Oct. 26, 1965 J. W. SMITH 3,213,769

MACHINE FOR SPREADING AND COMPACTING SURFACING MATERIAL

Filed Jan. 22, 1962 5 Sheets-Sheet 1

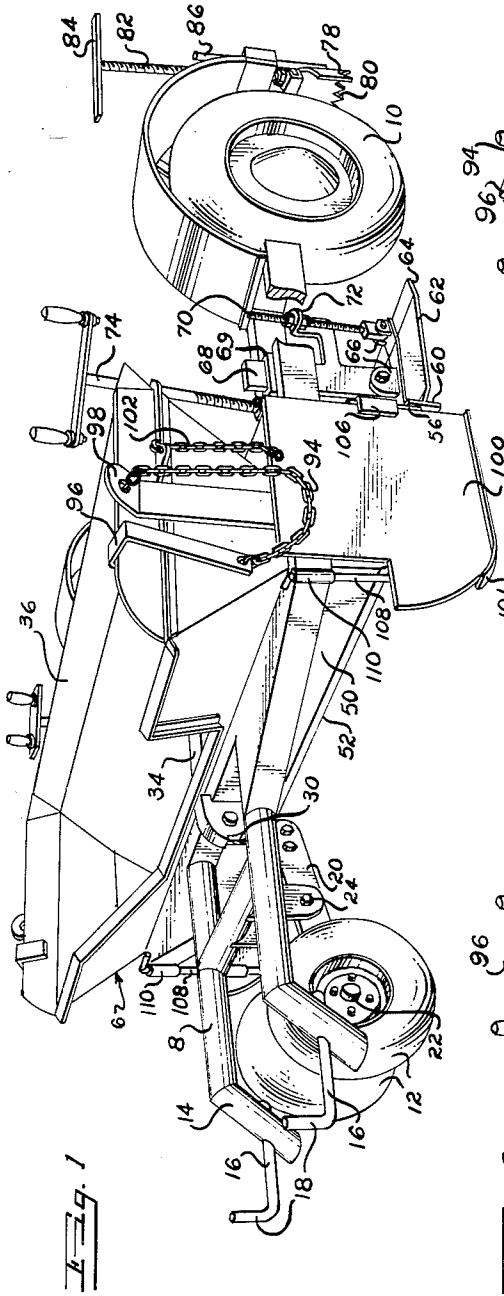


Fig. 1

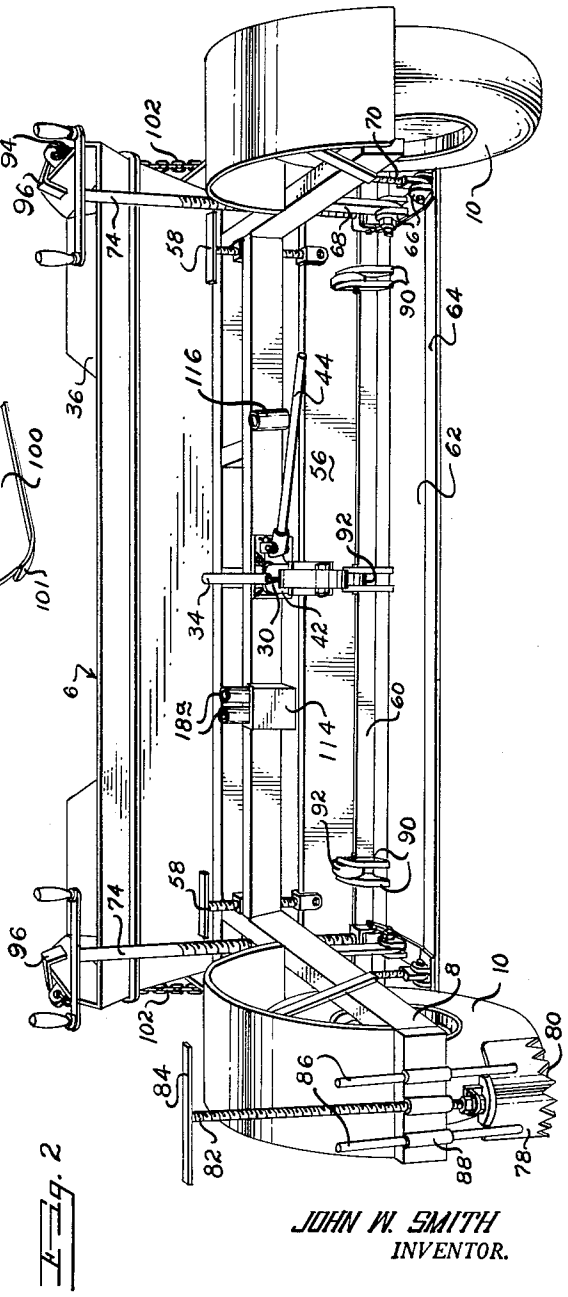


Fig. 2

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MACHINE FOR SPREADING AND COMPACTING SURFACING MATERIAL

Filed Jan. 22, 1962 5 Sheets-Sheet 2

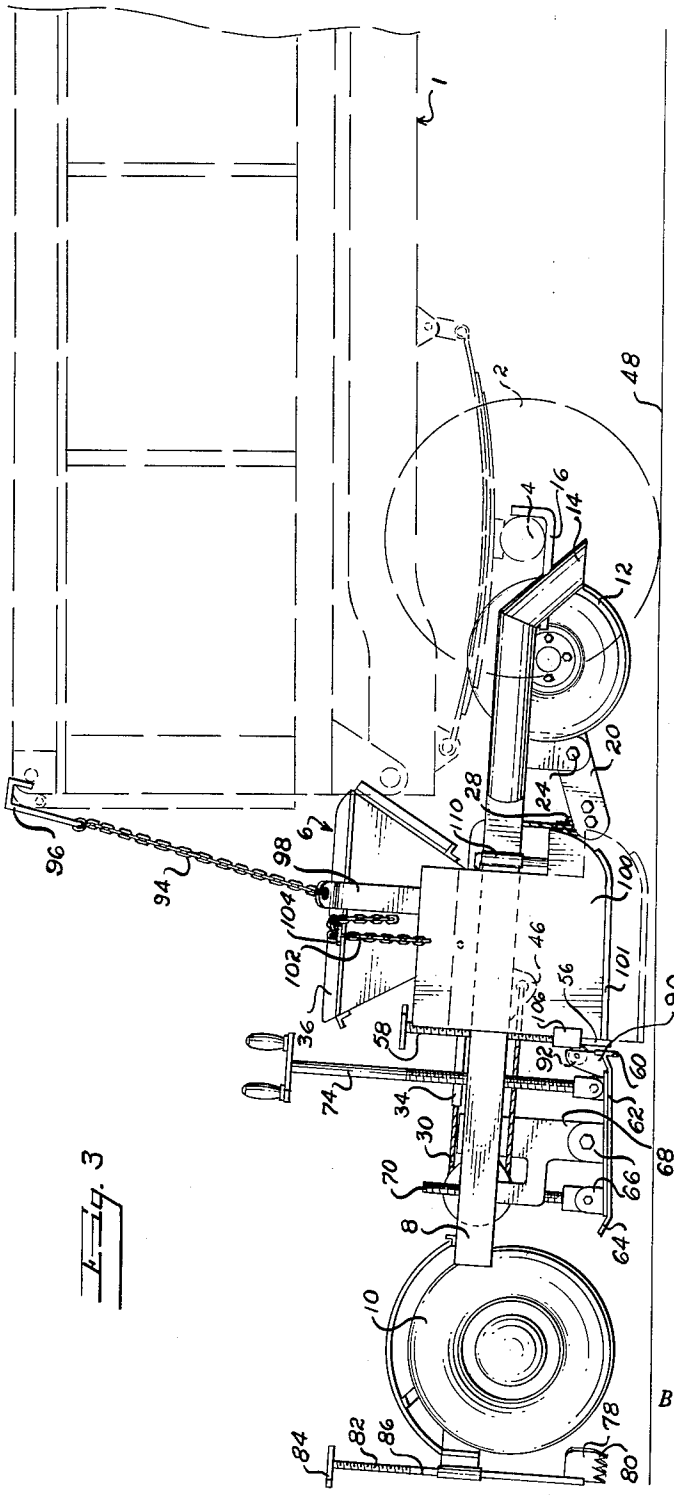


Fig. 3

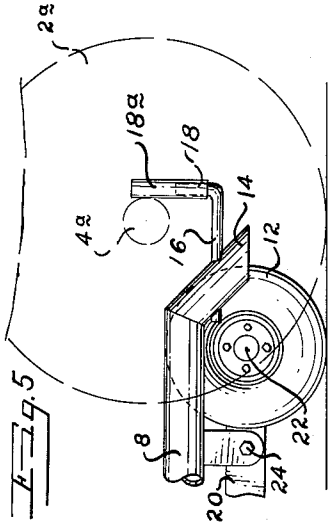


Fig. 5

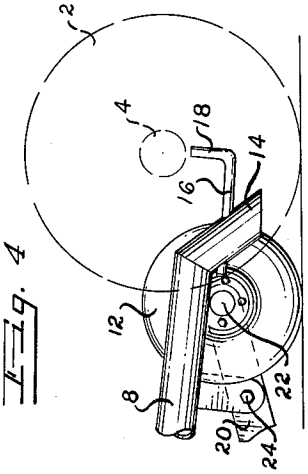


Fig. 4

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MACHINE FOR SPREADING AND COMPACTING SURFACING MATERIAL

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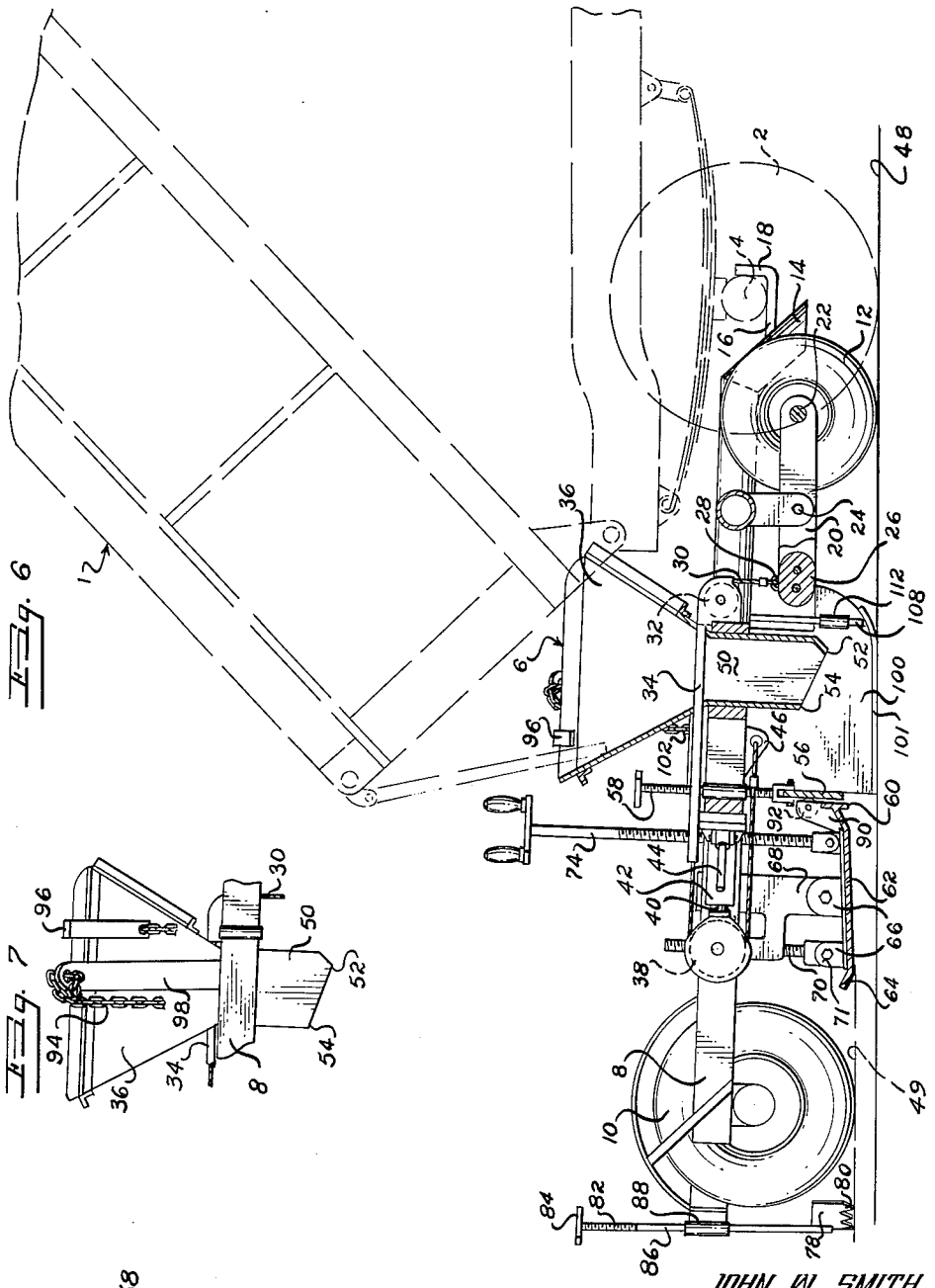


Fig. 6

Fig. 7

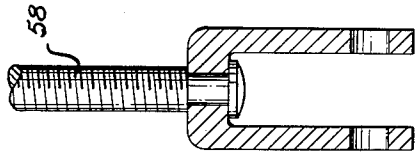


Fig. 8

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MACHINE FOR SPREADING AND COMPACTING SURFACING MATERIAL

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Fig. 9

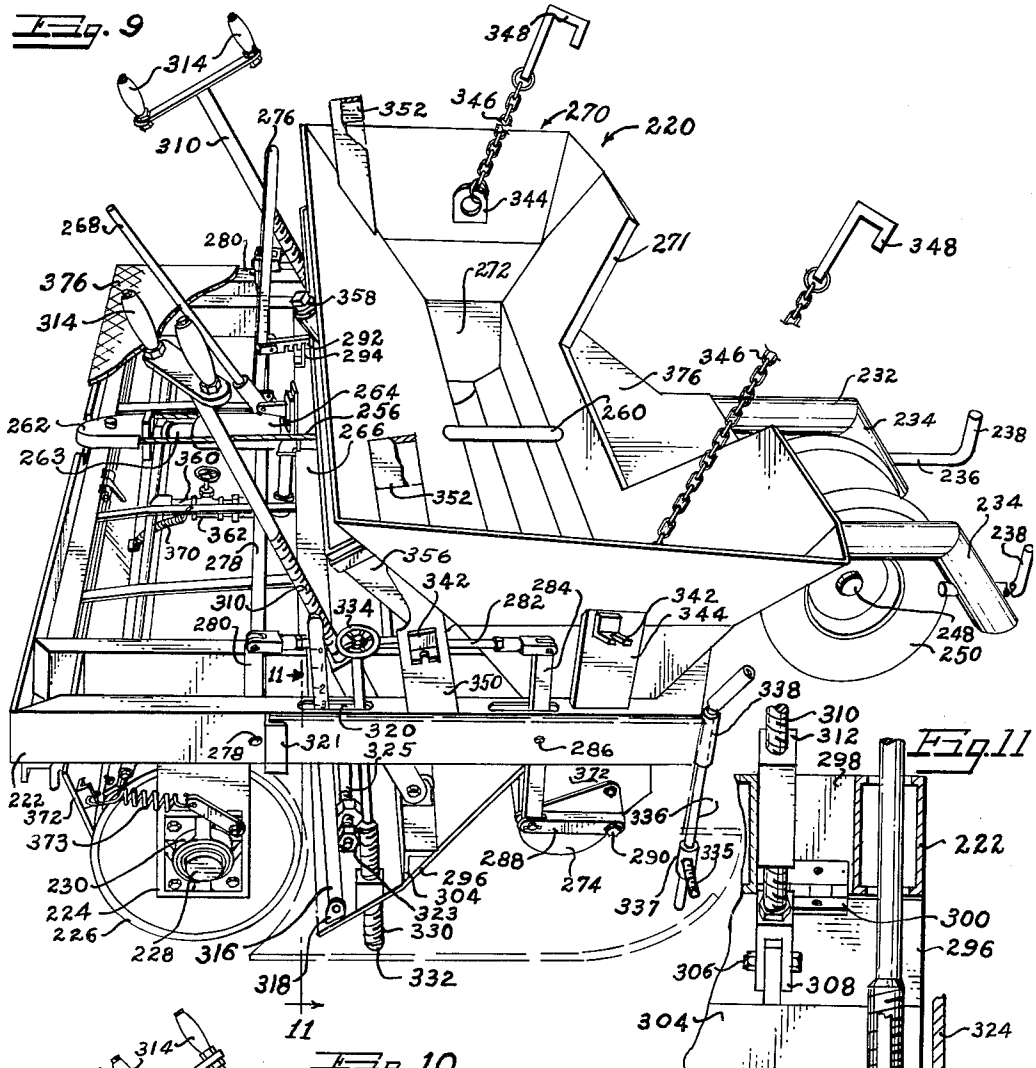
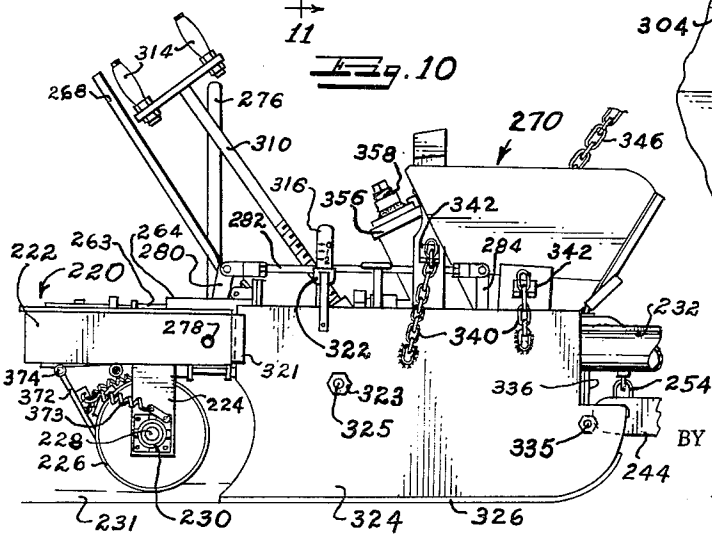


Fig. 11

Fig. 10



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MACHINE FOR SPREADING AND COMPACTING SURFACING MATERIAL

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Fig. 12

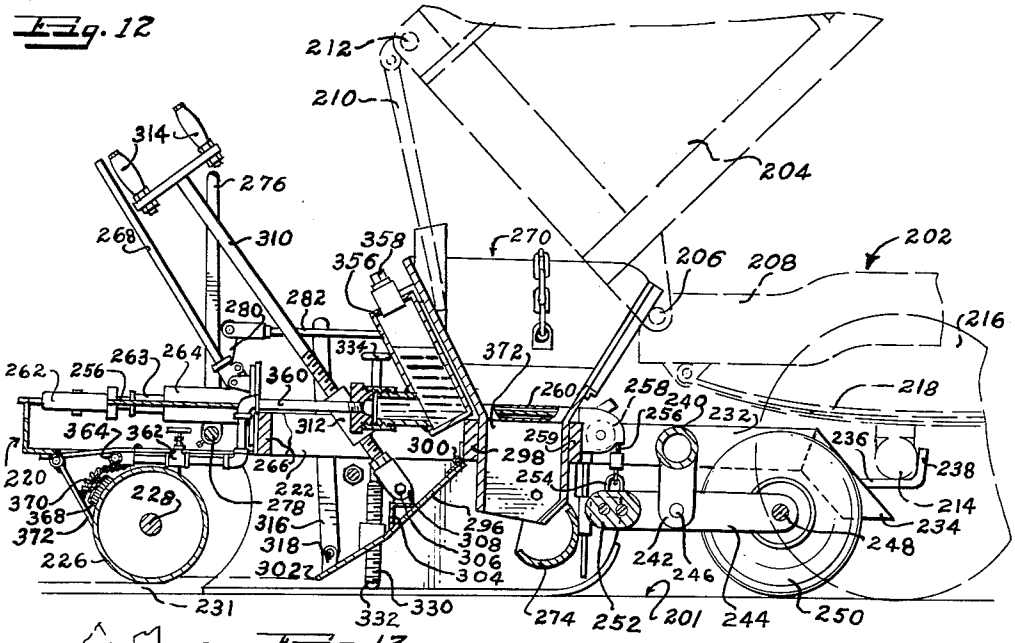


Fig. 13

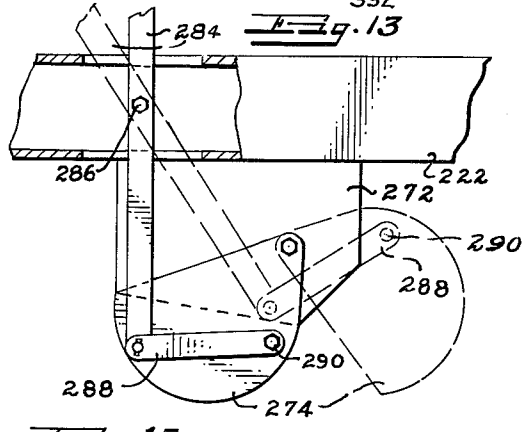


Fig. 14

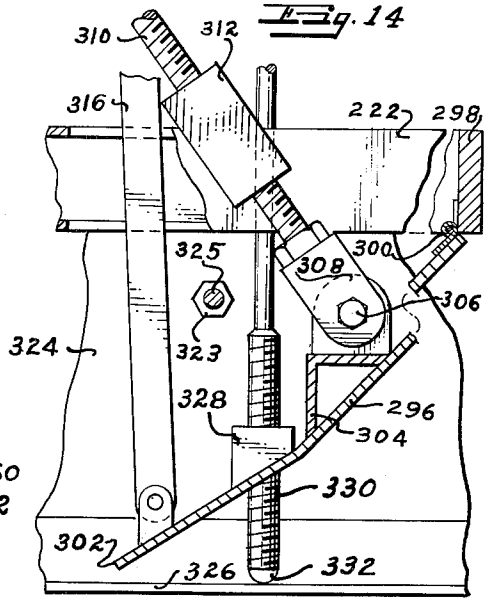
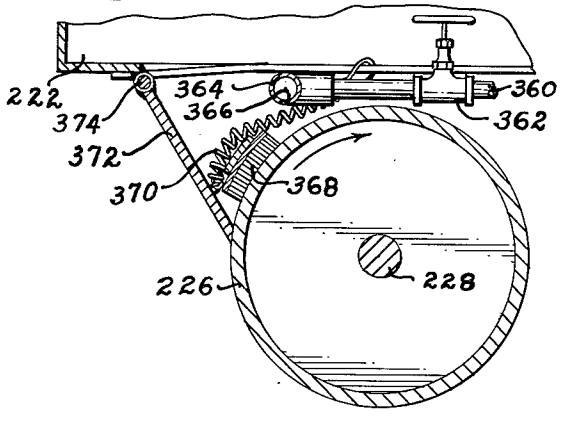


Fig. 15



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United States Patent Office 3,213,769 Patented Oct. 26, 1965

3,213,769

MACHINE FOR SPREADING AND COMPACTING SURFACING MATERIAL

John William Smith, 617 NW. 18th St., Oklahoma City, Okla.

Filed Jan. 22, 1962, Ser. No. 167,873
4 Claims. (Cl. 94—46)

This application is a continuation-in-part of my prior application on a Machine for Spreading and Compacting Surface Material, Ser. No. 59,423 filed Sept, 29, 1960, and now abandoned.

This invention relates to machines for spreading material over the surface of the terrain, and more particularly to a machine for spreading paving material, such as prepared asphalt aggregate, over the terrain to a uniform, compacted thickness in a designated, laid out path.

Various paving machines have been proposed heretofore for spreading an asphalt mixture over the surface of the terrain, but these, for the most part, were heavy, cumbersome to handle, and usually required a separate compacting element, such as a steam roller or the like, to compact the material after it had been spread over the surface to be paved.

The present machine is comparatively light in weight, and is adapted to be connected to most types of dump trucks, which enables the utilization of the dump truck for the motive power to move the paving machine over the terrain, thereby effecting considerable saving over the cost of constructing a self-propelled machine.

The present machine is so constructed that it may be readily attached to a dump truck for moving the machine over the terrain, while the material, such as asphalt aggregate compound or the like, is dumped into the hopper thereof for spreading and compacting the asphalt aggregate compound or the like simultaneously with the movement of the paving machine over the terrain. The present machine is readily adaptable to be lifted bodily by the dump truck, to be moved from place to place, and to enable the machine to be placed in narrow passageways and the like.

An object of this invention is to provide a machine which is light in weight but sturdy in construction, and which is readily adaptable to be connected to a conventional dump truck, so as to be moved with the truck, and thereby spread and compact an asphalt aggregate compound or the like onto a surface to form a covering of uniform thickness.

Another object of the invention is to provide a paving machine which may be readily attached to or detached from a dump truck by the operator of the paving machine, without the necessity of the driver of the truck operating an accessory mechanism for the attachment or detachment of the paving machine from the truck.

Still another object of the invention is to provide a paving machine which may be readily lifted from the terrain by a dump truck to enable the maneuvering of the paving machine into relatively close places.

Yet a further object of the invention is to provide a paving machine into which an asphalt aggregate compound may be dumped, which aggregate compound is spread and compacted to a uniform thickness over the terrain.

Yet another object of the invention is to provide a paving machine which will distribute and compact asphalt aggregate paving material or the like in side-by-side strips, so that the adjoining edges of the strips of paving compound will be of uniform thickness and compacted to a uniform density.

A still further object of the invention is to provide a paving machine into which an asphalt aggregate compound may be dumped, which aggregate compound is

spread, compacted and rolled to a uniform thickness over the terrain.

And a final object of the invention is to provide a paving machine which will uniformly distribute, compact and roll asphalt aggregate material in uniform side-by-side strips so that adjoining edges of the strips of paving will blend to form a uniform, uninterrupted surface.

With these objects in mind and others which will become manifest as the description proceeds, reference is to be had to the accompanying drawings in which like reference characters designate like parts in the several views thereof, in which:

FIG. 1 is a perspective view of the paving machine taken from the front and a side and slightly above the machine, with parts broken away and shown in section to bring out the details of construction;

FIG. 2 is a perspective view taken substantially from the rear of the machine;

FIG. 3 is a side elevational view of the paving machine attached to a dump truck, and showing the paving machine lifted clear of the terrain thereby, with the paving machine being shown in full outline, and with the dump truck being shown in dashed outline;

FIG. 4 is a fragmentary, side elevational view of the front portion of the paving machine, in full outline, detached from the truck axle, with the axle and rear wheel of the truck being shown in dashed outline;

FIG. 5 is a view similar to FIG. 4 but showing a truck having a larger wheel than shown in FIGS. 3, 4, and 6, and showing the paving machine attached thereto by the use of tubular extension members over the upturned projections on the draw bars of the paving machine;

FIG. 6 is a substantially longitudinal, medial view taken through the paving machine, with portions of the paving machine being shown in section and portions being shown in full outline, and showing a dump truck in position to dump an asphalt aggregate compound into the hopper of the paving machine, the truck being shown in dashed outline, and showing the paving machine attached to the rear axle of the truck so as to be moved thereby, and showing the machine in position to spread and compact the asphalt aggregate compound as it is drawn over the terrain;

FIG. 7 is a fragmentary, elevational view of a portion of the paving machine as shown in FIG. 3, but with the side shields removed from the hopper to show the details of construction of the hopper;

FIG. 8 is a fragmentary, elevational view of the lower end of an adjustment screw having a swivel clevis thereon, which screw and clevis are representative of certain adjustment means used on the paving machine;

FIG. 9 is a perspective view of a modification of the paving machine taken from a side and slightly above, with parts removed, and with other parts being shown as broken away and in section to bring out the details of construction and the side fenders thereof shown in phantom for convenience in illustration;

FIG. 10 is a side elevational view of a modification of the machine on a reduced scale, with parts being broken away and with parts being shown in dashed outline to show the paving being laid thereby;

FIG. 11 is an enlarged fragmentary sectional view of the modified form of the invention taken approximately on the line 11—11 of FIG. 9, looking in the direction indicated by the arrows, and showing the paving material under a portion thereof;

FIG. 12 is a longitudinal sectional view through the modification of the paving machine in the position used for paving, and showing a portion of a dump truck in dashed outline in position to dump material into the paving machine; with the thickness of the paving ma-

terial being laid by the machine being shown in dashed outline;

FIG. 13 is a fragmentary elevational view of the lower portion of the hopper dispensing gate, showing a portion of the frame of the modification of the machine, and showing the mechanism which operates to close the hopper dispensing gate in full outline, with the dashed outline showing the gate and mechanism fully open, with parts being broken away and with parts being shown in section to bring out the details of construction;

FIG. 14 is an enlarged, fragmentary elevational view of a portion of the spreader blade of the modified form of the invention, showing the adjustment devices therefor, together with a depth indicator thereon, with parts being broken away and shown in section to bring out the details of construction; and

FIG. 15 is an enlarged fragmentary sectional view taken transversely through the compacting roller of the modified form of the invention, and showing a fluid dispensing conduit leading thereto together with an applicator pad and scraper blade thereon.

First form of invention

With more detailed reference to the drawing, the numeral **1** designates generally a dump truck having rear wheels **2** on an axle **4** thereof. Trucks, the wheels of which vary in size, may be used, as indicated in FIGS. 5 and 6, with the wheels **2***a* (FIG. 5) being larger than the wheels **2** (FIGS. 3, 4, and 6) with the axle **4***a* higher from the ground than the axle **4**, which will be brought out more in detail hereinafter.

The paving machine proper is designated generally at **6**, which machine has a frame **8** on which rear wheels **10** are rotatably mounted on an axle, which axle is fixed relative to the frame **8**, and front wheels **12** are rotatably mounted on an axle **22**, which axle is mounted on movable members **20**, which members or beams are movable with respect to the forward end portion of the frame **8**. The front end portion of the frame **8** is shown to be of tubular construction, and which frame has downturned end portions **14** to which forwardly extending draw bars **16** are secured. Each of the draw bars **16** has an upturned end portion **18**, which is adapted to pass below the axle **4** or **4***a* of the truck when the portions **18** are in the lowermost position, and which projections may be raised to a position as indicated in FIG. 6, when it is desired to tow the paving machine over the terrain. The front wheels **12** are rotatably mounted on an axle **22**, which axle is mounted near the forward ends of beams **20**. The beams **20** are pivotally mounted on frame **8** by a pivot pin **24** which pivots the beams thereto intermediate the length of the beams. It is preferable to have two of these beams **20**, spaced apart transversely, with a weight **26** secured therebetween, which weight, together with the weight of the beams, off-sets the weight of the wheels **12** and axle **22**. Therefore, when the paving machine is lifted clear of the ground, as shown in FIG. 3, the weight **26** will cause the wheels **12** to attain a position above the terrain.

The beams **20** are connected together by bolts **27** which secures the weight **26** between the beams, which assembly has a loop **28** secured thereto at the rear end thereof, to which loop **28** a cable **30** is secured. The cable **30** extends over a sheave pulley **32** and through a tubular pipe **34**, which pipe and cable pass through a material receiving hopper **36** so that the cable will be guided over a sheave pulley **38** mounted on the distal end of plunger **40** of a hydraulic jack **42**, which jack is mounted on frame **8** near the hopper **36**. The other end of cable **30** is connected to an anchor lug **46** on frame **8**, so upon movement of hydraulic jack plunger **40** of jack **42**, by actuation of a lever **44**, the cable **30** will move weight **26** and the end of the beams **20** to which the cable **30** is connected, upward, which will cause front wheels **12** to be forced down against the terrain **48**, which will move draw bars **16** into engagement with the lower side of axle **4** or axle **4***a*, and normally the projections **18** will be of sufficient height to engage the forward side of axle **4**, so upon movement of the truck in a forward direction along the terrain, the paving machine will be drawn therealong.

The dump body of the truck **1** may be moved into elevated position, as shown in dashed outline in FIG. 6, so the asphalt aggregate compound or the like contained in the truck body, will be dumped into the hopper **36** or forward thereof, so that the loosely dumped asphalt aggregate compound or the like will either flow down through chute **50** at the lower portion of hopper **36** to the surface of the terrain or onto such other surface as is to be paved. The thickness of the asphalt aggregate compound which is passed down through chute **50** or thereunder will be determined by the height of the respective lower lip portions **52** and **54** of the chute **50**. The asphalt aggregate compound is shown compacted at **49** in FIG. 6 in dashed outline.

The material is directed through the chute **50** onto the surface to be paved, whereupon an adjustable, transverse strike-off plate **56**, which is mounted transversely of the frame **8** to the rear of the hopper **36**, is adjusted to define the thickness of the loose material that is to escape thereby to be formed into a covering for the terrain. The strike-off plate **56** is gauged as to height by means of screw elements **58** attached thereto and to the frame **8**, one of which screw elements is positioned at each end of the adjustable, transverse strike-off plate **56** so that a uniform thickness of asphalt aggregate compound is deposited throughout the length of the adjustable, transverse strike-off plate, or when desired, one end of the adjustable, transverse strike-off plate may be lowered and the other end raised to a desired height, to give a feathering to an edge of the asphalt aggregate compound deposited. A second transverse strike-off plate **60** is positioned immediately rearward of the adjustable, transverse strike-off plate **56**, and may likewise be adjusted to conform to the adjustment of adjustable, transverse strike-off plate **56**, or this second transverse strike-off plate **60** may be adjusted so as to be lower than the adjustable, transverse strike-off plate **56**, to further cut the asphalt aggregate compound to the exact desired thickness.

A flat screed compacting element **62** extends rearward of the second transverse strike-off plate **60** and may be made integral therewith or attached thereto, which screed or compacting element **62** has an upturned edge **64** along the rear portion thereof. The screed or compacting element **62** has pairs of apertured lugs **66** thereon, a pair near each end thereof, which pairs of lugs each pivotally mount an apertured bar **68**, which bars extend upward and are fitted in sliding relation within loops **69** which are secured to the frame **8** rearward of the hopper **36**, as will be seen in FIG. 1, so the screed or compacting element **62** may be slanted at an angle with respect to the terrain, as indicated in FIG. 6, so that, upon the paving machine being moved forward, the asphalt aggregate compound, as it passes therebelow, is compacted, as indicated at **49** in FIG. 6, and the angle of the screed or compacting element **62** may be independently adjusted by adjustment of screw threaded element **70** which is pivotally connected to lugs **71** at the rear edge of screed or compacting element **62** by pins which pass through apertured lugs **71** secured to the rear edge thereof. The screw threaded element **70** is connected, by an outstanding lug **72**, to the apertured bar **68** to enable the angular adjustment of the screed or compacting element **62**.

The screed or compacting element **62** has an adjustment screw **74** connected to each end thereof, which screws extend upward and pass through screw threaded elements which are mounted on the frame **8** rearward of the hopper **36** so the screed or compacting element **62**

may be adjusted vertically by movement of the screw threaded members **74**, thereby maintaining the same angular adjustment of the screed or compacting element **62**. With the screed or compacting element **62** adjusted in the manner described, the greatest pressure is applied to the rear end of the transverse screed or compacting element **62** where a relatively short length of blade is in extreme pressure contact with the material being compacted. Thus, in effect, a pressurized troweling action is accorded the asphalt aggregate compound **49** which passes thereunder, and the asphalt aggregate compound or the like being laid is troweled with a smooth finish and to a relatively high density of compacting, which approaches, or even exceeds the results accomplished from compacting with rollers or the like, as a substantial portion of the weight of the paving machine and of the material loaded thereinto, and a substantial portion of the weight of the vehicle connected thereto can be directed to the troweling portion of the screed or compacting element **62** which contacts the asphalt aggregate compound or the like, as it is being spread.

It is to be pointed out that the rear wheels **10** of the paving machine rest upon the compacted asphalt aggregate compound **49** over which the screed or compacting element **62** has passed, therefore accurate gauging of the thickness of the asphalt aggregate compound **49** can be accomplished, as the wheels **10** roll on a uniformly smooth surface of the compacted material, whether it be foundation material which is being spread prior to the spreading of the asphalt aggregate compound or whether it be the asphalt aggregate compound **49**.

The paving machine is provided with an elongated hopper **36**, which is preferably eight feet in width, so it will be within the legal width limit as set by law in most States, and the wheels **10** are so positioned as to roll on the outer edges of the material being compacted. However, after the first strip of asphalt aggregate compound **49** or the like has been laid, and additional strips are to be laid in side-by-side relation with respect thereto, a joint scratcher **78** is mounted on a side of frame **8** immediately rearward of one of the wheels **10**, which joint scratcher **78** is adjusted so that the teeth **80** thereof will rake behind the wheel **10** which is riding on the joint between the strips being laid and the strip which has been laid, so that the joint is scratched to a uniform height, with the wheel **10** compacting the joint between the strip laid and that which is being laid.

The scratcher element **78**, as will best be seen in FIG. 2, is adjustable vertically by a screw threaded element **82** which is threadably mounted in screw threaded sleeve **83** secured on the frame **8**, which screw threaded element is operable by means of handle **84**. Guide rods **86** are provided on scratcher element **78**, which guide rods **86** are guided within sleeves **88**, which are mounted on the rear end of frame **8**, so upon movement of the scratcher element by means of handle **84**, the scratcher **78** is adjusted to the desired position.

The screed or compacting element **62** has pairs of upstanding lugs **90** secured thereto at spaced intervals throughout the length thereof. A roller **92** is journaled between each pair of lugs for turning movement therein, which rollers are in rolling engagement with the rear face of the adjustable, transverse strike-off plate **56**, so that the adjustable, transverse strike-off plate **56** may be supported against bending moments, and yet the adjustable, transverse strike-off plate **56** and the screed or compacting element **62** may be readily adjusted relative to each other by means of the respective adjustment screws.

The dump truck **1** carries a conventional power lift arrangement for moving the dump body from one position to another position. However, since it is desirable to move the paving machine from one position to another, frequently, this is accomplished by connecting chains **94**, by means of hooks **96**, over the top edge of the dump body of the dump truck **1**, and with the chains **94** connected to apertured lugs **98**, which are connected in rigid relation with respect to frame **8** of the paving machine, and with the dump truck lowered from the position, as shown in FIG. 6 to that shown in FIG. 3, and with the greater portion of the weight of the machine being rearward of apertured lugs **98**, the draw bars **16** of the paving machine will be urged upward against axle **4** of the truck. Then, by raising side shield members **100** from the position indicated in dashed outline in FIG. 3 to the position indicated in full outline therein, and with the chains **102** attached to the side shields **100** at one end and with the other ends thereof connected in coupled relation with lug **104** on hopper **36**, the machine will be lifted clear of the ground. By retracting plunger **40** of hydraulic jack **42**, the cable **30** will be loosened, which will permit the weight **26** to move beams **20** downward, as shown in FIG. 3, which will move the wheels **12** and axle **22** into elevated position, as shown in FIG. 3.

With the paving machine in elevated position, as shown in FIG. 3, the truck may be backed to place the machine in side-by-side relation with the previously laid strip of paving, the paving machine may then be lowered into ground engaging position, as shown in FIG. 6, and with the jack **42** adjusted so that the draw bars **16** will engage the lower side of axle **4**, the paving machine is ready to be moved along the terrain to lay successive rows or strips of asphalt aggregate compound **49**, or such other material as is adapted to be passed through the machine in the manner as set out above.

Each of the side shields **100** has a runner **101** thereon, so as to readily move along the surface of the terrain being coated with an asphalt aggregate compound or the like. The shields **100** are retained in sliding relation with respect to frame **8** by forwardly extending angle members **106**. The forward end of each shield **100** is coupled to the frame **8** by a pin **108**, which pins pass downward through the respective sleeves **110** which are mounted on the frame **8** and into the respective sleeves **112** (FIG. 6) mounted on the inner side of the respective shields **100**. In this manner the shields **100** may be used to retain the asphalt aggregate compound **49**, or other material, in a well defined strip, when successive strips of the compound are being laid. However, in some instances, it is desirable for the asphalt aggregate compound to spread to a greater width than that defined by the shields **100**, in which event, the pins **108** are removed, which allows the removal of the shields **100** from the machine, which will allow the asphalt aggregate compound to spread outward from the side of the machine from which the shield has been removed, so as to allow the feathering of the edges of the asphalt compound, which may be compacted by hand or by roller or in any desired, effective manner.

While the paving machine is so constructed that the upturned projections **18** will pass below axle **4** of the dump truck **1**, which has wheels of the usual height, it may be desirable to use the machine on dump trucks having larger wheels, such as wheels **2***a*, in which case, the axle **4***a* is at a higher elevation than the axle **4**. In this case, tubular extension members **18***a* are telescoped over the projections **18** on the respective draw bars **16**, so as to give the added height to the projection, so that the tubular extension members **18***a* will engage the forward side of axle **4***a* to enable the paving machine to be moved along the terrain by the truck having the larger wheels, therefore the higher axle, as shown in FIGS. 3, 4, and 6.

A rack **114** is provided on frame **8** to receive the tubular extension members **18***a* when these members are not in use. A further rack **116** is provided on frame **8** to receive jack handle **44**, when this handle is not in use.

While the machine has been described somewhat specifically for the spreading and compacting of an asphalt aggregate compound, it is to be understood that this has been done for purposes of illustration, and that other types of terrain coating surfacing material, which are

adapted to pass through or forward of the hopper may be used and smoothed and compacted onto the surface by adjustable, transverse strike-off plate **56** and screed or compacting element **62**, which use is considered to be within the scope and inventive concept of the present machine. It has been found that the machine is adaptable for spreading sub-surfacing material, prior to the spreading of the final surface coating of asphalt aggregate compound or a cementitious material if it is adapted to pass through the machine and to be processed thereby.

The discharge chute extends downward from the lower end of the hopper to a spaced distance above the terrain, thereby enabling the operator to watch the distribution of the material passing therethrough, which hopper and chute are of such size that either hot or cold material may be readily fed therethrough, but, if any foreign object is passed into the hopper which will not pass out through the chute, the operator of the machine will at once inform the driver of the truck, so as to insure even spreading of the surfacing material.

Second form of the invention

With more detailed reference to the drawings of the second form of invention, the numeral **201** designates generally the ground line over which the machine is to be towed and over which paving material is to be spread, by the dump truck towing the paving machine. The dump truck is designated generally by the numeral **202**, which dump truck has a body portion **204** which receives a load of aggregate, such as asphalt or the like therein. The body **204** is pivoted, as indicated at **206**, on the rear end of frame **208** and has an end gate **210** pivotally mounted, as indicated at **212**, to close the end of dump body **204** when the paving material is being hauled to the machine. The truck has an axle **214** with at least one wheel **216** on each end thereof. A spring **218** is interposed between axle **214** and frame **208** in the conventional manner.

The paving machine is designated generally by the numeral **220**, which machine has a frame **222** of substantially rectangular form, which frame has downwardly extending members **224** near one end thereof, one on each side of said frame **222**, which members **224** are mounted to form mounting brackets. A roller **226** is positioned between the mounting brackets **224** and has a shaft **228** which passes therethrough and through a bearing **230** positioned on each of the mounting brackets **224**, so as to journal the roller **226** about the axis of shaft **228**. The roller **226** forms a support for one end of the machine, while paving material **231**, such as asphalt aggregate compound is being applied.

The frame **222** of the paving machine has spaced apart, forwardly extending members **232** secured thereto to form a forward extension of the frame **222**. The forwardly extending members **232** are down-turned at an angle, as indicated at **234**, which downturned portions of the members **232** each has a forwardly extending rod or draw bar **236** secured thereto a spaced distance downward from the upper portion thereof. The forwardly extending bars **236** are up-turned, as indicated at **238** for engagement with the forward side of the rear axle **214** of the dump truck **202**, as will be brought out more in detail hereinafter.

A transverse member **240** extends between the forwardly extending members **232**, which transverse member has downwardly extending, apertured lugs **242** secured thereon. A wheel supporting, apertured beam is pivotally mounted between lugs **242** by a pivot pin **246** which passes through the apertured lugs **242** and through the apertures of the beams **244**. The respective forward ends of the beams **244** are apertured to receive an axle shaft **248** therethrough, on which axle shaft **248** wheels **250** are mounted for rotation about the axis thereof. The rear end of the beams **244** has a counterweight **252** secured therebetween to off-set the weight of the wheels **250**, as will be more fully brought out hereinafter. When the machine is depositing material on the strip of terrain **201**, the wheel **250** at the front end of the machine rides directly upon the terrain before any paving or surfacing material is deposited thereon, as shown in FIG. 12. On the other hand, the roller **226** at the rear of the machine rides upon and compacts the paving or surfacing material **231**, as is also shown in FIG. 12.

The counterweight **252** extends between beams **244**, as will best be seen in FIG. 12, and has an eye **254** secured on the upper side thereof, to which eye a cable **256** is attached to extend therefrom and over sheave pulley **258**, mounted on the forward side of cross beam **259** of frame **222**, and through a tubular member **260** and over a sheave pulley **262**, mounted on the plunger **263** of hydraulic jack **264**, mounted on cross bar **266** of frame **222**, with the end of the cable being anchored to the cross bar **266**.

Upon outward movement of plunger **263** of hydraulic jack **264**, by manipulation of jack handle **268**, the sheave pulley **262** will move outward, which will cause cable **256**, which is attached to beams **244**, to move the rear ends of the beams **244** upward to cause pivotal action of the beams about pivot pin **246**, which will move the forward end of the beams **244** carrying wheels **250** downward which will cause the forward end of frame extension members **232** and forwardly extending rods **236** to move upward beneath axle **214** of truck **202** to enable the towing of the paving machine over the terrain to perform a spreading and paving action, or to enable the paving machine to be lifted bodily for movement from place to place, as will be more fully brought out hereinafter.

An open top hopper, designated generally by the numeral **270**, is mounted on the frame **222**. The open top hopper preferably has the sides thereof diverging upwardly and outwardly, with the wall of the forward side of the hopper being notched, as indicated at **271**, to receive the rear end portion of the truck frame thereinto. The upwardly and outwardly diverging sides of the hopper direct asphalt aggregate paving material or the like downward into the chute portion **272** of the hopper **270**. The chute portion **272**, as will best be seen in FIGS. 9 and 12, is closed at the lower end thereof by a pivoted, swinging door or valve **274**, the purpose of which is to regulate the discharge of the asphalt aggregate compound or the like from the chute **272**. The swinging door or valve **274** may be closed, as indicated in full outline in FIGS. 9 and 13, or it may be opened to any degree, up to the extent indicated in full outline in FIG. 12 or in dashed outline in FIG. 13, by the manipulation of a regulating lever **276** which is secured to transverse shaft **278**, which shaft is journaled within frame **222**. A pair of levers **280** is secured to the shaft **278**, one near each end thereof, to each of which levers a rod **282** is pivotally connected. The rods **282** extend forward and pivotally connect to an end of lever **284**, which lever **284** is pivotally mounted, by pivot pin **286**, on frame **222** to actuate door or valve **274** by movement of linkage **288**, which linkage **288** is pivotally connected to the lower end of lever **284** by means of a pivot pin and to the ends of the door **274** by means of the pivot bolts **290**, one on each end of the door **274**. A rack **292** is pivotally mounted on lever **276** for engagement with a lug or keeper **294** on cross member **266** so as to hold the lever **276** in any desired set position to enable the feeding of the asphalt aggregate compound downward and out of the lower end of the chute **272**.

A spreader blade or trowel **296** is connected to cross member **298** of frame **222**, by hinge **300** so as to spread the asphalt aggregate smoothly across the entire width of the machine as it is being towed over the terrain. The spreader blade **296** has a free trailing edge **302** at a slightly more flattened angle than the upper portion thereof so as to discharge the material to a uniform thickness with respect to the terrain over which the machine is operating. An angle bar **304** extends longitudinally of spreader blade **296** and has an apertured lug on the upper end thereof through which lug a pivot bolt **306** passes and through clevis **308** which is adjustably mounted

on the lower end of screw rod **310**. The rod **310** threadably engages a threaded sleeve **312** which sleeve is secured to frame **222**, so upon rotation of rod **310** by handle **314** on the upper end thereof, the blade **296** is raised or lowered. One of the rods **310** is positioned on each side of the machine so as to enable adjustment of each end of the blade **296**.

A material thickness indicator rod **316** is pivotally mounted to lug **318** near the trailing edge **302** of spreader blade **296**. The indicator rod **316** extends upward through a slot **320** in frame **222** and has indicia thereon, which indicia is readable along the top edge of pointer **322**, FIG. 10, thereby enabling the determination of the distance between the lower edge **302** of the blade **296** and the face of the terrain at all times, without measurements having to be taken.

The paving machine has fenders or side shields **324**, one on each side thereof, as indicated in dashed outline in FIG. 9 and in full outline in FIGS. 10, 12 and 14, which fenders **324** are maintained against outward movement by a guide bracket **321** secured to each side of frame **222** and by stay rods **325**, one of which stay rods pass through each fender **324**, as indicated in FIGS. 10, 12 and 14. The stay rod is threaded at each end and each end thereof has two nuts thereon so as to secure each fender against lateral movement with respect to frame **222**. The fenders or shields **324** confine the aggregate within the width of the machine. Each of the fenders **324** has a runner **326** on the lower side thereof, which runners are formed of in-turned angle members, as will best be seen in FIGS. 11 and 14. The blade **296** has a screw threaded boss **328** on each end thereof, which bosses extend substantially vertically therethrough and are threadably engaged by jack screws **330**, which jack screws **330** are rounded at the lower ends thereof, as indicated at **332**, for engagement with the upper surface of the flange of angle members **326**, as will best be seen in FIGS. 11 and 14. The upper end of each jack screw **330** extends upward through an elongated slot **320** in frame **222**, and each has a hand wheel **334** on the upper end thereof to enable the turning of the respective jack screws **330** to position blade **296** to define the desired thickness between the lower edge of strike-off plate or spreader blade **296** and the terrain on which the runner angle members seat.

Each fender or shield **324** has a sleeve **337** secured thereto by a pivot bolt **335** at the forward end thereof, to connect with the forward end of frame **222** by means of a bar **336** which passes through the respective sleeves **338**, one on each side of the forward end of the frame **222**. This enables the fenders **324** to "float" or rise and fall in sliding relation on bar **336** to a limited degree, however, chains **340** are secured to the outer side of each fender **324** and are engageable with the respective slotted lugs **342** mounted on the frame adjacent the sides of the hopper **270** to hold the fenders in raised position when it is desired to transport the machine from place to place. The chains **340** limit the downward movement of the fenders **324** relative to frame **222**, thereby enabling the machine to be picked up without the fenders moving downward below the bottom of the machine.

The frame **222** has an ear **344** on each side thereof, which ears extend upward therefrom and through each end of the hopper **270**. The upper ends of the respective ears are apertured and a chain **346** is secured in each ear. Each chain **346** has a hook **348** thereon for engagement with the upper edges of the body **204** of the truck **202** to enable the lifting of the paving machine clear of the ground for transportation from place to place by the truck.

A lug **350** is secured on each side of the frame **222** and these lugs extend upward through each end of the hopper **270** and each of the lugs has an out-turned hook **352** thereon to receive a chain therein for lifting the machine or for loading the machine onto a truck or the like. When it is desired to raise the rear end of the paving machine to a higher elevation, as for loading, a chain is connected directly to the respective lugs **350**, as pointed out above.

The hopper **270** has a liquid supply tank **356** mounted on the rear thereof, into which tank a liquid, such as water, Diesel oil, or the like, may be introduced through fill cap **358**. A conduit leads from the liquid supply tank **356** to a perforate spreader pipe **364**. The conduit **360** has a control valve **362** therein so as to control the flow of liquid to the perforate spreader pipe **364** which is mounted on the frame **222** directly above the rolller **226**. The spreader pipe **364** has the perforations **366** therein at spaced intervals throughout the length thereof to direct the liquid from pipe **360** onto roller **226**. An elongated pad **368**, preferably of absorbent material, is positioned on the upper side of roller **226** in position to receive liquid discharged from the perforations **366** in pipe **364**. The pad **368** is resiliently held in place by a series of springs **370** which are secured to the frame **222** at one end and to the scraper blade **372** at the other end. The scraper blade **372** is pivotally mounted, on one side, to frame **222** by pin **374**, and the other side thereof is sharpened so the edge will fit in cutting relation with the cylindrical surface or roller **226**. Further springs **373**, one on each end of blade **372**, interconnect the scraper blade **372** with the frame **222** through downwardly extending lugs **224**.

The frame **222** has a floor plate **376** a portion of which is mounted on the upper surface thereof forwardly of the hopper **270** and a portion of which is mounted on the upper surface from the frame **222** extends rearwardly of the hopper **270** to provide space on which an operator may stand for operation and/or inspection of the machine.

Operation of the second form of the invention

With the paving machine **220** positioned immediately rearward of a dump truck **202**, and with the up-turned projections **230** of bars **236** lying in a plane parallel to and forward of the axis of axle **214**, the jack handle **268** of jack **264** is operated to move the plunger **263** of jack **264** outward. The jack plunger **263** has a sheave **262** mounted thereon and with one end of the cable **256** anchored to frame **222**, the cable will be tightened to cause the rear end of beams **244** to be raised, which will cause a relative movement of the lower side of wheels **250** and the upper side of outwardly projecting bars **236** away from each other. This will cause the bars **236** to move into contact relation with the lower side of axle **214** of truck **202**, and upon continued actuation of jack handle **268**, additional pressure will be put on wheels **250** and a portion of the truck weight will be lifted to cause more weight to be transferred to compacting roller **226**.

The upstanding portions **238** of bars **236** will enable the paving machine **220** to be pulled over the terrain. Upon raising the dump body **204** of truck **202** to the position as indicated in dashed outline in FIG. 12, the tail gate **210** will swing against the rear wall of hopper **270**, with the aggregate being dumped from the dump truck body **204** being directed into hopper **270**, and with the door or valve **274** on the lower end of chute **272**, on the lower end of the hopper, open, as indicated in dashed outline in FIG. 13, the asphalt aggregate compound will pass outward through the lower end of chute **272** as the paving machine moves forward. The asphalt aggregate compound will become banked against the forward side of the spreader blade **296** and with the trailing edge **302** of strike-off plate or troweling blade **296** spaced the desired distance above the terrain by means of the jack screw **330** engaging the upper face of runner **326**, a basis will be formed for maintaining the runner firmly against the surface of the terrain, with the trailing edge **302** of the blade **296** being spaced the desired distance upward from the surface of the terrain **201** to control the uncompacted asphalt aggregate compound.

With the dump truck **202** in this position, and with the machine thus adjusted, the asphalt aggregate compound feeds outward between the lower edge **302** of blade **296** and the terrain **201**, as the truck moves forward. The asphalt feeds outward beneath trailing edge **302** of blade **296**, as indicated at **231**, which strip of asphalt aggregate compound then receives the roller **226** thereon to compact the asphalt aggregate compound into a smooth linear strip, the width of which is defined by the spacing of fenders **324**. Successive strips of asphalt aggregate compound may be laid in side by side relation to obtain the desired width of paving.

In view of the fact that the asphalt aggregate compound or other aggregates will, under certain conditions, stick to the roller **226**, a liquid distribution pipe **364** is mounted directly above the roller **226**, which pipe is perforated, as indicated at **366**, so as to direct liquid onto the upper surface of roller **226** and onto the absorbent pad **368**, which pad extends the length of the roller **226**, and with the roller **226** rolling in the direction indicated by the arrow in FIG. 15, the roller will be coated with liquid from pipe **364**, and as it comes in contact with the strip of asphalt, as indicated at **231**, will normally be prevented from sticking to the asphalt aggregate compound or the like. Should the asphalt aggregate compound or the like adhere to the surface of the roller **226**, the scraper blade **372** is positioned on the frame **222** in position to engage the cylindrical portion of the roller **226**, under the tension of springs **370**, to scrape the paving material from the roller.

Once the trailing edge **302** of blade **396** is adjusted with respect to the terrain **201**, the blade **372** will be maintained in this relation until it is changed by the adjustment of the screw threaded rods **310** and jack screws **330**.

The amount of material discharged from the lower end of the chute **272** is controlled by the door or valve **274**, which door or valve may be opened the desired degree, or it may be closed completely, as indicated in full outline in FIGS. 9 and 13, when it is desired to move the machine from place to place.

It is to be pointed out that the machine is relatively light in weight, and is, therefore, easy to transport from place to place, however, the rods or draw bars **236** are jacked upward against the lower side of axle **214** until some of the weight of the truck is supported by the paving machine. The pressure on the roller **226** is proportionate to the weight on the paving machine, the weight of the material in the hopper, plus a portion of the weight of the truck and the material therein, as indicated by the weight of the load lifted by jack **264** in urging wheels **250** downward and drawbars **236** upward.

In laying strips of asphalt aggregate compound pavement, the dump truck **202** may be backed into place so the draw bars **236** and the upwardly extending projections **238** may be readily engaged on axle **214** of the truck, then the dump body **204** of the truck is raised, as indicated in dashed outline in FIG. 12, so as to dump the asphalt aggregate compound into the hopper of the paving machine **220** as the truck **202** and the paving machine move along the surface to be paved. However, when the asphalt aggregate compound becomes exhausted from the dump body **204** of the truck, the pressure on the plunger **263** of jack **264** may be released, which will lower the upstanding projections **238** on draw bars **236** to a point below the lowermost point of axle **214**, whereupon, the truck can be driven away to be reloaded, and another truck, filled with paving material may be backed into position so that, upon actuation of jack handle **268** to move plunger **263** outward, the cable **256** will be tightened to move the draw bars **236** into contact, lifting relation with respect to axle **214**, whereupon, successive loads of paving material may be dumped into hopper **270** to be rolled and spread on the surface to be paved, as set out above.

The present machine is particularly adaptable for work in close places, as set forth in the first mentioned form of invention. The paving machine **220** may be picked up by the truck, while the paving machine is filled with aggregate, by engaging hooks **248** with the top edge of body **204** and utilizing the downward movement of the truck body from the position shown in dashed outline in FIG. 12, to the normal position of the truck for traveling. With the paving machine thus lifted clear of the terrain, the truck **202** may be backed, or otherwise maneuvered into close places to put the paving machine in desired locations for simultaneously dispensing, applying, spreading and rolling the paving material onto the surface of the terrain in a continuous strip as the truck passes over the terrain.

Having thus clearly shown and described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A machine for spreading and compacting surfacing material onto a strip of terrain, which machine is adapted to be towed by a dump truck, which machine comprises;

(a) a wheeled frame,

(b) a transverse hopper mounted on said wheeled frame which hopper has a discharge opening formed in the lower end thereof,

(1) said opening in said hopper being of the width of the strip of terrain to be surfaced,

(c) a chute attached to the lower end of said hopper and being of a width of the opening in the lower end thereof,

(1) said chute leading from the lower end of said hopper to a point a spaced distance above the terrain to direct surfacing material from the hopper onto the strip of terrain to be surfaced,

(d) a transversely arranged plate mounted on said frame rearwardly of said hopper and extending downward to a spaced distance above the terrain to form a strike-off means to strike off surfacing material discharge from said chute to a predetermined thickness,

(e) a single roller compacting means mounted on said wheeled frame transversely thereof rearwardly of said strike-off means, which roller is in compacting contact with the surfacing material discharged onto said strip of terrain and being at least the width of said strip of surfacing material,

(f) a beam pivotally mounted on said frame near the forward end thereof,

(g) a pair of wheels of said wheeled frame being mounted on the forward end of said pivoted beam for rotation about an axis to support said wheeled frame for movement over the terrain,

(h) cable means connected to the rear end portion of said pivoted beam,

(i) jack means positioned intermediate said frame and said cable to exert a pulling action on said cable when said jack is moved in one direction to urge said wheels into contact relation with the terrain, and

(j) forwardly and upwardly extending bar portions secured to the forward end of said frame and being adapted to engage the lower and forward side of an axle of a towing vehicle to form a draw bar, and to support at least a portion of the weight of the towing vehicle thereon while the machine is moved over the terrain to perform a surfacing and compacting operation.

2. A machine for spreading and compacting surfacing material on a strip of terrain which includes a frame having front and rear ends, means at said front end of said frame for attaching the same to a vehicle, such as a dump truck, so as to be towed thereby, wheel means centrally located at said front end of said frame for supporting that end of the strip of terrain before any surfacing material has been deposited thereon, a hopper for holding surfacing material mounted on said frame to the rear of said wheel means, a chute attached to the lower end of said hopper for conveying surfacing material from said hopper

to a point a spaced distance above the strip of terrain, a transversely disposed plate movably mounted on said frame to the rear of said hopper and said chute, means connected between said frame and said plate for adjusting the vertical position of said plate on said frame so as to cause said plate to strike off surfacing material discharged from said chute to a predetermined thickness on the terrain, compacting means mounted on said frame transversely thereof and to the rear of said plate, whereby said compacting means supports said rear end of said frame on the surfacing material deposited upon the strip of terrain through said chute after said plate has struck off the material to the predetermined thickness, side fenders vertically movable mounted on said frame at opposite sides of said plate, said side fenders including lateral projection means, adjustable stop means vertically adjustably carried by said plate and adapted to engage said lateral projection means for limiting vertical movement of said side fenders relative to said plate, said side fenders serving to restrain lateral movement of the surfacing material and measuring means between said plate and said side fenders to indicate the relative orientation of said plate and said side fenders to aid the operator of the machine in correctly vertically adjusting said plate.

3. A machine adapted to be attached to a vehicle, such as a dump truck, for spreading and compacting surfacing material on a strip of terrain, said machine including a frame having front and rear ends, rigid hook means on said front end of said frame adapted to attach said frame to an underside of the vehicle for towing thereby, wheel means rotatably and vertically adjustably mounted on said front end adjacent the longitudinal center line of said frame, adjacent said rigid hook means, and subjacent the vehicle for supporting said front end on the strip of terrain, said wheel means being spaced inwardly from the sides of said frame, hopper means for holding surfacing material, said hopper means mounted on said frame rearwardly of said rigid hook means, a transversely disposed plate movably mounted on said frame rearwardly of said hopper means, adjusting means for vertically adjusting said plate relative to said frame, transversely disposed compacting means mounted on said frame rearwardly of said plate, and jack means mounted on said frame, said jack means operatively connected to said wheel means to raise and lower said wheel means to urge said rigid hook means into pressure engagement with the underside of the vehicle whereby a portion of the weight of the vehicle will be transferred to the forward end of the frame.

4. A machine according to claim 3 wherein a bar is connected an end of said transversely disposed plate and extends upwardly therefrom, indicia on at least one face of said bar, side fenders at each side of said hopper means having runners along their lower edge adapted to ride on the surface of the terrain, a second bar mounted on said fenders and extending upwardly in side-by-side relation to a side of said bar having indicia thereon, the upper surface of said second bar forming a reading gauge relative to said indicia to the lower edge of said plate and the face of the terrain.

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