

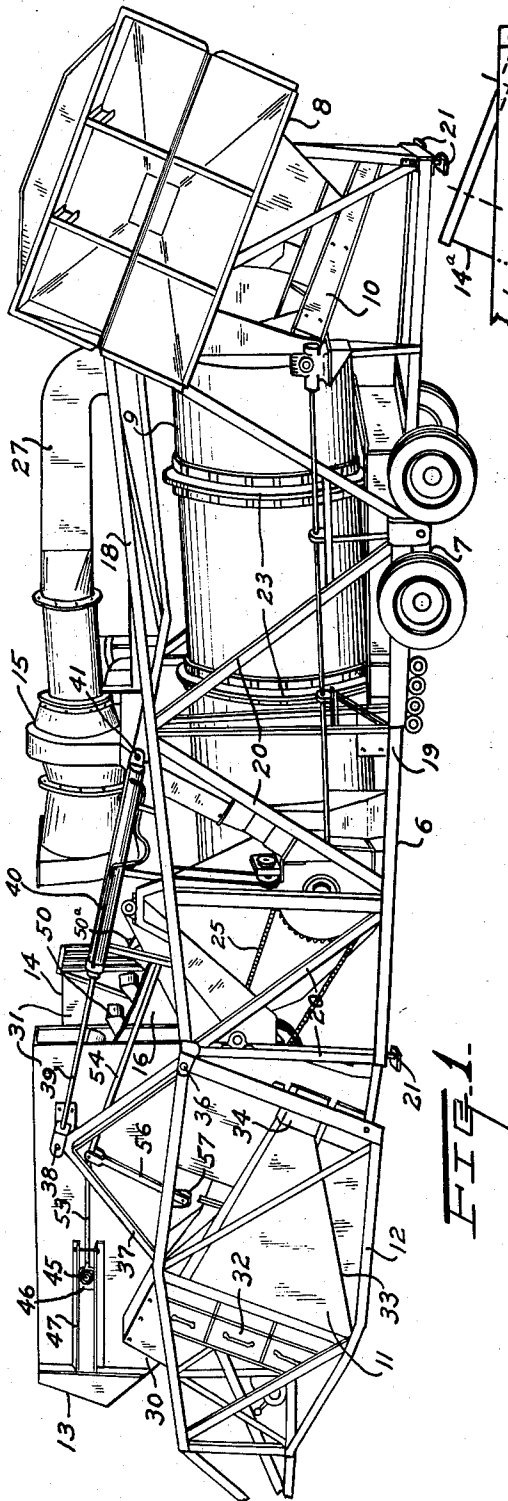
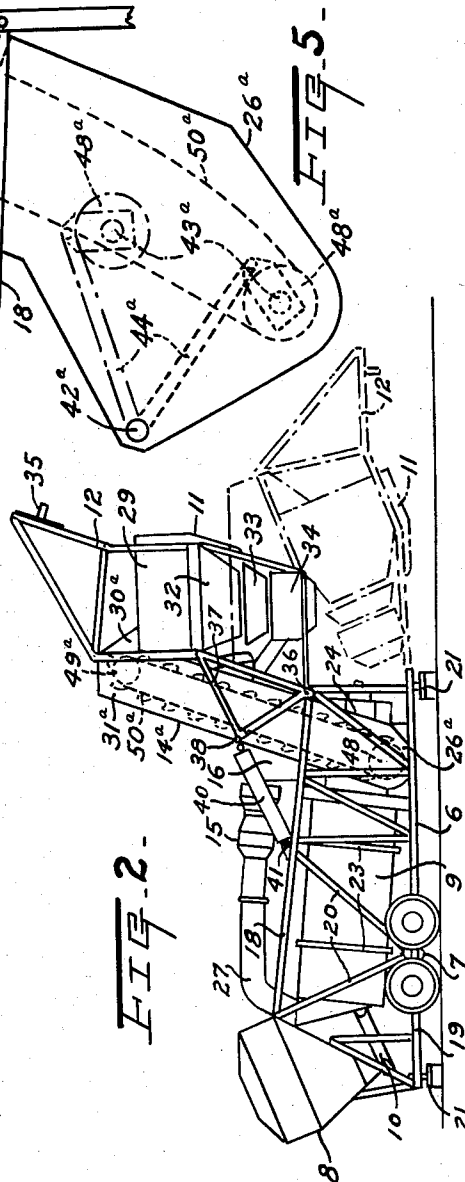
July 19, 1960

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MOBILE ASPHALT PLANT

2,945,683

Filed Feb. 28, 1957

2 Sheets-Sheet 1



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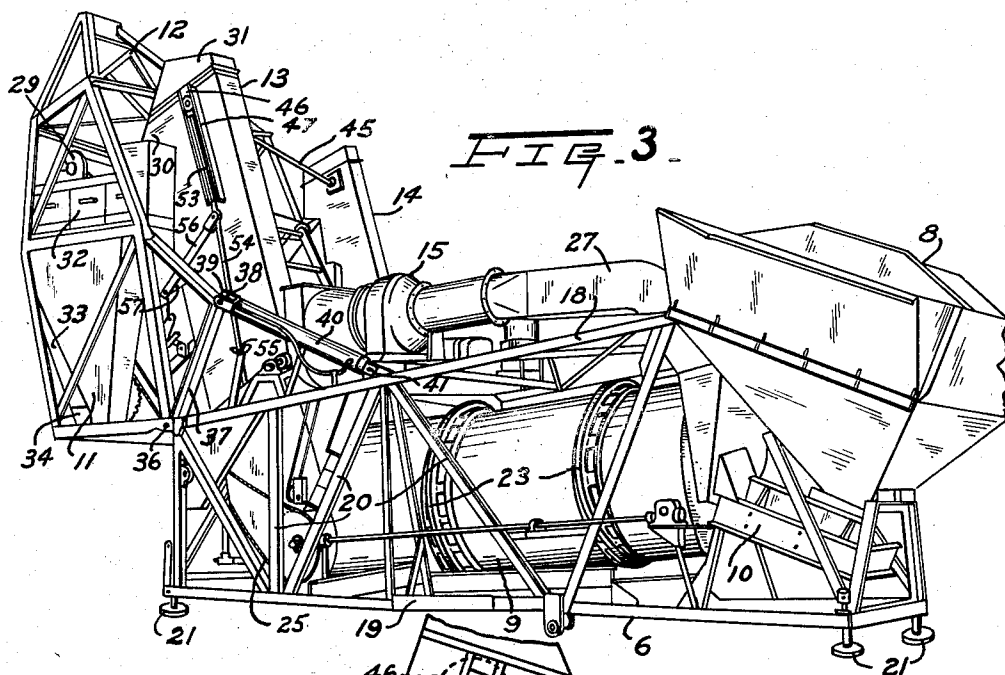
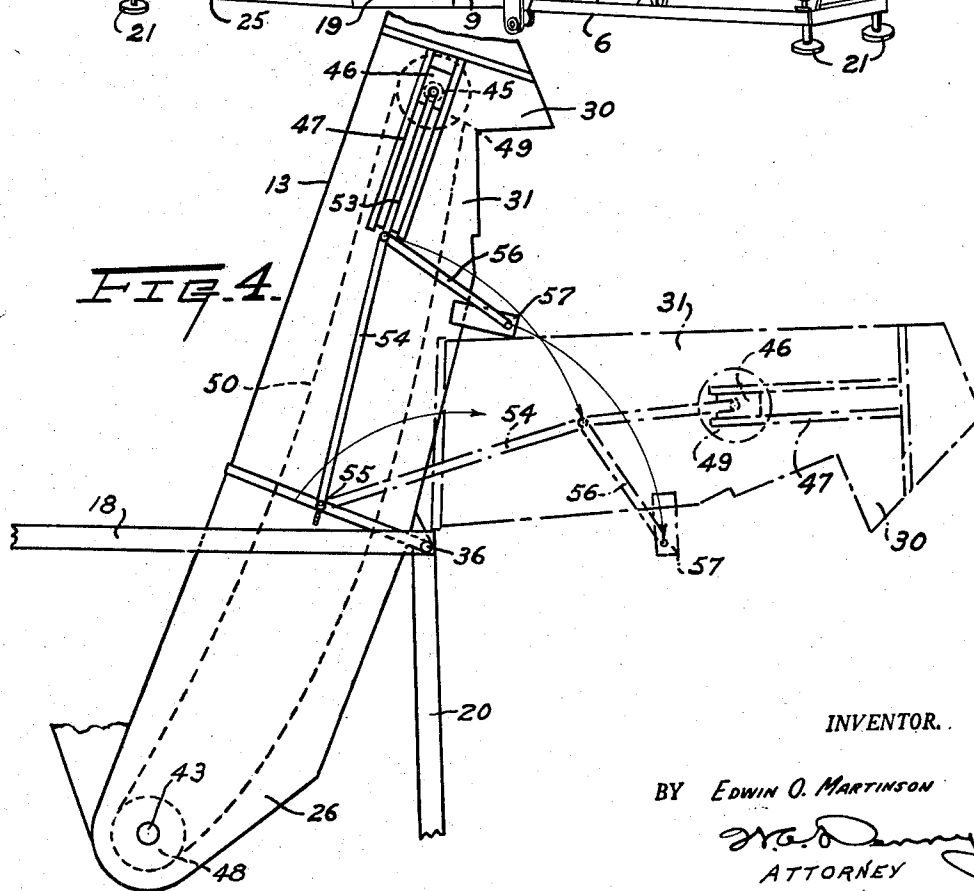
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MOBILE ASPHALT PLANT

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3 Claims. (Cl. 259—159)

The present invention relates generally to improvements in road building equipment, and relates more particularly to improvements in the construction and operation of mobile asphalt mixing plants.

Asphalt mixing plants are adapted to accurately proportion and to thoroughly mix the ingredients of the asphalt so as to insure a satisfactory product. While most of the larger and centrally located plants of this kind are of the stationary type, it has been found more expeditious and economical in cases where long hauls of the mixed asphalt are required to provide portable or mobile units capable of producing such mixtures at or near the point of use. Although prior attempts have been made toward the production of such portable asphalt mixing plants, these have not been entirely successful.

It is therefore a primary object of this invention to provide an improved mobile asphalt mixing plant, which by reason of its unusual compactness and arrangement of component parts is readily transferable from place to place and requires exceptionally little time and effort for placing it in operating condition or in condition for road transport.

A clear conception of the various features constituting the present improvement, and of the construction and operation of a typical commercial mobile asphalt mixing plant embodying the invention, may be had by referring to the drawings accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a perspective view of a mobile asphalt mixing plant built in accordance with the invention and depicting the various parts in collapsed condition as when being transported;

Fig. 2 is a diagrammatic opposite side elevation of a similar mixing plant, showing the same in assembled and installed condition in solid lines, and in knock-down transportable condition in dot-and-dash lines;

Fig. 3 is another perspective view of the complete mobile asphalt mixing plant of Fig. 1, showing the various parts assembled for operation;

Fig. 4 is an enlarged diagrammatic side elevation of the hot material elevator only, showing the elevator in operative position in solid lines and in transporting position in dot-and-dash lines, and also showing in detail the mechanism which permits the quick shifting from one position to the other without necessity for disconnecting the bucket chain.

Fig. 5 is an enlarged fragmentary side elevation similar to that of Fig. 4, but showing only the boot or bottom section of the mineral dust elevator and the mechanism which permits that elevator to be quickly moved from the operating to the transport position without necessity for breaking the bucket chain.

Referring to the drawings, the improved self-contained, mobile, hot mix, batch type asphalt plant illustrated therein, comprises in general, a truss-type first frame section or main frame 6 having transporting wheels 7 detachably associated therewith; an aggregate charging

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bin 8 mounted at one end of the frame 6; a rotary drier 9 having a drum revolvably supported upon the frame 6 and adapted to receive material from the bin 8 with the aid of a conveyor 10; an aggregate screening, weighing, pulverizing and mixing unit 11 mounted within a second frame section or auxiliary frame 12 pivotally secured to the end of the main frame 6 remote from the feed bin 8; a pair of laterally spaced bucket elevators 13, 14 interposed between the delivery end of the drier drum 9 and the unit 11 and also being carried by the main frame 6; a dust collecting system 15 mounted upon the frame 6 above the drier 9; and a driving engine 16 for the various movable elements also supported on the truss frame 9 between the elevators 13, 14.

The unitary main frame is constructed from structural bars and sheet iron with upper and lower decks 18, 19 respectively rigidly interconnected and reinforced by upright and inclined truss bars 20, and the lower deck may have the wheels 7 detachably secured thereto in any suitable manner while being provided at its opposite ends with adjustable foot pads 21 adapted to serve as supports for the plant when the wheels 7 have been removed and the equipment is erected for operation as in Fig. 3. The charging bin 8 is preferably firmly mounted as low as possible at one extreme end of the frame 6 so that it will provide sufficient head room for transportation clearance without removal thereof and so that it will also tend to counterbalance any load applied to the opposite end of the main frame. The conveyor 10 may be of the endless belt or any other suitable type.

The rotary drier or processing means 9 has its drum provided with supporting tires 23 rotatably cooperable with carrying rollers in a well known manner, and this drier has internal material showering flight therein and is also provided at its discharge end with a combustion chamber 24 as shown in Fig. 2. The drier 9 is confined between the upper and lower frame decks 18, 19 and is adapted to be revolved by the engine 16 through a chain drive 25 as depicted in Figs. 1 and 3, and the hot heavier aggregate delivered from the drier drum is discharged at its lower end into the lower fixed section 26 of the hot material elevator 13. The dust is withdrawn through a duct 27 from the upper end of this drum by a fan associated with the dust collecting and separating system 15 which is mounted upon the upper main frame deck 18, and is delivered into the lower fixed section 26^a of the mineral dust elevator 14.

The aggregate treating unit or processing means 11 which is confined within the auxiliary frame 12 is shown generally in Fig. 2 and includes an upper screening device 29 for receiving the heavier hot aggregate from the delivery end 30 of the upper downwardly swingable section 31 of the bucket elevator 13; several hot material storage bins 32 for the products discharged from the screening device 29; a batch weighing hopper 33 disposed beneath the bins 32; and a pugmill 34 adapted to receive hot aggregate from the elevator 13 and dust from the upper section of the other elevator 14 and to mix and blend these ingredients into the final mixture. The superimposed screening, storing, weighing, and blending elements of the unit 11 are all of relatively well known construction and operation, and are separated by suitable flow control gates for enabling the operator to accurately proportion the ingredients of the product.

The auxiliary frame 12 which swingably supports the treating unit 11, is also constructed of structural bar stock, and this frame 12 together with the upper movable sections of the bucket elevators 13, 14 is swingably suspended from the adjacent end of the upper deck 18 of the main frame 6 by a pair of axially aligned pivots 36, as shown in Figs. 1 to 4 inclusive. This auxiliary frame is also provided with triangular brackets 37 at its opposite sides

which are pivotally connected by pivot pins 38 with the plungers 39 of adjacent hydraulic rams the cylinders 40 of which are swingably secured to the upper deck 18 of the main frame 6 by other pivot pins 41, and these rams are operable by liquid pressure derived from a pump carried by the plant to swing the frame 12 and the unit 11 together with the two upper elevator sections downwardly for transportation as in Fig. 1, and upwardly for normal operation as in Fig. 3. These alternative positions are also illustrated in dot-and-dash and in solid lines in the diagram of Fig. 2. The frame 12 and unit 11 being supported in cantilevered elevated vertical position by the rams when the device is in the operating position as in Fig. 3. At the lower extremity of frame section 12 there is provided a fifth-wheel connection 35 of well known construction for engagement with a truck tractor unit when the plant is to be moved.

It will be observed that except for the enclosed bucket elevators 13, 14 all of the component parts of the asphalt plant are integrally mounted on either the main frame 6 or the frame extension 12. The bucket elevators are in part mounted on both parts of the frame and thus require a special construction to permit quick change of the plant between operating and transport conditions.

Generally, the housings for each of the elevators are divided into two parts. The larger or so-called hot material elevator 13 has a bottom or boot section 26 which is rigidly mounted on the frame 6. This section includes a drive shaft 43 on which a drive sprocket 48 is mounted for driving the endless bucket chain 50. The top section 31 of this elevator includes a shaft 45 which is rotatably journaled in crossheads 46 mounted on both sides of the housing for movement between guides 47. A bucket chain head pulley 49 is non-rotatably mounted on the shaft 45. The crossheads 46 are movably connected by a link 53 with the upper extremity of a connecting link 54 the lower end of which is secured to the upper extremity of the fixed lower elevator section 26 by means of a pivot pin 55. The lower extremity of each link 53 is also pivotally attached to the upper end of an arm 56 the lower end of which is swingably secured to a bracket 57 attached to the adjacent elevator section 31.

This assemblage of elements is such that when the upper section 31 of the elevator 13 is raised into operative position as shown in solid lines in Figs. 2, 3 and 4, the crossheads 46 and the head pulley 49 will be in uppermost position so as to place the chain 50 in stretched normal operating condition. However, when the upper elevator section 31 of the elevator 13 is swung down as shown in dot-and-dash lines in Figs. 2 and 4 and in solid lines in Fig. 1, so as to position this section and the units 11 in approximately horizontal alinement with the drier 9, then the elevator bucket chain 50 will collapse and move the crossheads 46 and the pulley 49 inwardly along the guideways 47 so as to permit the chain to slacken and bend around the pivot pins 36 without damaging the same.

A somewhat different arrangement is used with the mineral dust elevator 14 because of the relatively small and lightweight construction of its bucket chain. In this elevator the housing sections 26^a and 31^a are similar to and mounted in the same way as the corresponding sections of the elevator 13. However, the head pulley arrangement is like the drive pulley arrangement shown in Fig. 4 for the hot material elevator, the head pulley being driven by an extension of shaft 45 as shown in Fig. 3. Now referring to Fig. 5, to prevent breaking the bucket chain 50^a when the elevator sections are pivotally moved apart, the bottom pulley 48^a mounted on shaft 43^a is arranged for vertical swinging movement by means of a pivot 42^a and arm 44^a. Its weight is such that it will normally maintain the position shown in dotted lines. However when the top section of the elevator 14 is moved forwardly and downwardly into the travel position, the

pulley 48^a will be lifted against gravity into the position shown in dot-and-dash lines.

When the various parts of the improved mobile asphalt plant have been constructed and assembled as hereinabove described, the entire assemblage may be safely transported by a suitable tractor from one locality to another without danger of interfering with overhead obstructions. The lowering of the auxiliary frame 12 and its associated parts may be quickly and readily effected with the aid of the hydraulic rams interposed on the opposite sides between the upper frame deck 18 and the brackets 37.

When a desired destination has been reached, the foot rests 21 may be caused to coast with suitable mounting blocks as in Fig. 2 and the carriage 7 may if desired be removed, whereupon the hydraulic rams may be reversely actuated to raise the auxiliary frame 12, and the screen and pugmill assembly 11 together with the upper elevator sections 31, 31^a into operative position as illustrated in Figs. 2 and 3. The propelling motor 16 which may be either an internal combustion engine or any other suitable type, may be operated to revolve the drier 9, to actuate the feed conveyor 10 and the elevators 13, 14 and to operate the dusting system and other auxiliary mechanisms. After the heater 24 has been placed in operation, successive batches of aggregate may be deposited within the supply bin 8 and delivered in regulated quantities and proportions to the revolving drier 9 wherein this aggregate is thoroughly heated and mixed and has excessive dust removed, the dust being withdrawn by the dust collecting system 15 which delivers the usable fines separated from the exhaust gases into the lower portion of the dust elevator 14.

The heavier aggregates after being properly treated in the drier 9 are ultimately delivered in hot condition into the lower fixed section 26 of the elevator 13 and are conveyed upwardly and deposited upon the vibrating screen 29 mounted in the upper portion of the frame 12 where this coarser hot aggregate is separated into grades and is deposited into the storage bins 32. The operator may then deliver the screened material in desired sizes and quantities to the weighing device 33 from which it may be deposited into the pugmill 34 where regulated quantities of bitumen and the fines received from the system 15 may be added by the other elevator 14 and other ingredients may also be added to produce the desired final mixture. The resultant product may thereafter be delivered to vehicles positioned beneath the pugmill 34 and trucked away.

From the foregoing detailed description it should be apparent that the present invention provides a mobile, asphalt plant which is simple and compact in construction, readily and safely transportable, and effectively operable to produce accurately proportioned batches of mixture in rapid succession. The assemblage provides a self-contained highly mobile mixing plant in which a single attendant has full control of every phase of plant operation at all times and can produce various types of asphalt with utmost precision. All ingredients including the bitumen may be accurately weighed or measured and the pugmill 34 stirs, blends, kneads and thoroughly mixes the ingredients so as to insure proper coating of every particle with asphalt before final delivery of the product.

The assemblage for converting the improved plant from operative condition to inactive position and vice versa is a very important part of the present invention since it enables the unit to be conveniently transported with maximum headroom clearance, while still permitting the assemblage to be quickly set-up for normal operation. The sectional elevators and the linkages associated with the elevator bucket rotor supporting shafts 43, 45 enable the bucket chains to be either slackened or distended without danger of damaging the same, and the lowering and raising of the auxiliary frame 12 with the aid of hydraulic rams effects such slackening and tensioning of the endless

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bucket carriers automatically and with little effort on the part of the operator.

I claim:

1. A mobile asphalt plant comprising, in combination, a first frame section having material processing means thereon; a second frame section having material processing means thereon; means for conveying materials between said first and said second sections; means for securing said two sections together to form a single frame unit for transport; and means for supporting said second section in a cantilevered elevated vertical position, said last mentioned means including means for swinging said second section between its transport position and said elevated position.

2. A mobile asphalt plant comprising, in combination, a first frame section having aggregate drying means thereon; a second frame section having aggregate weighing and mixing means thereon, said second section being rigidly connectible to said first section in a horizontal position for forming a single low elongated transportable structure; elevator means for transferring materials between said sections, said elevator means having an upper portion foldable to a horizontal transport position; and means for simultaneously swinging said second section and said elevator upper portion between said horizontal transport position and an elevated vertical operating position, said last mentioned means adapted for supporting said second section in cantilever fashion from said first section.

3. A mobile asphalt plant comprising, a unitary trans-

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portable frame having an elongated drier mounted thereon, a charging bin for said drier carried by one end of said frame, a unit pivotally connected to the opposite end of said frame for receiving and further treating material delivered from said drier, a collapsible elevator having a lower portion carried on said frame and an upper portion carried by said unit for transferring said material from said drier to said unit, and means for supporting said unit in a cantilevered elevated position, said last mentioned means also adapted for swinging both said unit and said elevator upper portion between a horizontal position and said elevated position.

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