May 9, 1933. D. BROWN 1,907,731

CLAY TEMPERING MACHINE

Filed Nov. 7, 1930 4 Sheets-Sheet 1

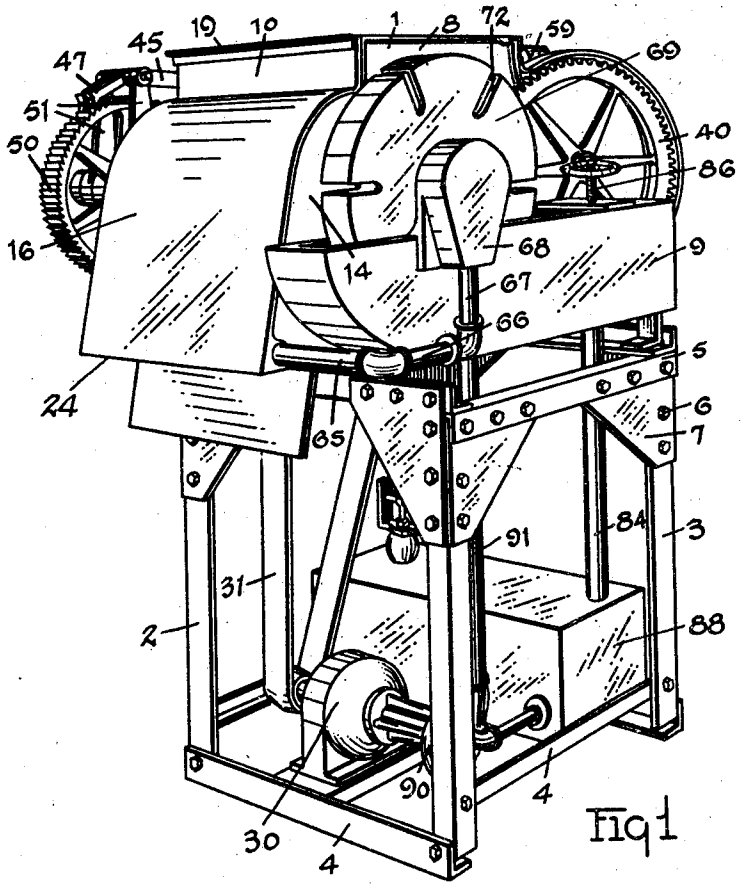

Fig 1

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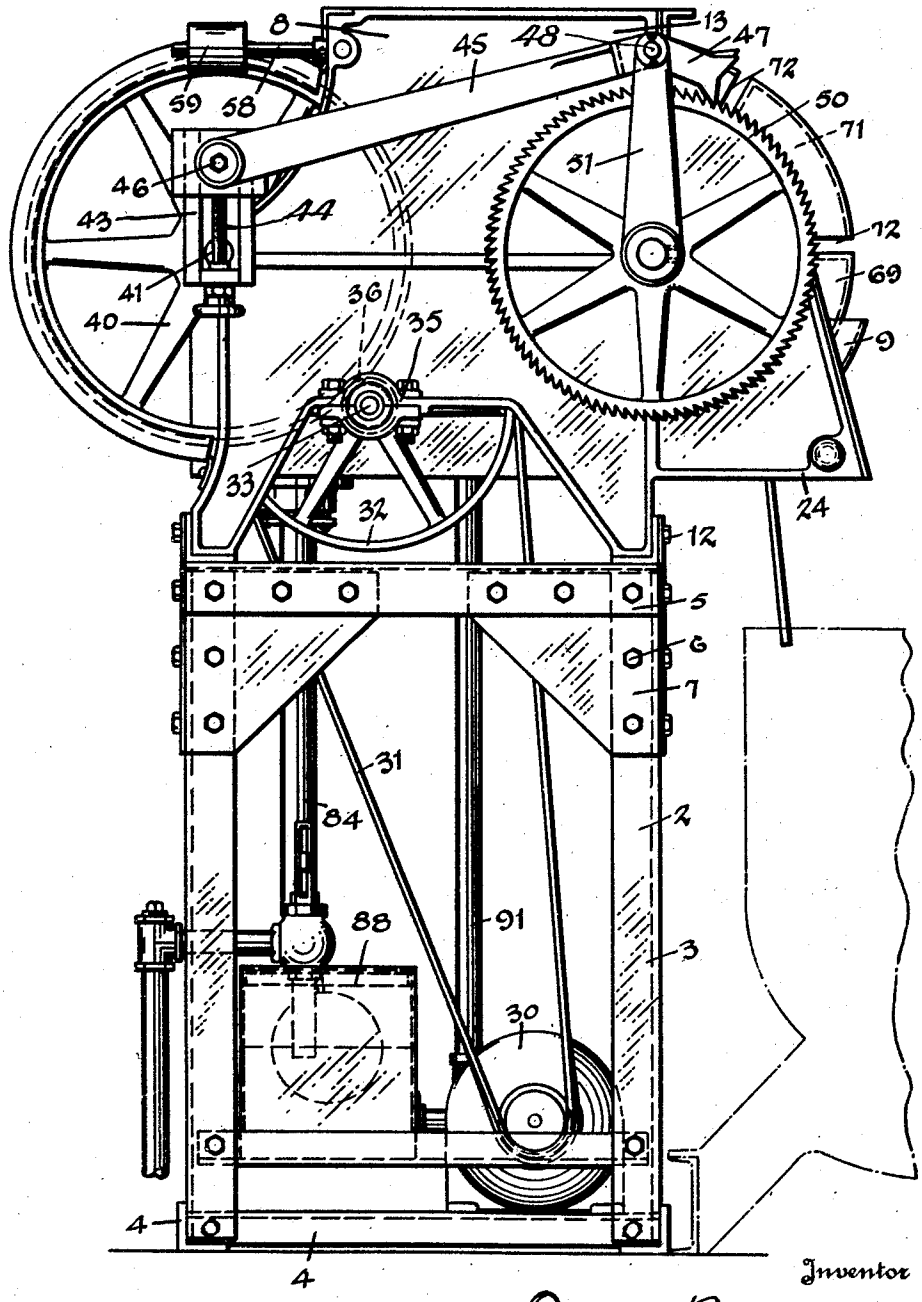

Fig 2

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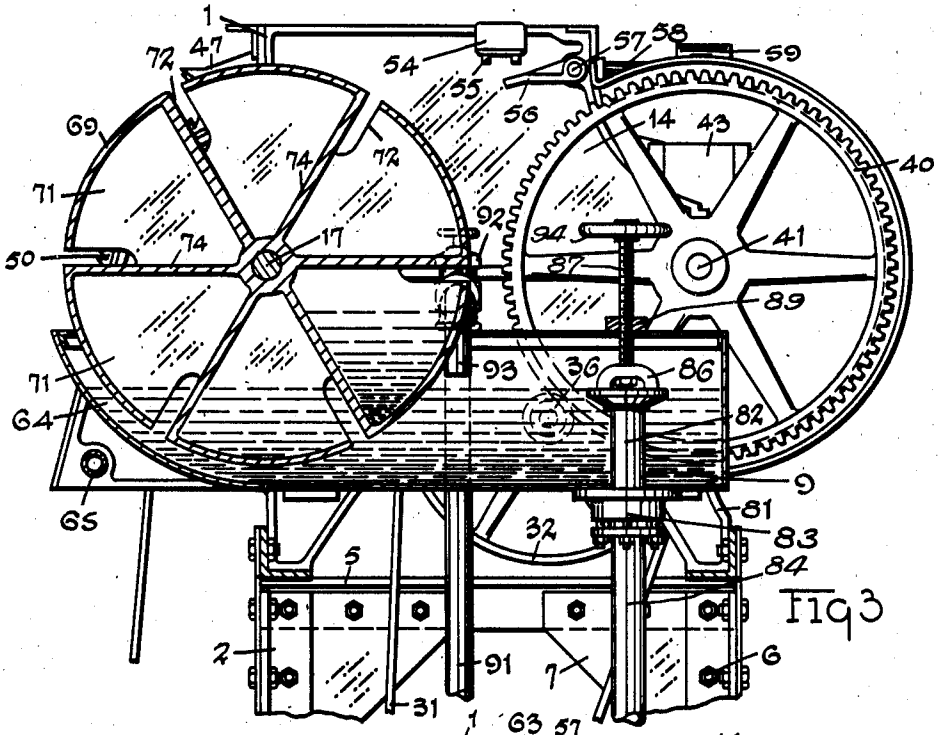

Fig 3

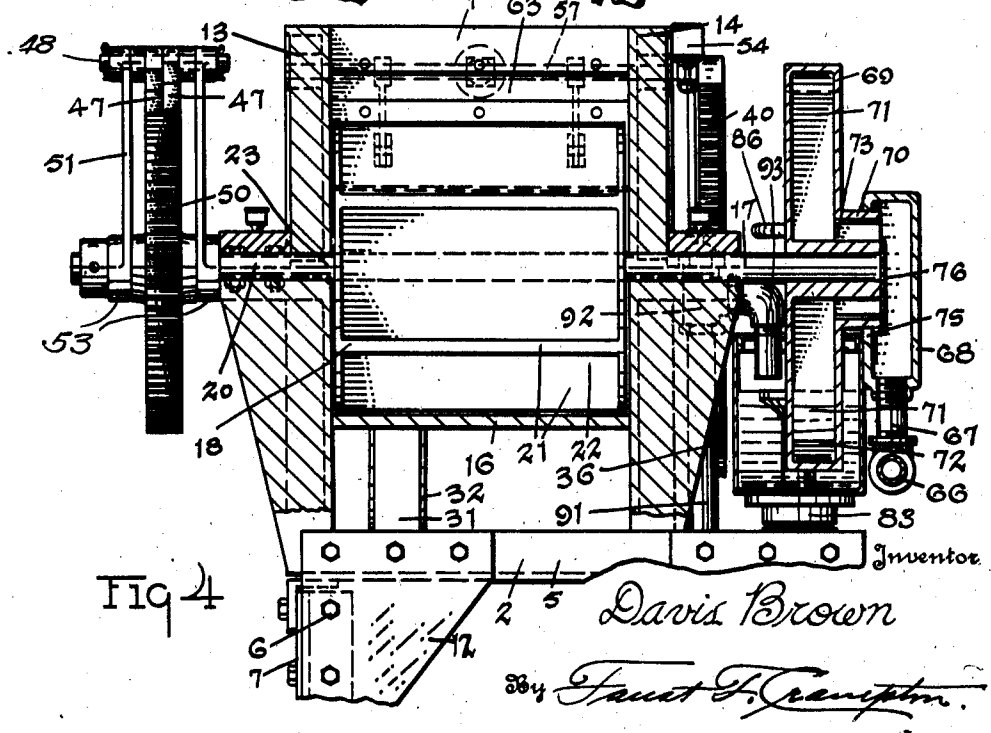

Fig 4

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CLAY TEMPERING MACHINE

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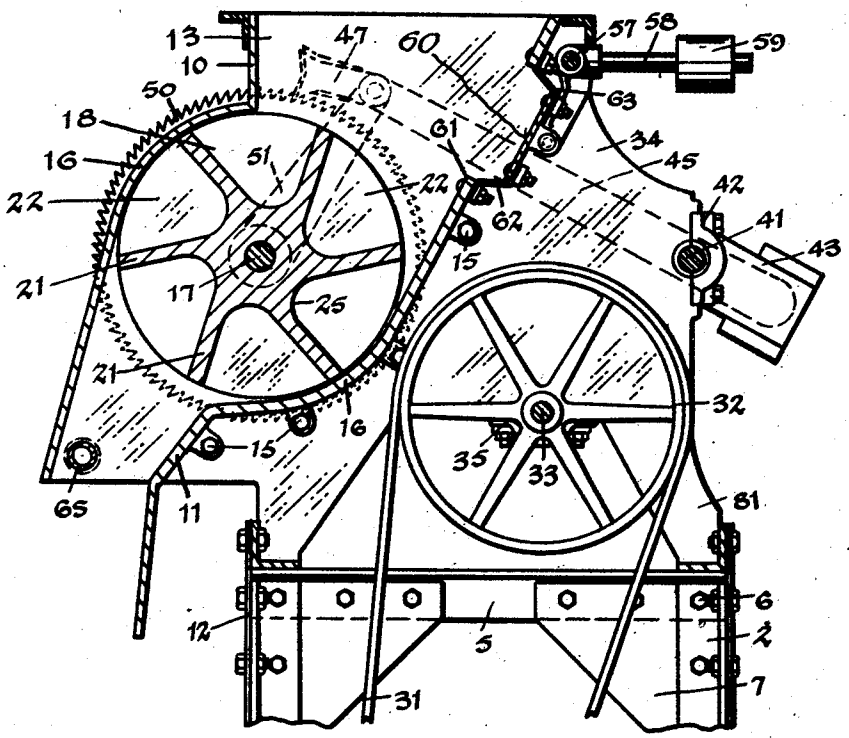

Fig 5

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Patented May 9, 1933 1,907,731

UNITED STATES PATENT OFFICE

DAVIS BROWN, OF LOS ANGELES, CALIFORNIA

CLAY TEMPERING MACHINE

Application filed November 7, 1930. Serial No. 494,177.

My invention has for its object to provide a tempering machine having a means for maintaining, under all conditions of speed of the machine, a constant predetermined ratio between the plastic material to be tempered and the tempering liquid.

Another object of my invention is to provide a measuring wheel for liquids which will conduct a specific amount of liquid to a material as the liquid is desired.

My invention also provides an automatic shut-off for the machine after the supply of the material to be tempered is exhausted or fails to enter the machine.

The invention may be contained in tempering machines that vary in their details and, to illustrate a practical application of the invention, I have selected a tempering machine containing the invention and various embodiments of my invention, and shall describe it hereinafter. The particular structure selected, as an example, is shown in the accompanying drawings.

Fig. 1 illustrates a perspective view of the tempering machine. Fig. 2 illustrates a side view of the tempering machine. Fig. 3 illustrates a view of a side of the machine showing the fluid pan and wheel in section. Fig. 4 illustrates a cross sectional view of the machine. Fig. 5 illustrates a view of a longitudinal section of the machine.

In the working of plastics and the like, the best results are obtained, and the plastic will work better, where there is mixed with it a certain volume of water. The required water content desirable has been determined by experiment with a view to the use to which the plastic is to be put. The required contents have been reduced to tables or are well known in the art. The clay tempering machine illustrated in the drawings, is composed of two units which operate to deliver a liquid, such as water, and a substantially dry material, such as clay, at a predetermined volume ratio. The clay is received by a cylinder which has pockets, or cups, of equal size, distributed about its periphery and the water is measured by another cylinder which likewise has cups, or compartments, of equal size. Both cylinders operate on a common shaft to deliver to the mixing locality, under all variations of speed of the machine, the same constant rated volume of water and rated volume of clay.

The tempering machine 1, shown for purposes of illustration, may be supported on a suitable frame work 2. The frame work 2 may be formed by legs 3 which are connected by cross braces 4 and top pieces 5. The frame work may be formed of angle iron and joined together by suitable rivets 6 and angle braces 7 to produce a supporting structure which will withstand vibration and prevent side play of the machine 1.

Superimposed upon the top pieces 5 of the frame work 2, is a measuring chamber 8 for measuring and holding material to be tempered, such as clay, and a tank 9 for storing tempering liquid, such as water. The chamber 8 may be formed by cast steel plates, such as the plates 10 and 11, which may be fitted between two side plates 13 and 14 and there held by rivets 15, leaving a top opening 19 and a bottom opening 24. The side plates 13 and 14 may be connected to the top pieces 5 by bolts or rivets 12 and have extending parts 34 which provide an auxiliary supporting structure for the machine. The plates 10 and 11 are formed to have curved portions 16. The curved portions 16 have a radius which is, substantially, the radius of a measuring cylinder 18 which is located and moves between the plates 10 and 11.

The clay as it moves by its own weight through the chamber 8 is received by the measuring cylinder 18. The measuring cylinder is of an elongated drum shape having open sections along its periphery which moves the clay in equal amounts about its axis to the opening 24 through which it falls. A pug-mill, or other mixing means, may be located under the opening 24 where the water may be thoroughly mixed with the clay.

In the tempering machine illustrated, the measuring cylinder 18 is keyed to, and supported on, an axle 17 which extends through openings 23 in the side walls 13 and 14. The axle 17 may be located in suitable bearing members 20. The measuring cylinder 18 is formed to have partitions 21 which extend

radially outward and along the cylinder. The partitions are spaced equi-distant from each other so as to form sections 22. To more efficiently carry the material to be measured, the partitions 21 may have curved portions 25 tangential to the radial line to give the sections 22 a cup-shape. The material to be measured may be fed to the measuring cylinder through the top opening 19 of the chamber 8 from a hopper or bin. The material will fill the sections 22 of the cylinder 18 by its own weight as each section is brought in alignment with the opening 19 of the chamber 8. The plate 10 will act to scrape off the excess material which may be deposited on each section, as the section moves past the plate 10, and the curved portion 16 will act to retain the material within the section until the section rotates to the position, in alignment with the opening 24 of the chamber 8, where the material will fall by its own weight into a mixing machine or pug-mill.

The measuring cylinder 18 may be rotated within the chamber 8 by a motor 30. The motor 30 may be located in the frame work 2 and is connected by a belt 31 to a pulley 32 which is supported on its shaft 33. The shaft 33 may be rotatably supported in brackets 35 which may be located on the extensions 34 of the plates 13 and 14. A pinion 36 is keyed to the shaft 33 and is so located as to mesh with a gear wheel 40. The gear wheel 40 is keyed to a shaft 41 which may be rotatably secured to the extensions 34 of the plates 13 and 14 by brackets 42. A crank 43 may be connected to the shaft 41 which will transmit oscillatory motion to an arm 45 which is pivotally secured to the crank 43 by the pin and block 46. The crank 43 may be provided with an adjustable screw 44 to vary the amplitude of movement of the arm 45 by moving the pin and block 46 relative to the axle 41. The arm 45 is pivotally connected by a pin 48 to a pair of dogs 47 which are adapted to make contact with a toothed wheel 50, one of the pair being shorter than the other dog of the pair, to insure contact between the dogs and the toothed wheel. The arm 45 is supported above the toothed wheel 50 by a pair of props 51 having hubs 53. The ends of the props are pivotally secured to the end of the arm 45 by the pin 48. The hubs 53 of the props 51 are located about the axle 17.

Thus, as the motor 30 moves the belt 31 and the pulley 32, the pinion 36 will rotate the gear wheel 40. The rotation of the gear wheel 40 will be transmitted by its shaft 41 to the crank 43. The movement of the crank 43 causes the oscillatory movement of the arm 45. The dogs 47 are moved by the arm 45 over the toothed wheel 50 and then against the teeth of the toothed wheel 50 to rotate the toothed wheel 50 and its axle 17 upon which the measuring cylinder 18 is likewise keyed. Variation in the speed of delivery of the machine may be obtained by the adjustment of the screw 41 which operates to change the effective length of the crank 43, thereby varying the angular displacement about the common axis of the two measuring cylinders 18 and 19 with each revolution of the gear wheel 40.

The liquid 64 is delivered at the opening 24 by a pipe 65 having suitable openings to produce a distribution of the liquid along the longitudinal axis of the opening 24. The pipe 65 is connected by the pipes 66 and 67 to a box 68 for collecting liquid.

The box 68 is connected to a liquid control wheel 69 by an extension 70 of the hub of the liquid wheel 69. The liquid wheel 69 is drum-shaped having radial partitions 74 which extend longitudinally through the drum 69, dividing its interior into a plurality of sectoral chambers 71. Each section 71 has two openings, one opening 72 is located on the periphery of the liquid wheel, and the other opening 73 is located near the hub of the liquid wheel. The opening 72 may be located relatively close to the point of jointure of the spokes 74 and the periphery of the liquid wheel so as to permit a substantial filling of each section as the liquid wheel is moved through a liquid. The opening 73 is located at the hub of the liquid wheel so as to connect with the extension 70 of the hub of the liquid wheel. The extension 70 of the hub is inserted within an opening 75 of the liquid box 68 and is free to rotate therein. It will be seen as the liquid wheel is rotated the liquid, contained in the sections 71, will flow through the openings 73. extension 70 of the hub, and into the box 68 where it will be carried by the pipes 67, 66, and 65 to the mixing locality. The wheel 69 is supported on, and keyed to, the axle 17 so that as the axle is rotated, to cause rotation of the measuring cylinder 18 within the chamber 8, there will be a corresponding rotation of the liquid wheel 69 to cause the emptying of a definite number of sections 71 into the liquid box 68. It will be seen, therefore, that a constant ratio will be maintained between the delivery of the material to be tempered, with the delivery of the tempering liquid to a mixing locality.

To provide for liquid which, by reason of rapid operation of the machine might fill up the box 68 to such a height as to flow back into a section 71 of the wheel 69 through the extension of the hub 70 and thereby disturb an already measured quantity of liquid, an apron 76 may be provided and located on the interior of the box 68. The apron 76 is cut to substantially cover the lower half of the opening 75 of the box 68. The apron 76 may be supported over the opening 75 by suitable bolts and may be dished to allow

the insertion of the extension 70 of the hub in the opening 75. Thus the apron 76 will prevent the liquid 64 from backing up into the section 71 from the liquid box. In order to supply the liquid 64 to the liquid wheel, an open tank 9 is located so that the liquid wheel 69 will pass into it so as to substantially fill the sections 71 through the openings 72.

The tank 9 may be formed of sheet metal. and supported by suitable brackets 81 on the top pieces 5 of the frame work 2. The tank has a suitable drain pipe 82 which extends through the bottom of the tank 9 and is adapted to telescopically fit within an auxiliary drain pipe 84. The point of connection between the pipes 82 and 84 may be surrounded by a suitable stuffing box 83 to prevent leakage. The pipe 84 may be connected with a suitable reservoir 88 which may be located in the frame work 2. It will be seen that the pipe 82 may be moved up or down within the tank thereby permitting different levels of fluid to be maintained within the tank 9, as may be desired. By varying the level of the liquid the volume of liquid taken into each chamber of the measuring wheel 69 may be varied in keeping with the required water content desirable in the mixed material. In order to facilitate the movement of the pipe 82, a yoke 86 may be attached to the opening of the pipe 82. The yoke may be attached to a suitable screw 87 so as to operate within a cross brace 89 on the top of the tank 9. A handle 94 may be provided for the operation of the screw 87. The tank 9 may be supplied with liquid from the reservoir 88 by a suitable pump 90 which may be operated by the motor 30. The pump 90 is connected by a pipe 91 to a valve 92. The valve 92 may be controlled as desired to allow the liquid to enter the tank 9 by way of the spigot 93.

In order to provide for automatically stopping the electric motor 30 when the material being fed to the measuring cylinder 18 is exhausted, or fails to enter the chamber 8, a switch 54 may be connected in the circuit of the motor 30. The switch 54 may have the conventional push buttons 55 for completing or breaking the circuit and may be located on the side plate 14. An arm 56 is located by a shaft 57 so that it will make contact with the button 55 for breaking the motor circuit and may be located on the side plate 14. The arm 56 is located by the shaft 57 so that it will make contact with the button 55 for breaking the motor circuit when an arm 58, having a slidable weight 59 on it, moves downwardly. The weight 59 is slidable in order to adjust the switch to operate under varying weights of material which will strike a plate 60. The plate 60 is located in the chamber 8 in an opening 61 formed in the plate 16. The edges of the plate 60 are connected to the plate 16 by canvas bellows 62 which may be secured by suitable nuts and washers The plate 60 is pivotally supported on an arm 63 which is keyed to the shaft 57. It will be seen, therefore, when the chamber 8 is not receiving material to be measured, the weight 59 forces the plate 60 into the chamber 8 and, at the same time, forces the arm 56 to press against buttons 55 to break the motor circuit. The motor will operate only when the weight passing over the plate 60 is sufficient to counterbalance the pushing action of the weight 59.

I claim:

1. In a tempering machine for plastic materials, a chamber for receiving the plastic having a delivery opening, a shaft, a measuring cylinder located in the chamber on the said shaft, the measuring cylinder having a plurality of open sections, a tank for containing liquid, a second measuring cylinder having a plurality of closed sections, a plurality of openings located on the periphery of the said second cylinder, the said second cylinder located on the said shaft so as to immerse said openings of said second cylinder in the said tank, means for rotating the said shaft to move said measuring cylinder to deliver respective volumes of the plastic and the liquid at said delivery opening of the chamber.

2. In a tempering machine for plastics having a measuring chamber, a switch, a movable plate forming a part of a wall of the chamber, a counterbalancing weight for counterbalancing the pressure of the material within the chamber on the plate, and means connected to the counterbalancing weight for operating the switch when the pressure on the plate is reduced.

3. In a tempering machine for dry plasticable materials, a pair of rotative members having chambers, means for directing the dry plasticable material into the chambers of one of the rotative members, and means for directing a tempering liquid into the chambers of the other rotative member, means for regulating the proportionate volume of tempering liquid directed into the chambers of said second rotative member while rotating, the machine having a common outlet for the plasticable material and the tempering liquid.

4. In a tempering machine for plasticable material, a pair of rotative members having chambers, means for directing the plasticable material into the chambers of one of the rotative members, the machine having an outlet for ejecting the plasticable material, the chambers of the second rotative member having openings on the periphery thereof for receiving a tempering liquid into the chambers and openings near the axis of rotation for discharging the tempering liquid into the outlet of the machine and means for varying the quantity of tempering liquid entering the chambers of the said second rotative member while the said member is being rotated.

5. In a tempering machine for plasticable material, a pair of rotative members having measuring chambers, means for directing the plasticable material into the measuring chambers of one of the rotative members, an outlet for ejecting the plasticable material, a vat for containing a tempering liquid, the second of the rotative members being partially submerged in the vat, a liquid collection box, means connecting the liquid collection box with the outlet of the machine, the second named rotative member having peripheral openings for receiving the tempering liquid into the measuring chambers thereof and axially adjacent openings for delivering the tempering liquid into the liquid collection box and means for regulating the level of the tempering liquid in the vat in order to vary the proportionate volume of tempering liquid delivered by the second rotative member to the outlet of the machine while the machine is operating.

6. In a tempering machine for plasticable material, a pair of rotative measuring cylinders mounted on a common shaft, means for delivering the plasticable material to one of the said pair of measuring cylinders and a tempering liquid to the other of the said pair of measuring cylinders, a ratchet wheel keyed to the said common shaft, a drive shaft, a crank mounted on the drive shaft, a link adjustably connected to the crank, means for rotating the said drive shaft, a pawl pivotally supported by the link and adapted to periodically engage the ratchet wheel upon successive rotations of the crank, and means for varying the effective length of the crank whereby the angular displacement of the said pair of rotative members may be varied to change the rate of delivery of the plasticable material and tempering liquid to the outlet of the machine.

7. In a tempering machine for plasticable material, a pair of rotative members having measuring chambers, means for directing the plasticable material into the measuring chambers of one of the rotative members, the machine having an outlet for delivering the plasticable material, the measuring chambers of the second rotative member having openings on the periphery thereof for receiving a tempering liquid, and openings near the axis of rotation of the rotative member for discharging the tempering liquid to the outlet of the machine, and means for varying the volume of tempering liquid added to the plasticable material as it is delivered at the outlet of the machine while the rotative members are rotating, whereby the consistency of the delivered plastic may be maintained at a desired constancy regardless of the moisture content of the plasticable material delivered to the measuring chambers of the first named rotative member.

8. In a tempering machine for plasticable material, a pair of rotative members having measuring chambers, means for directing the plasticable material into the measuring chambers of one of the rotative members, the machine having an outlet for delivering the plasticable material, the measuring chambers of the second rotative member having openings on the periphery thereof for receiving a tempering liquid into its measuring chambers and openings near its axis of rotation for discharging the tempering liquid to the outlet of the machine, and means for varying the volumetric ratio of the tempering liquid delivered to the outlet of the machine, to the plasticable material delivered to the outlet of the machine, while the rotative members are being rotated.

9. In a tempering machine for plasticable material, a pair of rotative members having a plurality of measuring chambers and mounted on a common shaft, an electric motor, a switch connected to the motor, means connecting the motor and the common shaft for driving the shaft at various speeds, means for directing the plasticable material into the measuring chambers of one of the rotative members while in motion, means for opening the switch upon the failure of the supply of plasticable material, an outlet opening for the delivery of the measured plasticable material, a vat for containing a tempering liquid, means for maintaining said liquid in the vat at any desired elevation, the second rotative member located within the vat and partially submerged in the tempering liquid, said second rotative member having openings on its periphery for receiving the tempering liquid into its measuring chambers and openings near its axis of rotation for the discharge of said tempering liquid, a collection box for receiving the measured tempering liquid and means for delivering it to the outlet opening of the machine.

In witness whereof I have hereunto signed my name to this specification.

DAVIS BROWN.