June 9, 1942. F. L. CARSWELL 2,285,765

AGGREGATE MIXING MACHINE

Filed April 17, 1941 4 Sheets-Sheet 1

Fig. 1.

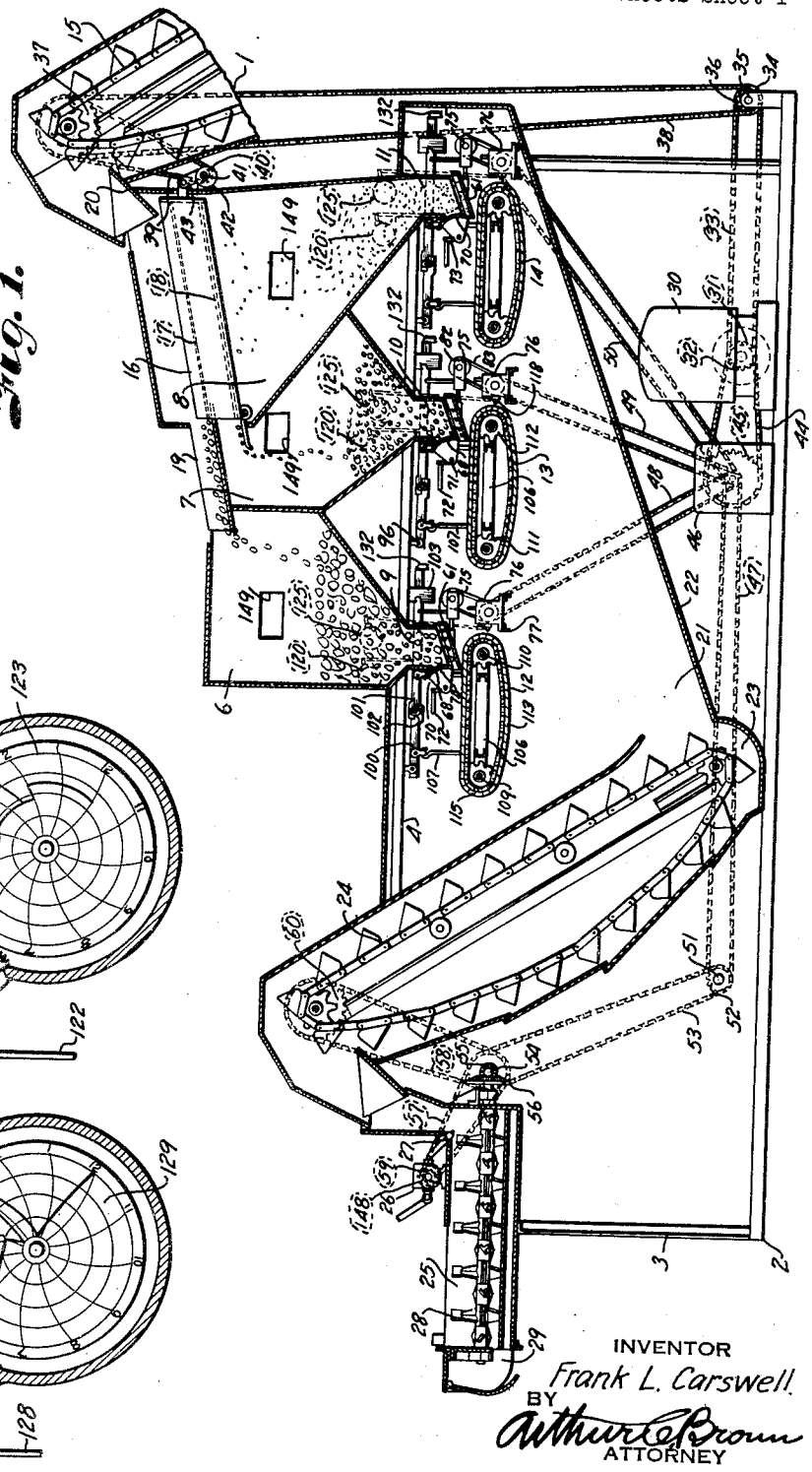

Fig. 7.

Fig. 6.

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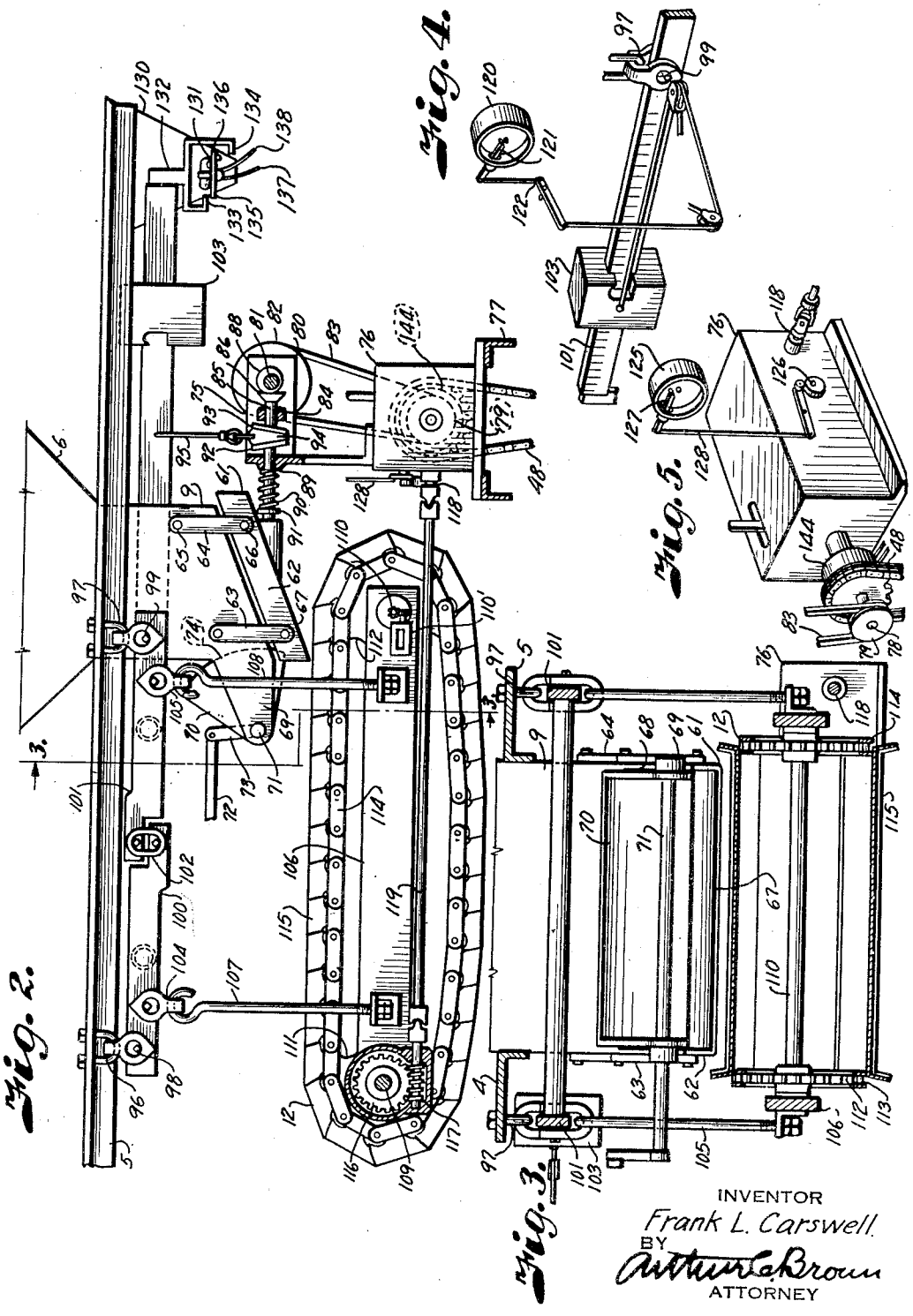

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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AGGREGATE MIXING MACHINE

Filed April 17, 1941 4 Sheets-Sheet 3

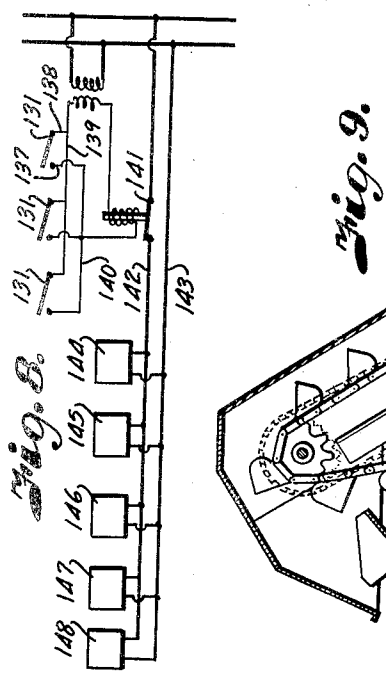

Fig. 8.

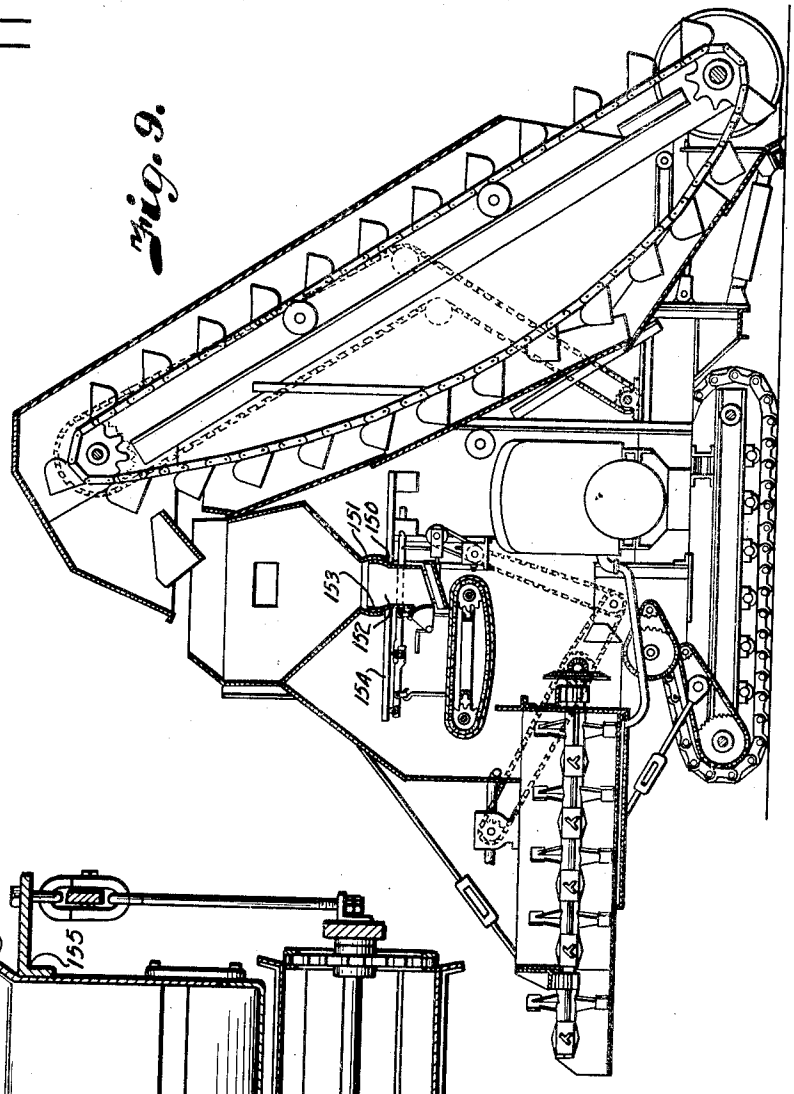

Fig. 9.

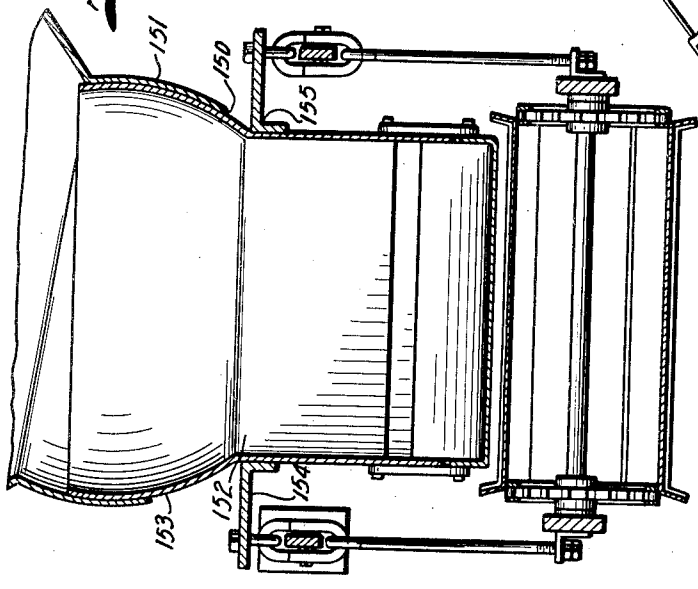

Fig. 10.

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AGGREGATE MIXING MACHINE

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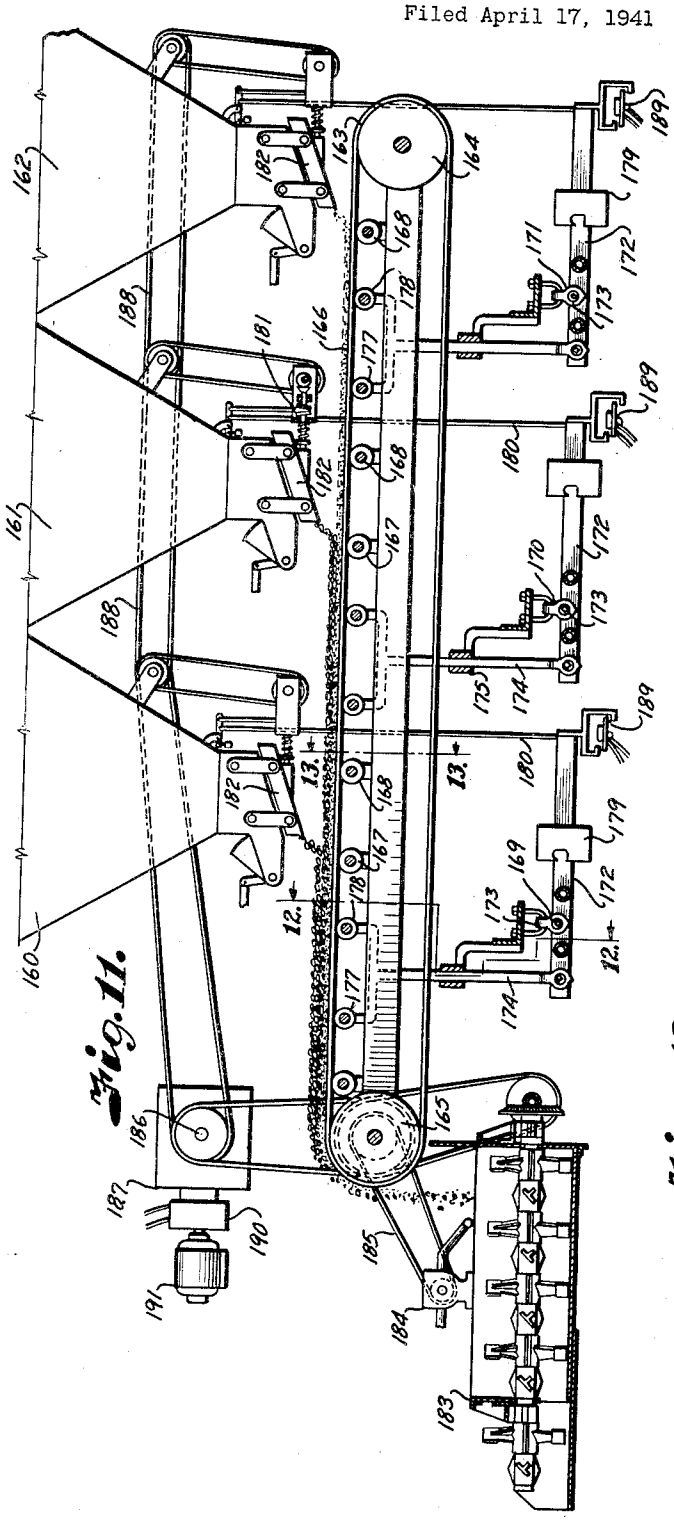

Fig. 11.

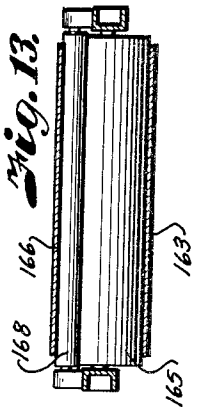

Fig. 13.

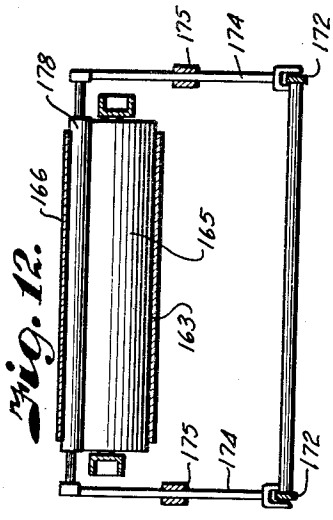

Fig. 12.

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2,285,765

AGGREGATE MIXING MACHINE

Frank L. Carswell, Kansas City, Mo.

Application April 17, 1941, Serial No. 388,942

16 Claims. (Cl. 259—165)

This invention relates to a mixing machine, for example a machine for continuously mixing aggregates and/or ingredients, with bitumen, Portland cement, or other binding medium in the manufacture of paving and similar materials.

Usually the specifications for such materials require that the various components be mixed in proportion by weight and since machines of the character described measure the component materials by volume it is difficult to maintain a continuous run of the product which conforms to the specifications.

It is, therefore, the principal objects of the invention to provide a machine of this character constructed for continuous movement of the materials to the mixing point; and to provide the machine with the continuous gravimetric feeders whereby continuous streams of the respective materials may be effected to deliver the materials in proper proportions by weight.

Other objects of the invention are to provide the machine with means for recording rate of feed of delivery and any change in weight of the materials being discharged from their respective hoppers.

A further object of the invention is to provide for automatic levelling of the gravimetric feeders thereby adapting an embodiment of the invention in a mobile mixing plant.

In accomplishing these and other objects of the invention, as hereinafter pointed out, I have provided improved structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a longitudinal section through a stationary mixing machine embodying the features of the present invention.

Fig. 2 is a side elevational view of one of the gravimetric feeders.

Fig. 3 is a cross-section on the line 3—3 of Fig. 2.

Fig. 4 is a detail perspective view of the scale beam, poise, and the recorder for indicating weight of the material being discharged through a given period of time.

Fig. 5 is a detail perspective view of the transmission operating the feed belt and showing the recorder for recording feet of belt delivery during a given period of time.

Fig. 6 is a sectional view through the recorder which indicates feet of belt delivery over a given period of time.

Fig. 7 illustrates the recorder for indicating weight of material delivered per foot of belt travel over a period of time.

Fig. 8 is a wiring diagram of the circuit for stopping feed of the materials when the supply of one of the materials becomes exhausted.

Fig. 9 is a longitudinal section through a mobile type mixing machine constructed in accordance with the present invention.

Fig. 10 is a section through the gravimetric feeder of the mobile machine.

Fig. 11 is a side elevational view of a modified form of the invention.

Fig. 12 is a cross-section on the line 12—12 of Fig. 11.

Fig. 13 is a similar cross-section on the line 13—13 of Fig. 11.

Referring more in detail to the drawings:

1 designates a stationary type of machine adapted for mixing aggregates with a bitumen or the like at a central location from which the mixed product is conveyed to the place of use. The machine includes a stationary base 2, carrying a frame 3 including spaced longitudinals 4 and 5. Supported by the frame, above the members 4 and 5, are aggregate containing hoppers 6, 7 and 8, having discharge throats 9, 10 and 11 in the bottoms thereof through which aggregates are discharged into the gravimetric feeders 12, 13 and 14, later described.

The respective hoppers are charged by an elevator or conveyor 15 which carries the materials into a shaker shoe 16, having an upper coarse screen 17 and a finer mesh, lower screen 18, the shaker being arranged over the top of the hopper 8 and the upper screen 17 connected with the feed hopper 6 by a chute 19. The material is discharged from the conveyor onto the upper screen by way of a chute 20 and the particles of material too large to pass the meshes of the screen 17 slide therealong and are discharged through the chute 19 into the hopper 6. The finer materials pass through the meshes of the screen 17 onto the screen 18, where the intermediate size particles, or those too large to pass the meshes of the screen 18, slide down the screen and are discharged into the hopper 7. The remaining material passes directly through the screen 18 and collects in the hopper 8.

The gravimetric feeders discharge the respective aggregates in predetermined proportions by weight into a collecting hopper 21 which is carried by the frame below the hoppers 6, 7 and 8. The bottom 22 of the collecting hopper slopes downwardly toward an elevator pit 23 to receive the proportioned aggregates for removal from the collecting hopper by a conveyor 24 having discharge into a mixer, for example a pug-mill

25, where the proportioned aggregates are mixed with a liquid, for example a binding material, such as bitumen, the bitumen being discharged into the pug-mill by means of a measuring pump 26 having an outlet 27 discharging into the path of the material being admitted to the pug-mill.

The mixer has mixing devices 28 to thoroughly mix the materials and arranged to discharge the mixture through an outlet 29 into the trucks or other conveyances used in moving the mixed product to the place of use.

The various mechanisms just described are operated from a power unit 30 that is carried on the base 2 below the hopper 21. The power unit has sprockets 31 and 32, the sprocket 31 actuating a chain 33 operating over a sprocket 34 on a counter-shaft 35. Fixed on the counter-shaft 35, in driven relation with the sprocket 34, is a sprocket 36, and operating over the sprocket 36 and a sprocket 37 of the elevator 15 is a chain 38 to form a driving connection for the elevator 15. Each shaker screen is operated from the elevator by a chain 39 operating over a sprocket 40 on a shaft 41, having an eccentric 42 which operates the shaker screen by a pitman 43. The other sprocket 32 on the power unit carries a chain 44 operating over a sprocket 45 on a speed reducing transmission 46. Operating over suitable sprockets on the driven shaft of the transmission are endless chains 47, 48, 49 and 50. The chain 47 extends forwardly of the machine and actuates a counter-shaft 51 which carries a sprocket 52 operating a chain 53 which runs over a suitable sprocket on a countershaft 54 at the rear of the pug-mill. Fixed on the counter-shaft 54 is a pinion 55 meshing with a gear 56 on the pug-mill shaft to effect operation of the mixing devices 28 therein. The counter-shaft 54 also drives the measuring pump 26 and the conveyor 24 through chains 57 and 58 respectively, the chains operating over suitable driven sprockets 59 and 60 connected with the respective mechanisms.

Each of the gravimetric feeders previously mentioned is of the same construction, and a description of one suffices for the others, therefore only one of the feeders will be described in detail.

Supported below the feed throat of each of the respective hoppers is a downwardly sloping feeding tray 61 having sides 62 suspendingly supported by pairs of links 63 and 64 pivoted to the hopper throats, as at 65, and to the sides of the tray, as at 66, the bottoms 67 of the trays being spaced from the throats a sufficient distance to allow oscillating movement thereof for promoting discharge of the material, as later described. Formed in each feed throat, at the sides thereof adjacent the discharge end of the feeding trays, is an outlet opening 68 which cooperates with the lower or forward edge of the trays to discharge the material from the hopper. Projecting from the sides of the opening are arms 69 supporting a valve member 70 on a shaft 71 carried by the arms 69 and actuated from a remote point through a link 72 having connection with a crank-arm 73 on the shaft 71. The valve member 70 has an arcuate valving or gate portion 74 movable over the opening to regulate the effective area thereof so that approximately the desired amount of material is delivered from the hopper in a continuous stream.

In order to maintain a positive feed of the material from the hopper, the trays 61 are reciprocated by actuating mechanisms 75, as now to be described. Each actuating mechanism includes a transmission 76 mounted on the cross-members 77 of the frame to the rear of the respective discharge throats and which is actuated by the chain 48, 49 or 50, as the case may be. Fixed on the driven shaft 78 of the transmission is a pulley 79. Supported above the transmissions, substantially in horizontal alignment with the feeding trays 61 on bracket-like supports 80, are transverse shafts 81. Fixed on each shaft 81 is a pulley 82 which is actuated by a belt 83 operating over the pulley 79. Slidably supported in a bearing 84 carried by each bracket-like support 80 is a tappet 85, having a foot 86 engageable with a cam 88 on the shaft 81. Located in coaxial alignment with the tappet, and in spaced relation therewith, is a rod 89 having connection with the tray 61. Each tray is normally retained in a forward position together with its rod 89 by a coil spring 90, sleeved on the rod and having one end bearing against the bracket 80 and its opposite end against a collar 91 fixed to the rod, Fig. 2. Fixed to the facing ends of each rod 89 and tappet 85 are inclined heads 92 and 93, and projectable between the heads is a control wedge 94, the control wedge being suspendingly supported by a link 95 connected with the scale beam, as later described. It is obvious that when the wedge is positioned to fill the space between the heads, full movement of the tappets is imparted to the feeding trays through the rods 89 to effect maximum movement thereof in one direction for return by the springs 90, but as the wedge is withdrawn to leave space between the wedge and the respective heads, the stroke of the feeding tray is reduced proportionate to the spacing since part of the movement of the tappets is ineffective until the heads of the tappets have moved sufficiently to take up the spaces. Thus by moving the control wedges any predetermined feed of material may be maintained from the respective throats of the hoppers, the primary or rough adjustment being made by the valves 70 and the fine adjustment through the control wedges.

Carried by the longitudinal members 4 and 5 are spaced pairs of scale beam hangers 96 and 97 forming the fulcrums 98 and 99 for pairs of scale beams 100 and 101 extending toward each other and having their adjacent ends interconnected by links 102, as shown in Fig. 2. One of the scale beams of each rear pair projects rearwardly along the sides of the hopper throats and carries a balancing poise 103 that is slidably mounted thereon to effect balance of the scales, as later described. Suspendingly supported from the respective scale beams, in spaced relation with the fulcrum points 98 and 99, are hangers 104 and 105 suspending feed belt frames 106 by means of pairs of links 107 and 108. Journalled in the frames 106, at the ends thereof, are shafts 109 and 110. Carried on the respective shafts are pairs of sprockets 111 and 112 over which chains 113 and 114 of feeder belts 115 operate. Fixed to each shaft 109, at one end thereof, is a worm gear 116 meshing with the worm 117 which is connected with a driven shaft 118 of the transmission 76 through a flexible shaft 119 so that the feed belts are driven at predetermined speeds through the transmissions to carry the materials discharged from the hoppers thereabout for discharge off the ends of the belts into the collecting hopper 21. By setting the poises 103 on the scale beams, the scales may be made to balance, and by moving the poises from feed balancing position the scales will again effect a

balance when the weights of the material thereon correspond with the position of the poises on the scale beams. Thus as long as the correct amount of material is carried upon the belts, the scales will balance and maintain a constantly flowing stream of material at a constant feeding rate in accordance with the weight thereof. However, should the weight of the material on any one of the belts change, the scale for that belt is thrown out of balance to cause raising or lowering of the control wedge and increase or decrease the feeding rate of the tray to correct delivery of the material and maintain the feed in accordance with the weight of the material.

In order to record the weight of the material being fed and any change that may occur in the flow of material from a specified weight as set by the poises, each poise is connected with a recorder **120** of the chart type, the stylus **121** being operably connected with the poise through a flexible connection **122** so that should the poise be moved in either direction a corresponding change is indicated on the chart **123** of the recorder by means of a stylus **121**, as shown at **124** in Fig. 7. The recorder is actuated by a time mechanism (not shown) so that the time of making the weight change is shown on the chart, for example the chart shown in Fig. 7 indicates that a change in gravimetric feed of the material was effected at 2 o'clock and that the same rate of feed was maintained after the change up to 4 o'clock.

The footage rate of movement of the conveyor is also recorded by means of a recorder **125** having connection with a driven element **126** on the transmission and operatively connected with the stylus **127** of the recorder by a connecting mechanism **128**, the chart **129** being specifically illustrated in Fig. 6.

In Fig. 8 is illustrated an electrical circuit for stopping operation of the feeders **12**, **13** and **14**, conveyor **24**, and metering pump **26** in case one of the hoppers runs out of material. Fixed to the frame of the machine adjacent the poise beam of each scale mechanism is a bracket **130** pivotally mounting a mercury switch **131**, and fixed to each poise beam is a cooperating bracket **132** having inwardly directed fingers **133** and **134** to engage the ends **135** and **136** of a lever carried with the mercury switch. The fingers **133** and **134** are located respectively above and below the ends of the lever so that when the beam swings downwardly because of lack of material on the belt, the finger **133** engages the lever to close circuit through conductors **137** and **138** and through connecting wires **139** and **140** to a solenoid switch **141**. The solenoid switch **141** opens circuit through conductors **142** and **143** supplying current to solenoid actuated clutches **144**, **145** and **146** for the driving connections of the transmissions **76**, a solenoid operated clutch **147** for the operating shaft of the conveyor **24**, and a solenoid operated clutch **148** for the driven shaft of the metering pump. Thus it is obvious that when any one of the mercury switches is closed because of lack of material on one of the belts, operation of all the feeders is suspended, together with operation of the conveyor **24** and meter pump. The conveyor **15**, however, will continue in operation to replenish the hopper which has become exhausted of material and the pug-mill will continue to operate to clear itself of the material being mixed. Should for some reason one of the feeding mechanisms fail to operate, an excessive amount of material may be delivered onto the feeding belt, in which case the poise beam will swing upwardly and the finger **134** on the beam will tilt the mercury switch to close circuit therethrough so that feed of all of the material will be stopped until the correctly related feeds are again established.

It is possible that one of the hoppers may fill to a greater extent than the others and to take care of the excess material each hopper is provided with an overflow opening **149**, Fig. 1. If desired the conveyors may be provided with revolution counters **110'** operating directly upon the shafts **110**.

In operation, the poises **103** of the respective scale mechanisms are set on the scale beams to regulate actuation of the feeding trays in cooperation with the control valves **74** for maintaining a predetermined feed of the aggregates from the respective hoppers according to the weights of the materials being carried in the respective conveyors. Feed of the materials is effected by gravity through the effective areas of the discharge openings under the influence of the vibrating trays **61**, the extent of vibration controlling the amount of feed. Should the amount of feed onto one of the belts exceed the specified amount by weight, the increased weight on the belt effects movement of the scale to change the position of the beam, which change in position of beam effects a corresponding change in the control wedge to slow down the feed tray for that particular mechanism. When the feed is such as to again maintain the balance as set by the counter-poise, the wedge is automatically readjusted to maintain the feed at the desired amount. Should the poise be moved to change the rate of feed, the fact is recorded on the recorders **120** and should the delivery speed of the feed belts be changed this is recorded on the charts **129** of the recorders **125**, the charts indicating the time that the change was made and the time the machine was in operation after such change.

The respective aggregates in the proper proportions by weight are discharged off the ends of the feed belts into the collecting hopper, where they are carried by the conveyor **24** to the pug-mill **25** for mixture with the bitumen and discharged as a finished product through the outlet **29**.

The mechanism just described is adapted for a stationary plant but in a mobile plant where the machine moves up and down the inclines of a roadway, it is necessary to provide a pendulum mounting for the respective gravimetric feeders to maintain the scale mechanisms in horizontal position at all times regardless of the position of the machine. This is effected by providing a universal connection **150** including an outlet socket **151** in the bottom of the hopper and the throat **152** has a ball-like portion **153** mounted to move within the outlet. The throat **152** has a depending spout portion carrying brackets **154** and **155** from which the scale beam and conveyor supports are suspended so that the gravimetric feeder always retains its horizontal position regardless of the position of the machine. Otherwise the machine operates in the same manner as the stationary plant.

While I have illustrated all the various driving connections as being of the chain and sprocket type, it is obvious that other driving connections may be used if desired. It is also obvious that in some installations the pug-mill may be

located directly below the gravimetric feeders, in which case the conveyor 24 may be omitted.

In the form of the invention illustrated in Fig. 11, the hoppers 160, 161 and 162 discharge onto a common belt type conveyor 163, the belt of the conveyor operating over pulleys 164 and 165. The upper run 166 of the belt receives the material from the hoppers and is supported directly below the discharge of each hopper on dead rollers 167 and 168 so that the belt is supported from yielding movement at these points. However, the belt is free to flex intermediate the dead rollers for the respective hoppers so as to actuate weighing mechanisms 169, 170 and 171.

Each weighing mechanism includes a scale beam 172 carried on a fulcrum 173 and actuated by a rod 174 slidably mounted in a bearing 175 and having a forked upper end 176 carrying rollers 177 and 178 engaging the bottom of the yieldable portions of the belts. The weights of the material moving across the yieldable portions of the belt are counterbalanced by poises 179 operable on the scale end of the beams 172. The scale beams 172 are connected by rods 180 with wedge mechanisms 181 controlling vibrating trays 182 identical with the trays 61 described in connection with the preferred form of the invention to cooperate with the control valves for regulating feed of material onto the belt in accordance with predetermined amounts as set by the poises 179. With this arrangement the scale mechanism 171 measures only the material discharged from the hopper 162. The scale 170 weighs the material to be discharged from both the hoppers 161 and 162 and the scale mechanism 169 weighs the sum of the material discharged from all of the hoppers, the weight of the material from the preceding hoppers being accounted for so that the scales actuate to effect the desired feed from the succeeding hoppers.

The end of the belt conveyor discharges directly into the pug-mill 183 wherein the various aggregates are mixed with a bituminous material discharged from a measuring pump 184, the pump 184 being driven from the conveyor through a belt 185. The conveyor is actuated from the driven shaft 186 of a transmission 187. The tray operating mechanisms for the respective hoppers are actuated from the power shaft of the transmission through belt connections 188 for the respective hoppers.

Each of the scale beams is provided with a switch mechanism 189 similar to that illustrated in connection with the preferred form of the invention and which functions to disengage a clutch indicated at 190 located between the transmission 187 and the driving motor 191 therefor to stop operation of the feed conveyor and measuring pump whenever one of the hoppers is not feeding the material at a rate to maintain the desired feed as set by the scale mechanism.

From the foregoing it is obvious that I have provided a machine wherein continuous streams of aggregates and/or ingredients may be delivered in proportions by weight of the respective materials to a mixer so as to conform with the specifications of a specified product.

What I claim and desire to secure by Letters Patent is:

1. A machine for mixing aggregates with a cementing material including, means for separately conveying the respective aggregates in continuous streams, a gravimetric feeder associated with each conveying means, means controlling said conveying means responsive to actuation of the gravimetric feeders to discharge said aggregates by weight thereof, a mixer, means discharging the weighed streams of aggregates to the mixer, and a measuring pump arranged to discharge the cementing material into the mixer.

2. A machine of the character described including, a supporting frame, a plurality of hoppers carried by the supporting frame and having discharge throats in the bottom thereof, control valves for regulating the amount of material discharged from the hoppers through said control valves in continuous streams, feed belts for receiving the streams of discharged materials, scales supporting the feed belts for measuring the streams of material discharged thereon, means for actuating the feed belts, agitating means cooperating with the control valves for assisting in feed of the materials onto said feed belts to maintain a predetermined weight of said streams, means for oscillating said agitating means, and means controlling the oscillating means responsive to movement of said scales.

3. A machine of the character described including, a supporting frame, a plurality of hoppers carried by the supporting frame and having discharge throats in the bottom thereof, control valves for regulating the amount of material discharged from the hoppers through said control valves, feed belts for receiving the discharged material, scales supporting the feed belts and including poises slidable on beams of said scales for measuring the material carried on said feed belts, means for actuating the feed belts, agitating means cooperating with the control valves for assisting in feed of the materials onto said feed belts, means for oscillating said agitating means, means controlling the oscillating means responsive to movement of said scales, and time recorders connected with the poises for recording position of the poises over a given period of time.

4. A machine of the character described including, a supporting frame, a plurality of hoppers carried by the supporting frame and having discharge throats in the bottom thereof, control valves for regulating continuous streams of material discharged from the hoppers through said control valves, feed belts for receiving the discharged material, scales supporting the feed belts for measuring the material discharged thereon, means for actuating the feed belts, agitating means cooperating with the control valves for maintaining a constant predetermined flow of the materials by weight under control of said scales, means for oscillating said agitating means, means controlling the oscillating means responsive to movement of said scales, a pug-mill, means for delivering the proportioned materials to the pug-mill, and means delivering a mixing liquid to the pug-mill in a constantly predetermined flow.

5. A machine of the character described including, a supporting frame, a plurality of hoppers carried by the supporting frame and having discharge throats in the bottom thereof, control valves for regulating the amount of material discharged from the hoppers through said control valves, feed belts for receiving the discharged material, scales supporting the feed belts for measuring the material discharged thereon, means for actuating the feed belts, agitating means cooperating with the control valves for assisting in feed of the materials onto said feed belts, means for oscillating said agitating means,

means controlling the oscillating means responsive to movement of said scales, a collecting hopper supported in receiving relation with said feed belts, a pug-mill, a conveyor connecting the collecting hopper with the pug-mill to carry the proportioned materials from the collecting hopper to the pug-mill, means delivering a binding material into the pug-mill, a shaker shoe carried above one of the hoppers and having screens arranged to discharge different sized materials into the other hoppers, and means for conveying a stock material to said shaker shoe.

6. A machine for mixing aggregates with a cementing material including, means for separately conveying the respective aggregates in continuous streams, a gravimetric feeder associated with each conveying means to discharge said aggregates by weight thereof, a mixer, means discharging the weighed streams of aggregates to the mixer, a measuring pump arranged to discharge the cementing material into the mixer, and means associated with each feeder and having connection with the other feeders to stop said feed of materials when the weight on any feeder drops below a predetermined minimum.

7. A machine for mixing aggregates with a cementing material including, means for separately conveying the respective aggregates in continuous streams, a gravimetric feeder associated with each conveying means to discharge said aggregates by weight thereof, a mixer, means discharging the weighed streams of aggregates to the mixer, a measuring pump arranged to discharge the cementing material into the mixer, and means associated with each feeder and having connection with the other feeders and with said measuring pump to stop said feed of materials when the weight on any feeder drops below a predetermined minimum.

8. A portable machine for effecting continuous mix of aggregates including, a hopper containing the aggregates, a mixer, a gravimetric feeder arranged to feed aggreates from the hopper into the mixer by weight of said aggregates, and universal means suspending the gravimetric feeder from said hopper whereby said gravimetric feeder is supported horizontally regardless of the terrain over which the machine is transported.

9. A machine of the character described including, a supporting frame, a plurality of hoppers carried by the supporting frame and having discharge throats in the bottom thereof, control valves for regulating the amount of material discharged from the hoppers through said control valves in continuous streams, means for receiving the streams of discharged materials, scale means for each hopper and arranged to support said receiving means for actuation responsive to the weight of material carried thereby, means for actuating the receiving means to carry the material thereon, agitating means cooperating with the control valves for assisting in feed of materials onto said receiving means, means for oscillating said agitating means, and means controlling the oscillating means responsive to movement of said scale means.

10. A machine of the character described including, a supporting frame, a plurality of hoppers carried by the supporting frame and having discharge throats in the bottom thereof, control valves for regulating the amount of material discharged from the hoppers in continuous streams, a conveyor for receiving the streams of materials discharged through said control valves, scales supporting selected portions of said conveyor for measuring the material carried thereon, means for actuating the conveyor, agitating means cooperating with the control valves for assisting in feed of the material onto the conveyor to maintain a predetermined weight of said materials on the conveyor, means for oscillating said agitating means, and means controlling the oscillating means responsive to movement of the scales.

11. In an apparatus for effecting continuous mix of a plurality of materials, a mixer, material collecting means arranged to deliver the materials in continuous movement to the mixer, power actuated feeding mechanisms for effecting continuous feed of each kind of material to the collecting means, gravimetric means for each power actuated feeding mechanism and arranged to support the material fed thereby to weigh the materials while in continuous movement, and regulating means connected with each gravimetric means and with the associated power actuated feeding mechanism, said regulating means being actuated by said gravimetric means to vary the feed effected by said power actuated feeding mechanism.

12. In an apparatus for effecting continuous mix of a plurality of materials, a mixer, a material collecting means arranged to collect and deliver the materials in continuous movement to the mixer, power actuated feeding mechanisms for effecting continuous feed of each kind of material to the collecting means, a feed control valve cooperating with each power actuated feeding mechanism to feed the materials, gravimetric means for each power actuated feeding mechanism and arranged to support the material fed thereby to weigh the materials while in continuous movement, and regulating means connected with each gravimetric means and with the associated power actuated feeding mechanism, said regulating means being adapted for actuation by said gravimetric means to vary the feed effected by said power actuated feeding mechanism.

13. In an apparatus for effecting continuous mix of a plurality of materials, a mixer, a material collecting means arranged to collect and deliver the materials in continuous movement to the mixer, power actuated feeding mechanisms for effecting continuous feed of each material to the collecting means, a feed control valve cooperating with each power actuated feeding mechanism, gravimetric means for each power actuated feeding mechanism and arranged to support the material fed thereby to weigh the continuously moving materials, and regulating means connected with each gravimetric means and with the associated feeding mechanism, said regulating means being adapted for actuation by said gravimetric means to vary the feed effected by said power actuated feeding mechanism.

14. A machine of the character described including, a supporting frame, a plurality of discharge throats carried by the supporting frame and respectively connected with a source of material supply, valve means for each throat to control volume feed of material from said throats in continuous streams, continuous conveying means carried by the supporting frame and movable under the discharge throats for receiving the streams of material thereon, scale

means associated with each throat and arranged in supporting relation with said conveying means and being adapted for actuation responsive to fluctuation in weight of material being carried upon said conveying means, power actuated feeding means cooperating with each valve means for assisting in feed of said materials onto the conveying means, and regulating means having connection with one of said feeding means for each discharge throat and the associated scale for varying feed of the materials while the materials are under continuous movement by said conveying means.

15. A machine for mixing aggregates and a cementing material including a mixer, a metering pump for discharging the cementing material into the mixer, a plurality of discharge throats respectively connected with a continuous source of aggregate supply, valve means for each throat to control the material discharged through said throats in continuous streams, continuous conveying means movable under the discharge throats for receiving the aggregates discharged therefrom, scale means associated with each throat and arranged to support said conveying means for actuation responsive to weight of material carried upon said conveying means, agitating feeding means cooperating with each valve means for assisting in feed of said materials onto the conveying means, means for oscillating said agitating means, and means regulating said agitating feeding means responsive to movement of the associated scales for varying feed of the materials while the materials are under continuous movement by said conveying means to the mixer.

16. A machine of the character described including, a plurality of separate material supply means, a plurality of discharge throats respectively connected with the separate material supply means, means for each throat to control the amount of material discharged through said throats in continuous streams, a continuous conveying means movable under the discharge throats for receiving the materials discharged therefrom in continuous streams, scale means associated with each throat and arranged to support said conveying means for weight of material carried upon said conveying means, each succeeding scale means being arranged for weighing the material weighed by a preceding scale means and in addition the material discharged from its related discharge throat, regulating means for said control means, and an actuating connection between each control means and its related scale means for varying feed of materials while the materials are under continuous movement by said conveying means.

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