Sept. 5, 1944. M. S. ARIENS 2,357,374

SURFACE-WORKING MACHINE

Filed May 20, 1940 2 Sheets-Sheet 1

Fig. 1.

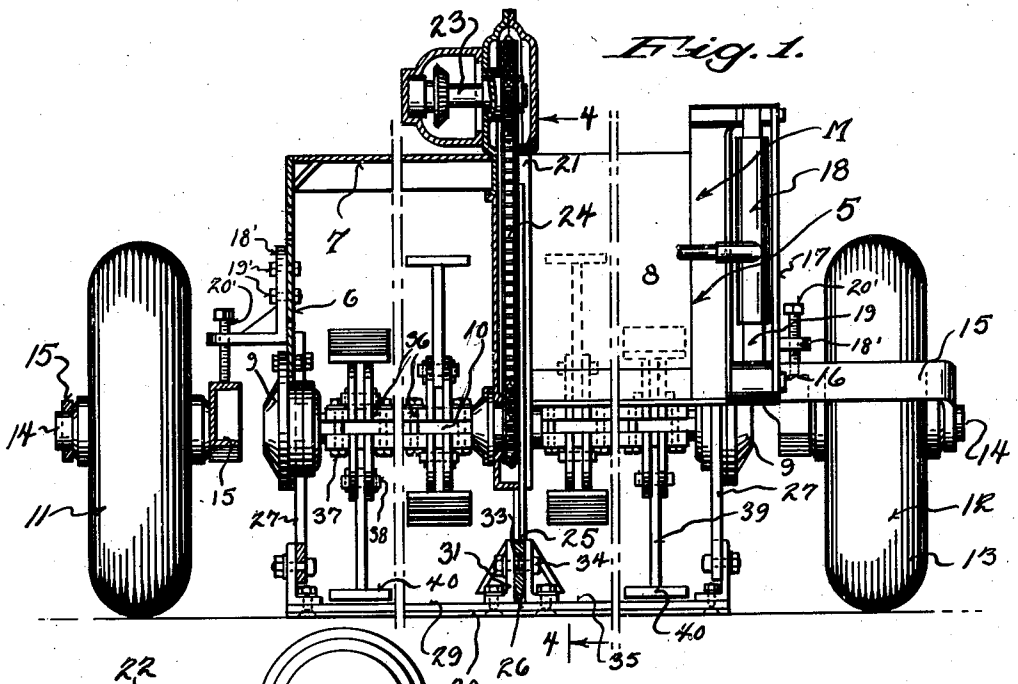
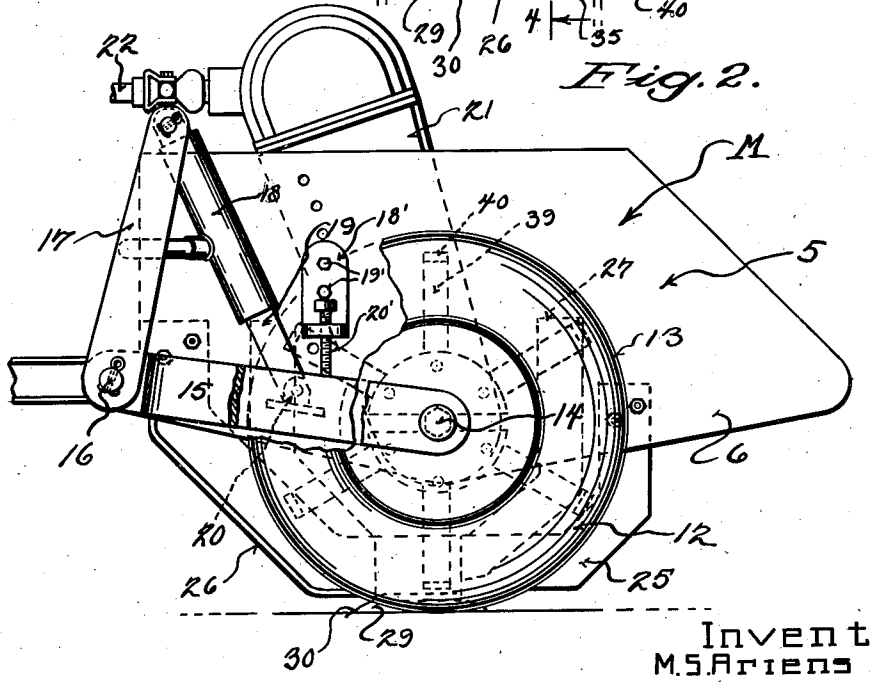


Fig. 2.



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Fig. 5.

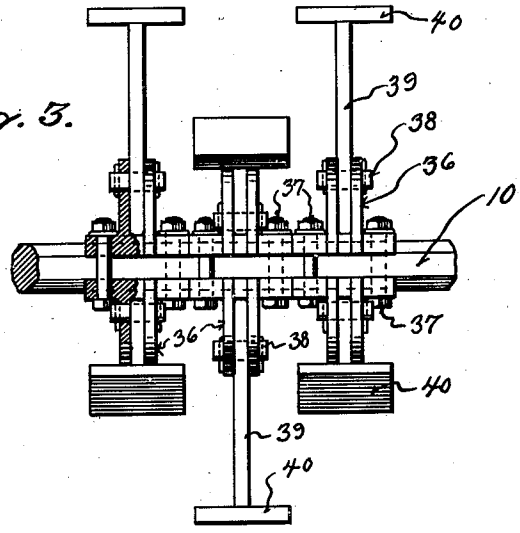
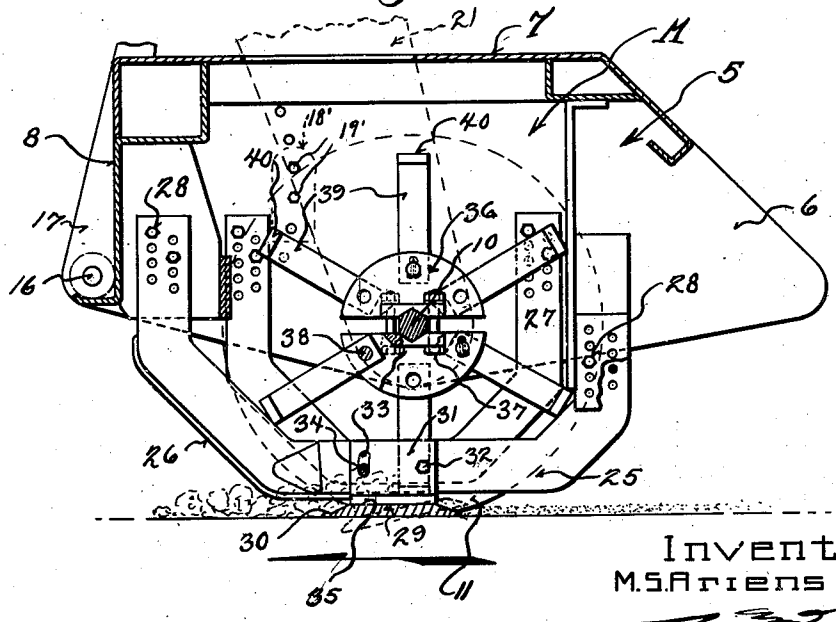


Fig. 4.



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UNITED STATES PATENT OFFICE

2,357,374

SURFACE-WORKING MACHINE

Mando S. Ariens, Brillion, Wis.

Application May 20, 1940, Serial No. 336,207

1 Claim. (Cl. 94—49)

This invention appertains to a surface-working machine of the general character shown in my Patent 2,025,494, issued to me December 24, 1935, and in my pending application Serial No. 298,639, filed October 9, 1939.

One of the primary objects of my present invention is to provide a machine particularly useful in road construction work for facilitating and insuring the proper pulverizing and mixing of various types of aggregates laid directly on a road surface.

It is well recognized by road builders that the better the road material is pulverized, mixed, and aerated with bituminous oils, cements, or whatever binder is used, the smoother, the more compact and stabilized the road will be. Great difficulty is experienced in properly mixing and pulverizing the aggregates directly on the roadbed during the surfacing of the road.

Therefore, another salient object of my invention is to provide a machine for use in "mixed-in-place" road construction, which will rapidly work and pulverize the aggregates and mix the various materials together and insure the smooth, even distribution of the materials over the roadway.

A further object of my invention is the provision of a mobile machine having a rapidly rotating, transversely disposed shaft carrying a plurality of pivoted hammers for operating against the material to be mixed, the action of the rotating, swinging hammers being such as to bring about the fast pulverizing and working of the road materials.

A further important object of my invention is the provision of an adjustable scraper and leveler blade having an upper top face over which the road-surfacing materials ride, and a plurality of rapidly rotating, swinging hammers for acting upon the material as the same passes over the blade, whereby the material will be pulverized and mixed by the action of the hammers against the blade.

A still further object of my invention is the provision of novel means for detachably mounting the hammers on the shaft, whereby the hammers can be readily and quickly replaced when worn or broken.

With these and other objects in view, the invention consists in the novel construction, arrangement, and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a front elevational view of my improved road-surfacing machine, showing parts thereof broken away and in section to illustrate structural details.

Figure 2 is a side elevational view of my machine.

Figure 3 is an enlarged, fragmentary, detail, sectional view illustrating the construction of the swinging hammers and the means for mounting the same upon the rotating shaft.

Figure 4 is a transverse, sectional view through the machine, taken on the line 4—4 of Figure 1, looking in the direction of the arrows.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter M generally indicates my improved machine, which comprises a protecting housing or casing 5, which is adapted to extend transversely across a roadway.

This housing or protecting casing 5 is rigidly and strongly constructed from steel or like plates of the desired gauge rigidly welded or otherwise secured together. The casing forms the main frame of the machine, and, hence, the casing is braced at various points by longitudinally and transversely extending boxlike girders. Briefly, the longitudinally extending casing or housing 5 includes side plates 6, a connecting top wall or plate 7, and a depending front plate or wall 8. The side or end walls 6 carry bearings 9 for the transversely extending shaft 10, which is freely rotatably mounted therein. The purpose of this shaft will be later described.

The frame of the machine is supported by independently adjustable ground wheels 11 and 12, and these wheels can be provided with pneumatic tires 13 of the tractor type. The wheels are rotatably mounted on short stub shafts 14 carried by swinging U-shaped wheel supports 15. The forward ends of the U-shaped wheel supports 15 are rockably mounted, as at 16, on hangers 17 rigidly connected with the frame or casing 5.

The upper ends of the hangers have pivotally connected thereto cylinders 18, and mounted in the cylinders for reciprocatory movement are pistons 19. These pistons are, in turn, pivotally connected to attaching brackets 20 welded or otherwise connected to the swinging wheel supports 15.

Means is provided for independently controlling the fluid to and from the cylinders 18, whereby the wheels 11 and 12 can be independently adjusted. Thus, the frame or casing 5

can be raised and lowered relative to the ground, and can also be tilted at any desired angle transversely of the roadway.

One of the important features of my invention is the provision of means whereby the frame can be adjusted or set accurately to any desired position relative to the ground. In employing the hydraulic means for raising and lowering the frame, the frame lowers relatively fast, and, hence, accurate adjustment cannot be had.

The means for holding the frame in an adjusted position includes angle brackets 18', and these brackets are adjustably bolted to the side plates 6. As illustrated, the side plates 6 are provided with an arcuate row of bolt-receiving openings, and bolts 19' can be extended through the brackets and into selected openings of the row of openings. The lower ends of the angle brackets 18' carry adjustable stops 20', which can be in the nature of screws threaded into the brackets. The lower ends of the screws are disposed in the path of the U-shaped wheel supports 15 and act as abutments or stops therefor. Obviously, by adjusting the screws 20', the downward swinging movement of the frame on the wheel supports can be accurately set.

During the use of the machine, the desired position of the frame relative to the ground is had by the initial adjustment of the brackets 18' and then the screws 20'. When the machine has traveled the desired distance down a roadway, the frame can be lifted by the hydraulic jacks, and the machine can be turned around. It is then merely necessary for the operator to release the fluid in the jacks, and the frame of the machine will lower until the screws abut the end brackets 15, and the frame and machine will again be disposed in the desired and correct position relative to the ground.

Disposed centrally on the housing or casing 5 is a depending gear housing 21. This gear housing is rigidly connected to the casing and, in effect, forms a part of the frame. Extending into the gear housing 21 is a drive shaft 22, which is adapted to be driven from the power take-off of a tractor (not shown). The drive shaft 22 operates a countershaft 23 disposed in the upper end of the gear housing, and this countershaft drives a sprocket chain 24, which travels over a sprocket wheel keyed or otherwise secured to the operating shaft 10 heretofore mentioned.

Also disposed at the central portion of the machine and arranged transversely of the casing is a depending center U-shaped bracket 25, and this bracket can have its lower and front edge sharpened, as at 26, for facilitating its passage through the road surface. Similar end U-shaped brackets 27 are provided, and all of these brackets 25 and 27 are adjustably secured by means of bolts 28 to frame plates and the like forming a part of the rigid casing frame 5. These brackets 25 and 27 support the scraper and leveling blade 29, which extends longitudinally of the machine, but transversely of the roadway. The scraper and leveler blade has its opposite longitudinal edges sharpened, as at 30, so as to permit the turning around of the blade when one edge becomes worn.

The blade has rigidly connected thereto angle brackets 31, and these angle brackets are connected by pivot bolts 32 to the brackets 25 and 27. By means of the pivot bolts 32, the blade 29 can be swung to a raised or lowered position, and in order to hold the blade in its desired adjusted position, the angle brackets 31 are provided with arcuate slots 33, through which extend clamping bolts 34 carried by said depending U-shaped brackets 25 and 27. The blade 29 is formed relatively wide and has an upper face 35 over which travels the road material during the drawing of the road machine over the roadway. The upper face 35 of the blade can be formed smooth or corrugated, as may be best suited for the work being done.

It is one of the prime objects of my invention to provide a hammermill action on the road aggregates during the drawing of the machine over the road, and by providing this hammermill action, I am enabled to bring about the desired rapid pulverizing and mixing of the road materials.

In carrying out this important feature of my invention, I provide duplicate pairs of semicircular hub plates 36, and these duplicate pairs of hub plates 36 are connected by clamping bolts 37, so that the hub plates will be rigidly, but detachably, mounted upon the operating shaft 10. This shaft is also preferably of a hexagonal shape in cross section. Between the companion pairs of hub plates 36, I mount at spaced points on pivot pins 38 the hammers 39. Thus, the hammers are mounted for free swinging movement on the hub plates, and by referring to Figures 1 and 3, it will be noted that the swinging hammers in one group are staggeredly related to the hammers of another group. I also prefer to mount the pivot pins 38 in such a manner that the same can be quickly and easily removed from the hub plates, so that the hammers 39 can be conveniently removed from the machine when the same become worn or broken. Thus, the hammers can be quickly replaced without dismantling the entire machine. It is also to be noted that the heads 40 of the hammers extend across the shanks of the hammers and longitudinally of the shaft 10. While I have shown the hammers to be of a T-shape, it is to be understood that the hammers can take any desired form or configuration.

In use of my improved machine, the same is connected to a tractor in the desired manner, and the shaft 10 is operated from the power take-off of the tractor.

During the travel of the machine over the roadway, the blade 29 will effectively scrape and level the roadway, and the surfacing material will flow over the top surface of the blade. During this traveling movement of the machine, the shaft 10 will be rotated at a high rate of speed, and, consequently, the hammers 39 will be thrown forcibly around the shaft and down toward and against the material passing over the blade 29, and, hence, the hammers will effectively pulverize and mix the material as the same passes over the blade.

By the use of my machine, I am enabled to rapidly pulverize and mix road materials laid on a road surface in a convenient and expeditious manner.

From the foregoing description it can be seen that I have provided a mobile machine which moves over a roadway and which pulverizes material during the travel of the same. Obviously, the machine can be pulled over the roadway in any desired manner, such as by a tractor, draft animals, or a truck, or the machine can be a self-contained unit having a driving and operating motor thereon. It is also to be understood that the machine itself can be incorporated directly with other pieces of road machinery, such as road scrapers and the like without departing from my invention.

Changes in details may be made without departing from the spirit or the scope of my invention, but what I claim as new is:

A mobile machine for pulverizing and mixing material on the ground during the travel of the machine comprising, a frame, an intermediate and end U-shaped brackets carried by and depending from said frame, said intermediate bracket having a leading sharpened edge and a sharpened lower edge, a swinging scraping and leveling blade mounted on the brackets, means rigidly securing the blade in an adjusted position against movement, a power-driven shaft arranged above the blade and carried by said frame, a plurality of hub members secured to and rotatable with the shaft, and a plurality of hammers pivotally mounted to each hub member for engaging the material as the material on top of the blade travels over the blade during the movement of the machine over the ground.

MANDO S. ARIENS.