what he is doing.

Due to the proper counterbalancing construction of the frame and its appurtenances, it is evident that the grinder cuts the concrete surface with a smooth even action and produces no jumping or chattering. In a sense, it involves a new principle in construction in that it embodies a high-speed grinding tool embodying self-accommodating cutters which do their work at a rapid rate, this being accomplished by placing the cutters around the outer rim or periphery of the drum-type cutter head. The rotary action of the cutter head placed on a horizontal axis, gives a smooth keen cutting action. Although, it is of secondary importance, the particular construction of the cutter head, that is, a structure made in sectional parts to provide for renewal of the toothed cutting disks, is an added improvement.

Of superior importance to the sensitive counterbalancing idea is the special conception which involves the special adaptation and use of a structural assemblage which invokes the unique idea of utilizing the simple two-wheeled truck as a compensating and mobile support in order to provide the requisite or transverse or horizontal axis on which the frame may be rocked as well as the upright axis around which the frame may be swung in a substantially horizontal plane parallel to the surface while being moved up and down to take care of varying contingencies; in conjunction with an appropriate grinding head having road grinding means on its periphery and suitable means, preferably a tool shaft, to serve to rotate the head on the frame so that the axis of the head extends in a direction substantially at right angles to the transverse axis and in a plane substantially parallel to the surface being worked to allow the peripheral grinding means to properly contact and adjustably engage said surface.

It is believed, however, that persons skilled in the art to which the invention relates will be able to appreciate the features and advantages, the weight and stress distribution, and the special maneuvering activity of the handle, for which reason a more lengthy description is deemed unnecessary.

I claim:

1. A grinding and abrading head for use in association with a road surfacing machine of the class described comprising a shaft adapted for horizontal rotation, said shaft including a spindle, a grinding head mounted on said spindle, said head embodying a pair of substantially duplicate disk-like sections arranged in abutting contact, the opposed faces of said sections being provided with alternating cavities forming disk receiving pockets, the portions of the sections between said cavities being provided with empaling pins to span the pockets, each pocket being provided with a counter-bore forming a socket for reception of the free end portion of the adjacent or complemental pin, and a group of toothed cutting wheels mounted for rotation on each pin and located in a complemental pocket.

2. A road surfacing machine of the class described comprising a truck including a wheel-supported axle, a frame mounted on said axle, a prime mover attached to one end of the frame and located rearwardly of the axle, a horizontally disposed drive shaft supported on the frame and operatively connected with said prime mover, a horizontally disposed bearing associated with the front end portion of said frame and adapted for disposition in close proximity to the surface being treated, a driven shaft mounted for rotation in said bearing, said shafts being disposed in superposed parallelism, means operatively connecting the two shafts together, a steering and maneuvering handle attached to the frontal portion of said frame, and a grinding head attached to the horizontal driven shaft.

3. A machine of the class described comprising a power-equipped wheel-supported frame including a forwardly extending power actuated drive shaft, a power transmission casing mounted on the forward end portion of said frame and depending into close proximity to the work, said casing being provided at its lower end with a horizontal bearing, said drive shaft extending through the upper end portion of the casing, a gear connected with said drive shaft, a driven shaft mounted for rotation in said bearing, an operating connection between said driven shaft and said drive shaft for simultaneously operating the shafts, and a grinding head on the front end of said driven shaft.

4. A machine of the class described comprising a motor-equipped wheel-supported frame including a forwardly extending motor actuated drive shaft, a gear casing mounted on the forward end portion of said frame and depending into close proximity to the work, said gear casing being provided at its lower end with a horizontal bearing, said drive shaft extending through the upper end portion of the gear casing, a gear connected with said drive shaft, a driven shaft mounted for rotation in said bearing, gearing connecting said driven shaft with said drive shaft for operating the shafts, a grinding head on said driven shaft, a dust fan casing attached to said gear casing, a fan located in said fan casing, said drive shaft extending into the fan casing and attached to said fan, said fan casing including a cover having a guard partially surrounding the peripheral portion of said head and further including a dust intake nozzle for delivering dust and dirt into the fan casing, said fan casing being provided with an outlet.

5. A machine of the class described comprising a truck including a tiltable frame having a motor supporting platform and a forwardly extending beam, said beam terminating at its forward end in a suspension unit, said unit including aligned bearings, a drive shaft having one end portion supported in one of said bearings, a hanger pin supported in the remaining bearings, a transmission casing swingably mounted on one of said bearings and depending from said suspension unit, an adaptation hanger swingably supported from said hanger pin and including a horizontal bearing, a driven shaft mounted in said horizontal bearing, a grinding head attached to one end of said driven shaft, and an operating connection between said shafts, said means being located in said transmission casing.

6. A machine of the class described comprising a portable support including a frame, a swingably mounted hanger on said frame including a pair of horizontal spaced parallel bearings, driven shafts mounted for rotation in said bearings, operating means for said shafts, and grinding heads on the forward ends of said shafts.

7. A machine of the class described comprising a portable support including a frame, a swingably mounted hanger on said frame including a pair of horizontal spaced parallel bearings, driven

shafts mounted for rotation in said bearings, operating means for said shafts, and grinding heads on said shafts, and means for turning said heads in directions reverse to each other so as to cause the heads to remain in self-accommodating contact with the surface being treated.

8. A surfacing machine of the class described comprising a portable truck including a frame having a beam formed at its forward end with an inverted hood-like suspension unit, a vertically elongated depending transmission housing hung for swingable movement in said suspension unit, a drive shaft extending into said casing and provided with a driving element, a pendulous hanger mounted for swinging movement in said suspension unit and provided with bearings, driven shafts mounted for rotation in said bearings and having their rear ends extending into said transmission housing and provided with driven elements, an idler also in said housing, a power transmission chain engageable with all of said elements in a manner to turn said shafts in reverse directions, and grinding heads on said driven shafts.

9. A surfacing machine of the class described comprising a portable truck including a frame having a beam formed at its forward end with an inverted hood-like suspension unit, a vertically elongated depending transmission casing hung for swingable movement in said suspension unit, a drive shaft extending into said casing and provided with a sprocket wheel, a pendulous hanger mounted for swinging movement in said suspension unit and provided with horizontal bearings, horizontal driven shafts mounted for rotation in said bearings and having their rear ends extending into said transmission casing and provided with sprockets, an idler sprocket also in said casing, a sprocket chain engageable with all of said sprockets in a manner to turn said shafts in reverse directions, and grinding heads on the forward ends of said shafts, together with resilient torque equalizing means on said suspension unit co-operable with said pendulous hanger.

10. A low-built concrete road surfacing and grinding machine of a one-man portable type comprising a relatively low transporting and maneuvering truck provided with independent idling wheels, a low-slung horizontally elongated chassis frame fixedly fulcrumed intermediate its ends on said truck, a prime mover on one end of the frame, a grinding tool and operating means therefor on the opposite end of the frame, said tool and associated means possessing an aggregate weight substantially equivalent to that of the prime mover in order to uniformly balance the frame on said truck, said grinding tool being of a rotary circular drum type revolvable about a horizontal axis disposed at right angles to said truck and embodying marginal grinding means, whereby to permit said tool to roll and ride from side to side while in contact with the surface and to swing in an arcuate path with respect to the truck during which time the truck wheels compensate for such swinging movements, and a handle structure associated with the tool-equipped end of said frame, and including an upstanding reach rod attached to the frame at its lower end and provided at its upper end with handle bars, said handle bars being located beyond the tool and sufficiently elevated to permit the tool to be controlled either by a downward thrust action and/or lateral swinging movement in a horizontal plane.

11. A portable concrete road surfacing and grinding machine of the class described comprising a truck including a horizontal axle, a pair of wheels mounted for free rotation on said axle, a frame fixedly fulcrumed intermediate its ends on said axle, a source of power mounted on the frame and located rearwardly of the axle, surface grinding means attached to the forward end of the frame and balanced in relation to the source of power and supporting rear end of the frame, an automatic speed controlled clutch equipped operating connection between the source of power and said grinding means for operating the grinding means only when it is in working contact in the surface being worked, a steering and maneuvering handle attached to the forward end of the frame above and extending outwardly beyond said grinding means, said grinding means embodying a rotary tool operable on an axis substantially at right angles to said shaft, and said tool further including self adapting peripheral grinding elements.

12. As a component part of a road surfacing machine of the class described, a grinding and abrading head comprising a supporting and rotating shaft, said head embodying a pair of duplicate companion sections having their inner or adjacent faces in direct abutting contact, the opposed faces of said sections being provided with a plurality of cavities forming marginal pockets, the outer open ends of said pockets opening through the peripheral or marginal rim of the head, retaining and pivot forming pins mounted in said pockets, and toothed cutters fitted into said pockets, said cutters being retained in place by said pins, being rotatably mounted on the pins, and the cutting teeth thereon projecting through the outer open ends of the pockets and beyond the rim of the head.

13. In a road surfacing machine, and in combination, a mobile supporting structure for movement on a road surface being worked, a frame on the mobile structure, said mobile structure including means whereby the frame may be rocked on a transverse axis substantially parallel to said surface being worked and simultaneously and/or independently swung on an upright axis, a cylindrical head having road grinding means about its periphery, means rotatably mounting the head on the frame so that the axis of the head extends in a direction substantially at right angles to said transverse axis and in a plane substantially parallel to said surface being worked and so that the grinding means on the head may engage the surface being worked, a prime mover on the frame operatively connected to the head for rotation thereof, and handle means on the frame, whereby an operator may maneuver the machine to rock the same on said transverse axis for engaging and disengaging the head with respect to the surface being worked and when the head is engaged with said surface, the operator may swing the frame on said upright axis causing the head to move from side to side in an arc concentric with respect to said upright axis.

14. In a road surfacing machine, and in combination, a mobile supporting structure for movement on a road surface being worked, a frame having an intermediate portion thereof mounted on the mobile structure, said mobile structure including means whereby the frame may be rocked on a transverse axis substantially parallel to said surface and may be swung on an upright axis, a cylindrical head having road grinding means about its periphery, means rotatably mounting the head on the frame so that the axis

of the head extends in a direction substantially at right angles to said transverse axis and in a plane substantially parallel to said surface being worked and so that the grinding means on the head may engage the surface being worked, said cylindrical head being located adjacent one end of the frame, a prime mover on the other end of the frame operatively connected to the head for rotation thereof and being of such a weight as to partially counter-balance the head, and handle means on the end of the frame adjacent the head, whereby an operator may adjust and regulate the machine to rock the same on said transverse axis for engaging and disengaging the head with respect to the surface being worked and when the head is engaged with said surface the operator may swing the frame on said upright axis causing the head to move from side to side in an arc concentric with respect to said upright axis.

15. A low-built concrete road surfacing and grinding machine of the portable one-man type comprising a relatively low transporting and maneuvering truck including a horizontal axle having idling wheels at its ends, a low slung chassis rockably mounted on said axle, a source of power on one end of the chassis, irregular concrete surface grinding and levelling means on the opposite end of said chassis, the ratio of weight of the opposite ends of the chassis including the source of power and said grinding means being such that the chassis is uniformly counterbalanced on said axle to allow the grinding means to be easily adjusted toward and from the surface, a handle structure attached to the end of the chassis adjacent said grinding means and elevated above said means and located in respect thereto to permit the chassis to be horizontally swung from side to side in an arcuate path, said grinding means embodying a horizontally disposed tool shaft located at right angles to the aforementioned axle and including a tool on said shaft, said tool being mounted for rotation about the horizontal axis of said shaft.

16. In a structural assemblage of the class described, a portable power-equipped support including a drive shaft and a tool shaft, said tool shaft being disposed in a horizontal plane and occupying a position in alignment with the longitudinal dimension of the support, a grinding head mounted on said tool shaft for rotation on a horizontal axis, said grinding head being of a circular type and including peripheral grinding means revolvable in an orbital path whose radius is at right angles to the surface being treated.

17. A machine of the class described comprising a portable powered support having manually controllable guiding and maneuvering handle means, and self adapting and levelling grinding means on said support including a hanger freely swingable in a pendulous manner and disposed at right angles to the surface being treated.

18. In a structural assemblage of the class described, a portable power equipped support having maneuvering and guiding handle means, a swingably mounted hanger on said support occupying a position at right angles to the surface being treated, and a pair of closely spaced grinding heads on said hanger for contact with the surface, said heads being mounted for turning on horizontal axes, being turnable in directions opposite to each other, and the grinding surfaces thereof travelling in circular paths at right angles to the surface being treated.

19. As a component part of a structural assemblage of the class described, a substantially triangular hanger unit having supporting means at its top, and a pair of spaced parallel bearings at its bottom, tool shafts mounted in said bearings and disposed in spaced parallel horizontal positions in relation to the surface being treated, and individual drum-type grinder heads on the operating ends of said tool shafts, said grinder heads being provided with peripheral freely rotatable grinding elements destined to revolve in orbital paths around their horizontal axes.

20. In a road surfacing machine, and in combination, a mobile supporting structure for movement on a road surface being worked, a frame on the mobile structure, said mobile structure including means whereby the frame may be rocked on a transverse axis substantially parallel to said surface being worked and may be swung on an upright axis, a pair of companion simultaneously operable oppositely working cylindrical heads having peripheral grinding means, means rotatably mounting the heads on the frame so that the axes of said heads extend in directions substantially at right angles to said transverse axis and in planes substantially parallel to said surface being worked, a prime mover on the frame operatively connected with the heads for rotating said heads, and handle means attached to the frame to facilitate maneuvering the frame and controlling the action of said heads.

21. In a machine of the class described, a portable elongated frame, a motor carried by said frame and having a drive shaft extending longitudinally in relation to the longitudinal dimension of said frame, a driven shaft journaled for rotation in bearing means on the frame below and substantially parallel to said drive shaft, an operating connection between said shafts, a surfacing tool operated by said driven shaft and having its axis positioned normally lengthwise of the frame, a fan housing associated with said driven shaft and having an inlet conduit adjacent said tool to receive the grindings therefrom, and a suction fan mounted in said housing having operating connection with one of said shafts.

22. A machine of the class described comprising an elongated frame, a rolling support for said frame permitting vertical rocking movement of the frame, power means mounted on the frame, a main drive shaft rotatably mounted in said frame lengthwise with respect to the longitudinal dimension of the frame and driven by said power means, a transmission housing receiving one end of said shaft and having a bearing downwardly offset with its axis substantially parallel to said shaft, a second shaft mounted in said bearing and having a surfacing tool thereon, power transmission means connecting said shafts operatively within said housing, a fan housing carried by the frame and disposed over said bearing and in advance of said transmission housing having an inlet conduit partially embracing and shielding said tool, said fan housing being furthere provided with an outlet, and a fan mounted in said fan housing and driven by said first named shaft.

23. In a structural assemblage of the class described, a portable support, a frame mounted on said support, said frame being provided at its outer end with a power transmission housing assuming a vertically disposed position, said transmission housing being provided at its lower end with a horizontal bearing, a driven tool shaft mounted for rotation in said bearing, a tool car-

ried by said shaft, one end of the tool shaft extending into said transmission housing, power supply means on said frame, a power actuated drive shaft mounted for rotation on the frame and operatively connected with the power supply means and extending through said transmission housing, an operating connection between said shafts confined in said housing, a dirt and dust collector fan housing connected with said transmission housing, said drive shaft extending into said fan housing and being provided with a fan, said fan housing having a marginal outlet and an intake nozzle, said intake nozzle depending therefrom and being fashioned to partially embrace said tool.

24. A road grinding machine of the class described comprising a manually controllable portable support having power supply means, a rotary tool operated by said power supply means and having surface grinding means around its periphery, said tool being rotatable on an axis substantially parallel to the surface being treated, and means operatively mounting the tool on said support in a manner to permit the grinding means to have self levelling contact with the surface and to be moved voluntarily toward and from the surface while being swung back and forth in a horizontal plane in a substantially arcuate path and on a vertical axis.

25. A portable road grinding machine of the class described comprising a mobile frame, a rotary tool provided with grinding means on its marginal rim, and means for mounting the tool on said frame including a horizontally disposed tool shaft movable vertically toward and from the surface on a horizontal axis, and swingable on a vertical axis in a horizontal plane while travelling in a substantially arcuate path in relation to said vertical axis, said tool shaft being disposed, when in an inactive condition, at substantial right angles to said horizontal and vertical axes.

26. A portable road grinding machine comprising a power equipped mobile support for manually controllable movement on the road surface being conditioned, substantially horizontally disposed operating means connected with the source of power, a planetary rim-type grinding and surface conditioning tool operatively connected with said horizontal operating means and rotatable on an axis substantially parallel to said surface, and additional two-way pivotal means under the control of the walking attendant permitting the tool to be swung laterally in an arcuate path on a vertical axis and to adjust itself vertically on a horizontal axis, whereby to conform to the irregular contour being traversed or to be bodily lifted vertically for guiding and transportation purposes.

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