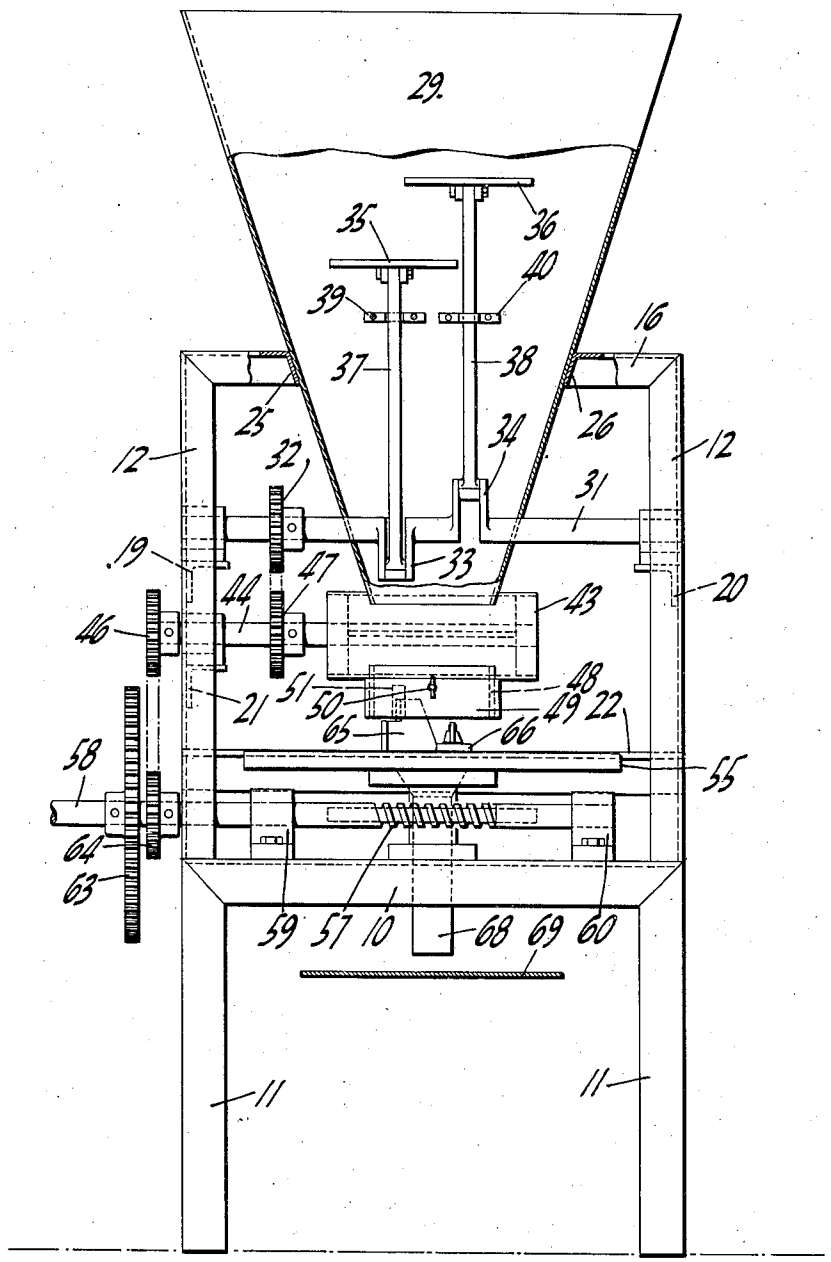
March 6, 1945. J. F. BARTON 2,370,709

MATERIAL FEEDING APPARATUS

Filed Nov. 25, 1942 3 Sheets-Sheet 1

FIG. 1.



INVENTOR

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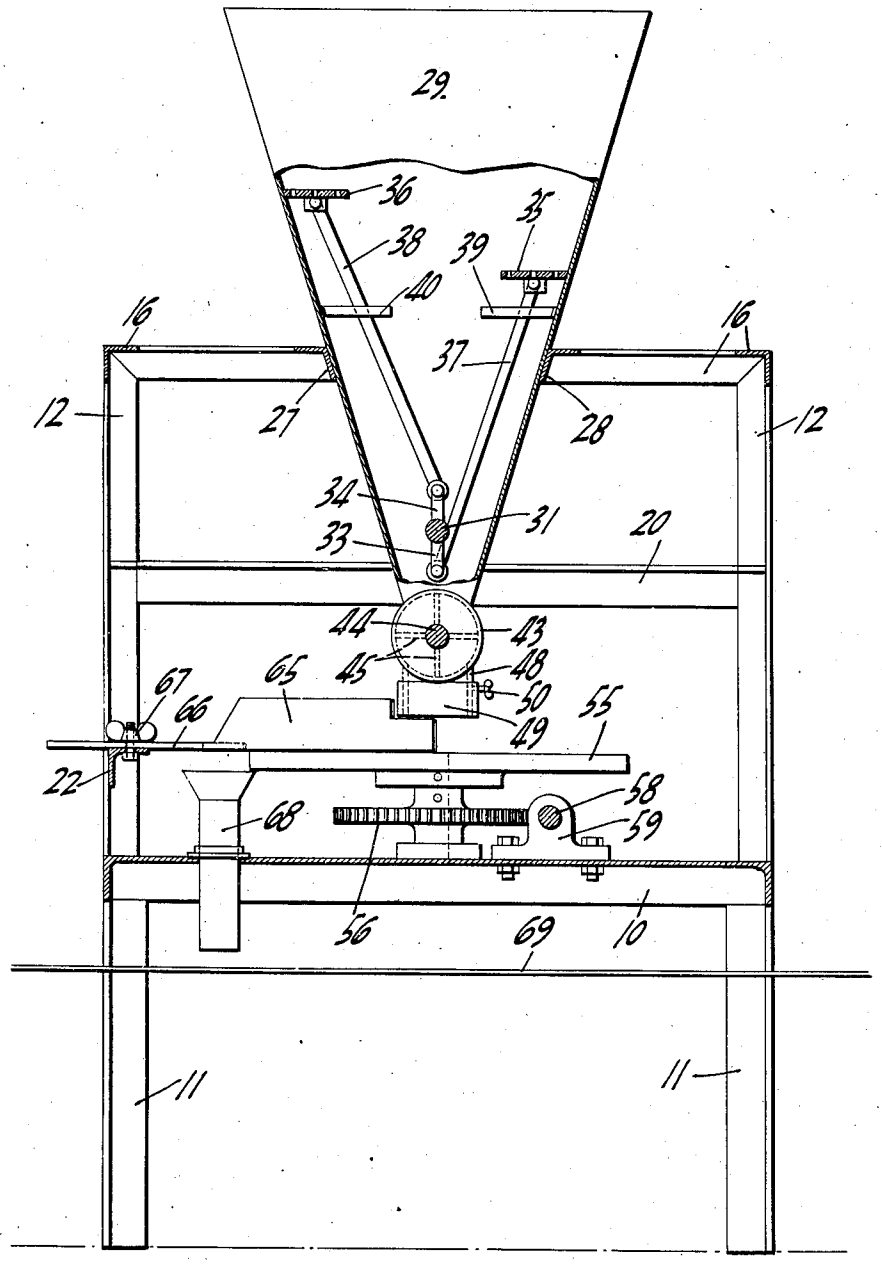
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MATERIAL FEEDING APPARATUS

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FIG. 2.



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MATERIAL FEEDING APPARATUS

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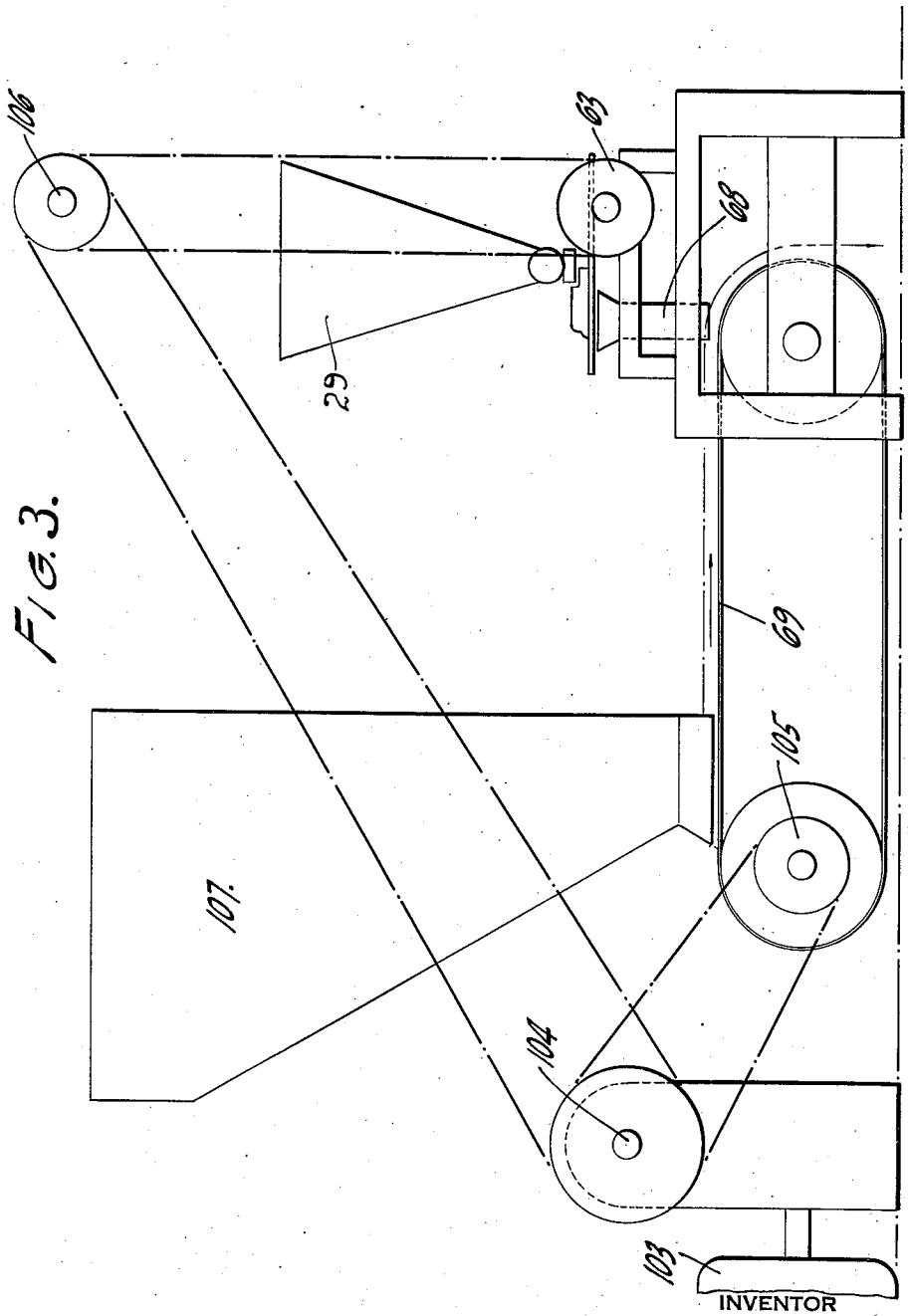


FIG. 3.

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Patented Mar. 6, 1945

2,370,709

UNITED STATES PATENT OFFICE

2,370,709

MATERIAL FEEDING APPARATUS

J. Frank Barton, Hamburg, N. Y.

Application November 25, 1942, Serial No. 466,967

10 Claims. (Cl. 222—227)

My invention relates to apparatus for feeding powdered, granular or flaky material so that regardless of the condition of the material the rate of flow will be constant and predetermined.

Many products used industrially require the combination of various ingredients in proportions which must be exact to the degree of hundredths of one per cent. Some mixtures require a very minute proportion of powdered or granular material having sticky characteristics with a large amount of some heavier or bulkier ingredient.

One example of the foregoing is the manufacture of cement having as one ingredient a resinous compound of less than one-half of one per cent of the entire mixture. The resinous compound may be added just prior to the final grinding of the cement clinkers and must be uniformly distributed among them. Prior to the present invention it has been customary for an operator to take a small cupful of the resinous powder or flakes and pour it into the mixer or grinder manually with as uniform a flow as possible to accomplish the emptying of the cup within a predetermined time. That method has proven costly in labor and not sufficiently accurate.

My invention, therefore, has for one of its objects the provision of automatic means to insure a uniform flow of a small amount of material regardless of its degree of stickiness.

Another object of my invention is to provide material feeding means which will insure that a small percentage of relatively sticky, fine material will be uniformly distributed through a large percentage of relatively coarser material.

A further object of my invention is to provide means for easily changing the ratio or proportion between two materials that are being admixed.

A further object of my invention is to provide a material feeding apparatus that will require a minimum of attention from an operator.

A further object of my invention is to provide an adjustable sleeve in combination with a hopper and rotatable plate to insure that an excess of material will not flood over the plate.

Other objects of my invention will readily appear from the drawings, description and claims.

In the drawings illustrating my invention:

Fig. 1 is an end elevational view of one form of the apparatus with part of the hopper broken away to show the agitator members;

Fig. 2 is a side elevational view of the apparatus of Fig. 1 viewed from the left and partly in cross-section, with part of the hopper broken away; and

Fig. 3 is a schematic view showing the apparatus in association with a conventional form of coarse material feeding mechanism.

Referring to Figs. 1 and 2, there is provided a base 10 having legs 11, a superstructure comprising a channel upright 12 at each corner and cross members 16 connecting the upper ends of the channel uprights 12. Likewise extending between uprights 12 are shaft support channels 19, 20 and 21 and a plow support channel 22.

Welded or otherwise rigidly fastened to the cross members 16 are channels 25, 26, 27 and 28 which support a tapered hopper 29. A crank shaft 31 extends through the lower portion of hopper 29 and has bearing support at its ends on the channels 19 and 20. Shaft 31 has a driving sprocket 32 and within the hopper has crank throws 33 and 34 for driving perforated scrapers or agitators 35 and 36 by means of connecting rods 37 and 38. Brackets 39 and 40 give slide bearing to the connecting rods and guide them so that the scrapers may reciprocate on or adjacent their respective side walls.

Attached by any suitable means to the bottom of hopper 29 is a horizontally disposed closed end hollow cylinder 43 which has an opening in its wall which registers with an opening in the bottom of hopper 29. A shaft 44 has bearing support on channel 21 and is journaled in the closed ends of cylinder 43 and within the cylinder has rigidly attached and uniformly spaced radially extending vanes 45. The vanes 45 have their outer edges substantially adjacent the inner cylindrical wall of cylinder 43 and divide the space within the cylinder into equal sized compartments. The shaft 44 is provided with sprockets 46 and 47. In the lower portion of cylinder 43 is formed a downwardly depending annular wall portion 48 which is surrounded by a sleeve 49 that is manually adjustable by means of wing screw 50 so that it may be lowered to extend the effective length of wall portion 48. Sleeve 49 is provided with a slot 51 for a reason which will be explained later.

Supported on base 10 by any desired form of bearing is a rotatable plate 55 secured to a worm wheel 56 which is in mesh with a worm 57 formed as a part of a shaft 58 which is supported by bearings 59 and 60 secured to the base 10. Shaft 58 is provided with a large sprocket 63 and a smaller sprocket 64. Driving chains indicated by broken lines connect sprockets 32 and 47 and sprockets 46 and 64.

Supported on channel 22 is a generally horizontally extending plow having a vertically disposed blade portion 65 and a horizontal end portion 66 provided with a slot through which extends a screw and wing nut locking assembly 67 which permits the adjustment of the plow toward and away from the center of the rotatable plate 55. Channel 22 is also provided with a longitudinai slot (not shown) through which the screw of assembly 67 passes and a universal horizontal adjustment of plow 65 may thereby be obtained. Below the juncture of plow 65 and the periphery of plate 55 may be located a chute or funnel 68 held in any desired manner so that its lower end overlies a conveyor belt schematically shown at 69. Such belts are ordinarily supported by suitable rollers and driven at a constant speed by well known means.

If desired, the drive means for the belt 69 may be coupled by a chain or other suitable mechanism to sprocket 63 and the relative speed of feed of the feeding apparatus thereby synchronized relative to the speed of the conveyor belt. If desired, for different materials to be mixed, or different percentages of materials, the ratio of the feed of the apparatus to the rate of movement of the conveyor belt can be easily changed by coupling any of the well known changeable speed transmissions between the belt conveyor and the apparatus shaft 58. The material feed apparatus, if desired, can be driven from any suitable source independent of the drive means for the conveyor belt.

In the operation of the apparatus just described the shafts 58, 44 and 31 are rotated at constant speeds or at speeds having a predetermined ratio with respect to the rate of movement of the conveyor belt 69. The material to be fed is placed in the hopper 29 and is continuously agitated by the scrapers 35 and 36, connecting rods 37 and 38, and crank arms 33 and 34 and flows down into the compartments formed by vanes 45 which, in rotating, deposit the material across the center or just to one side of the center of the rotating plate 55. The material on the rotating plate coming in contact with the stationary plow 65 is gradually forced out to the periphery of the plate where it drops in a steady stream into chute 68 which guides the material deposited therein in uniform predetermined amount onto the constantly moving conveyor belt 69. As the conveyor belt is intended to carry a relatively large amount of coarse material, the feeding apparatus insures the correct admixture of the two materials.

If the material in the hopper is flaky or fluffy and therefore dry, there may be a tendency for it to pass through the apparatus too rapidly in which case the adjustable sleeve 49 may be lowered by loosening the screw 50 and sliding the sleeve downwardly and securing it in a position where it will sufficiently restrict the free spread of the material on the plate 55.

The slot 51 in sleeve 49 permits the sleeve to be lowered so that the sides of the slot straddle the inner end portion of the plow and at the same time the plow can be adjusted inwardly or outwardly. By loosening sleeve 49 the plow can also be partially rotated to vary its angle with respect to the radius of the plate 55.

My invention can be coupled up with conventional types of material feeding apparatus; for example, as shown schematically in Fig. 3 a variable speed motor 103 through conventional gearing drives a common shaft 104 having two sprockets, one of which is connected by a chain drive to sprocket 105 which drives the conveyor belt 69, and the second sprocket on shaft 104 is connected by a chain drive to a sprocket on a countershaft 106. A second sprocket on shaft 106 is connected by chain drive to the sprocket 63 of my apparatus.

A coarse material hopper is indicated at 107 and material coming out of the bottom thereof is carried by conveyor belt 69 to a point where the material is admixed with material being fed by my apparatus. By using a common drive means the material being fed will be mixed and fed in the correct proportions; the coarse material fed from hopper 107 presents no problem. In one use the coarse material comprises cement clinkers and known means of control assure a steady flow on the belt 69. However, the material to be fed by my apparatus may be a resinous product to be introduced in the amount of only two to four one-hundredths of one per cent by weight of the total mix.

By changing the size of the sprockets, for instance those on shafts 104 or 106, it is possible to vary the amount of material that my apparatus will feed in comparison to that fed by belt 69 and so any desired ratio can be obtained.

If desired, a screen or cover can be placed across the top of hopper 29 so that large pieces of foreign material which might injure the mechanism can not be introduced with the material to be fed.

It will be understood that the apparatus herein shown and described is merely illustrative of the preferred embodiment of the inventive principles involved and that these principles may be otherwise embodied without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. Feeding apparatus for granulated or flaky material comprising a frame having spaced uprights, a vertically disposed material-containing hopper having an open bottom supported by said uprights, a crank shaft extending in a horizontal plane through the bottom portion of said hopper and having its ends journaled in said supports and a crank arm portion within the hopper, a connecting rod movable in said hopper and having one end formed as a bearing connecting said crank arm and a scraper member supported on the other end, said crank arm portion, connecting rod and scraper all serving to agitate the material in the hopper, a substantially horizontally disposed closed end hollow cylinder below said hopper having an opening registering with the opening in the bottom thereof, a second shaft journaled in one of said uprights and extending axially through said cylinder, a plurality of radially extending vanes attached to said second shaft and extending substantially to the interior wall of said cylinder to provide material metering means, the bottom of said cylinder having a downwardly depending wall portion open at its end, a manually vertically adjustable sleeve surrounding said wall portion, a horizontally rotatable plate below said sleeve, said sleeve being adjustable to different heights above said plate and constituting therewith a material flow control unit, a material removing plow extending inwardly from the periphery of said plate and having an edge adjacent the upper face thereof and disposed to shift material radially outwardly on said plate upon rotation

thereof, and drive means for constantly rotating said plate, crank shaft and said second shaft in synchronism.

2. Feeding apparatus for granulated or flaky material comprising a frame having spaced uprights, a vertically disposed material-containing hopper having an open bottom supported by said uprights, a crank shaft extending in a horizontal plane through the bottom portion of said hopper and having its ends journaled in said supports and a crank arm portion within the hopper, a connecting rod movable in said hopper and having one end formed as a bearing connecting said crank arm and a scraper member supported on the other end, said crank arm portion, connecting rod and scraper all serving to agitate the material in the hopper, a substantially horizontally disposed closed end hollow cylinder below said hopper having an opening registering with the opening in the bottom thereof, a second shaft journaled in one of said uprights and extending axially through said cylinder, a plurality of radially extending vanes attached to said second shaft and extending substantially to the interior wall of said cylinder to provide material metering means, a horizontally rotatable plate below said material metering means for receiving material therefrom, a material removing plow extending inwardly from the periphery of said plate and having an edge adjacent the upper face thereof and disposed to shift material radially outwardly on said plate upon rotation thereof, and drive means for constantly rotating said plate, crank shaft and said second shaft in synchronism.

3. Feeding apparatus for granulated or flaky material comprising a frame having spaced uprights, a vertically disposed material-containing hopper having an open bottom supported by said uprights, a crank shaft extending in a horizontal plane through the bottom portion of said hopper and having its ends journaled in said supports, material agitating means in said hopper and movable by said crank shaft, a substantially horizontally disposed closed end hollow cylinder below said hopper having an opening registering with the opening in the bottom thereof, a second shaft journaled in one of said uprights and extending axially through said cylinder, a plurality of radially extending vanes attached to said second shaft and extending substantially to the interior wall of said cylinder to provide material metering means, the bottom of said cylinder having a downwardly depending wall portion open at its end, a manually vertically adjustable sleeve surrounding said wall portion, a horizontally rotatable plate below said sleeve, said sleeve being adjustable to different heights above said plate and constituting therewith a material flow control unit, a material removing plow extending inwardly from the periphery of said plate and having an edge adjacent the upper face thereof and disposed to shift material radially outwardly on said plate upon rotation thereof, and drive means for constantly rotating said plate, crank shaft and said second shaft in synchronism.

4. Feeding apparatus for granulated or flaky material comprising a frame having spaced uprights, a vertically disposed material-containing hopper having an open bottom supported by said uprights, a crank shaft extending in a horizontal plane through the bottom portion of said hopper and having its ends journaled in said supports, material agitator means in said hopper and movable by said crank shaft, a substantially horizontally disposed closed end hollow cylinder below said hopper having an opening registering with the opening in the bottom thereof, a second shaft journaled in one of said uprights and extending axially through said cylinder, a plurality of radially extending vanes attached to said second shaft and extending substantially to the interior wall of said cylinder to provide material metering means, a horizontally rotatable plate below said material metering means for receiving material therefrom, a material removing plow extending inwardly from the periphery of said plate and having an edge adjacent the upper face thereof and disposed to shift material radially outwardly on said plate upon rotation thereof, and drive means for constantly rotating said plate, crank shaft and said second shaft in synchronism.

5. In material feeding apparatus for feeding material of varying characteristics, a material-containing hopper having a wall, a bottom portion, and a discharge opening in the bottom thereof, a crank shaft extending substantially horizontally through the bottom portion of said hopper, a crank arm portion within said hopper on said shaft, a connecting rod having one end attached to said crank arm portion for reciprocating movement and one end attached to a scraper, guide means for said connecting rod for supporting said scraper adjacent said wall, said crank arm portion, connecting rod and scraper all serving to agitate the material in the hopper to provide a uniform flow of material through the hopper discharge opening, material metering means positioned below said discharge opening, a manually vertically adjustable sleeve depending from said metering means, a horizontally rotatable plate below said sleeve, said sleeve being adjustable to different heights above the plate to compensate for varying characteristics of material being fed by limiting the spread of the material on said plate, a material removing plow extending inwardly from the periphery of the plate and having an edge adjacent the upper face of said plate whereby upon rotation of said plate, material thereon will be shifted radially outwardly by said plow, and means for constantly rotating said shaft and said plate.

6. In material feeding apparatus, a material-containing hopper having a wall, a bottom portion, and a discharge opening in the bottom thereof, a crank shaft extending substantially horizontally through the bottom portion of said hopper, a crank arm portion within said hopper on said shaft, a connecting rod having one end attached to said crank arm portion for reciprocating movement and one end attached to a scraper, guide means for said connecting rod for supporting said scraper adjacent said wall, said crank arm portion, connecting rod and scraper all serving to agitate the material in the hopper to provide a uniform flow of material through the hopper discharge opening, material metering means positioned below said discharge opening, a horizontally rotatable plate below said material metering means, a material removing plow extending inwardly from the periphery of the plate and having an edge adjacent the upper face of said plate whereby upon rotation of said plate, material fed thereon by said metering means will be shifted radially outwardly by said plow, and means for constantly rotating said shaft and said plate.

7. In material feeding apparatus for feeding material of varying characteristics, a material-containing hopper having a bottom portion, and

a discharge opening therein, a crank shaft extending substantially horizontally through the bottom portion of said hopper, a crank arm portion within said hopper on said shaft, a connecting rod having one end attached to said crank arm portion for reciprocating movement and one end attached to a scraper, said crank arm portion, connecting rod and scraper all serving to agitate the material in the hopper to provide a uniform flow of material through the hopper discharge opening, rotatable material metering means positioned below said discharge opening, a horizontally rotatable plate below said material metering means, a material removing plow extending inwardly from the periphery of the plate and having an edge adjacent the upper face of said plate whereby upon rotation of said plate, material fed thereon by said metering means will be shifted radially outwardly by said plow, and means for constantly rotating said shaft, said metering means and said plate.

8. In material feeding apparatus, a material-containing hopper having a discharge opening in the bottom thereof, material agitating means positioned within said hopper to provide a steady flow of material through the discharge opening thereof, material metering means positioned directly below said discharge opening for receiving said material and depositing it in batches, a horizontally rotatable plate below said metering means for receiving the batches of material, a rigid material removing plow having an edge adjacent the upper face of said plate whereby upon rotation thereof the material deposited in batch form thereon will be shifted radially outwardly by said plow and fed off the edge of said plate in a continuous stream, and means for operating said material agitating means, said metering means and said plate in synchronism.

9. In material feeding apparatus, a material containing hopper having a discharge opening in the bottom thereof, material agitating means positioned within said hopper to provide a steady flow of material through the discharge opening thereof, a substantially horizontally disposed closed end hollow cylinder below said hopper having an opening registering with the opening in the bottom thereof, a shaft extending axially through said cylinder and having a plurality of radially extending vanes attached thereto and extending substantially to the interior wall of said cylinder to provide material metering means for receiving said material and depositing it in batches, a horizontally rotatable plate below said metering means for receiving the batches of material, a rigid material removing plow having an edge adjacent the upper face of said plate whereby upon rotation thereof the material deposited in batch form thereon will be shifted radially outwardly by said plow and fed off the edge of said plate in a continuous stream, and means for operating said material agitating means, said metering means and said plate in synchronism.

10. In material feeding apparatus, a material containing hopper having a discharge opening in the bottom thereof, material agitating means positioned within said hopper to provide a steady flow of material through the discharge opening thereof, material metering means positioned directly below said discharge opening for receiving said material and depositing it in batches, said material metering means having a downwardly depending wall portion open at its bottom end, a manually vertically adjustable sleeve surrounding said wall portion, a horizontally rotatable plate below said sleeve, said sleeve being adjustable to different heights above said plate and constituting a material flow control unit, a rigid material removing plow having an edge adjacent the upper face of said plate whereby upon rotation thereof the material deposited in batch form thereon will be shifted radially outwardly by said plow and fed off the edge of said plate in a continuous stream, and means for operating said material agitating means, said metering means and said plate in synchronism.

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