May 18, 1948. E. M. SNOW 2,441,727

CHURN OPERATING MECHANISM

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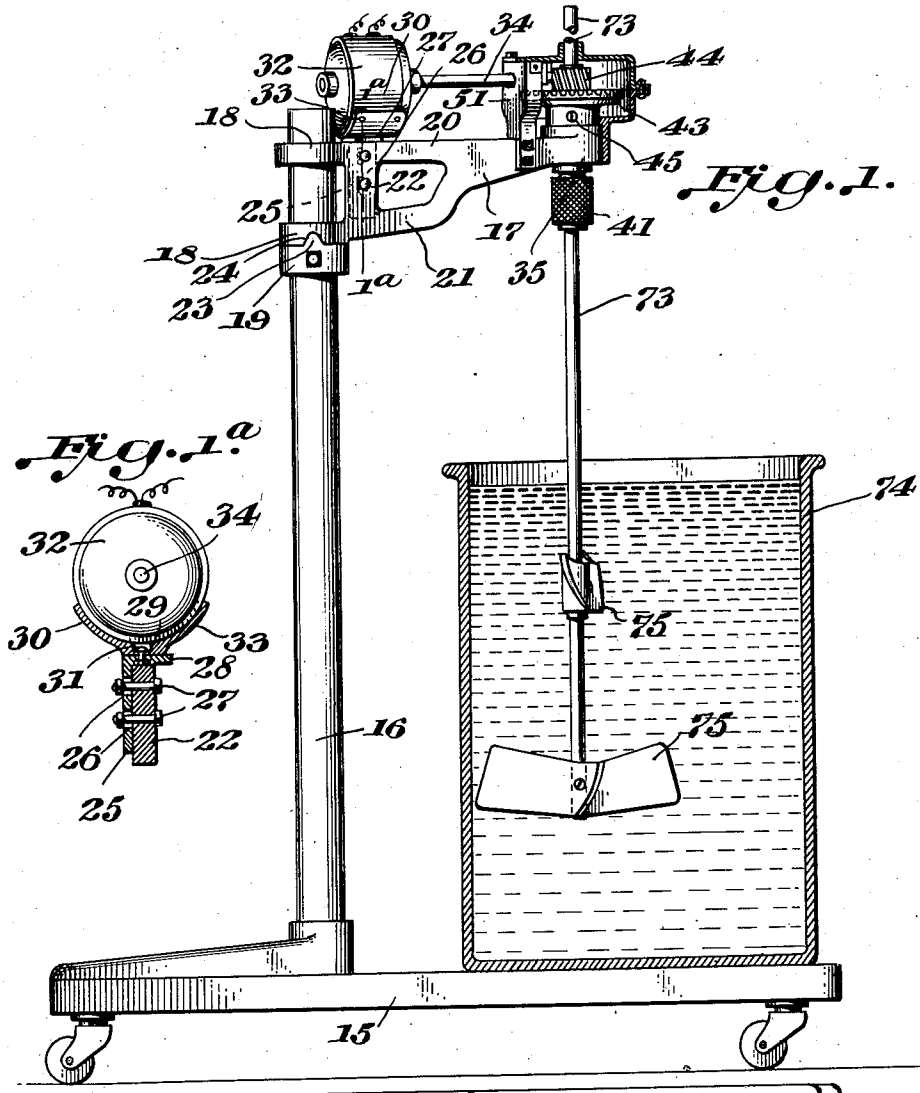


Fig. 1.

Fig. 1a.

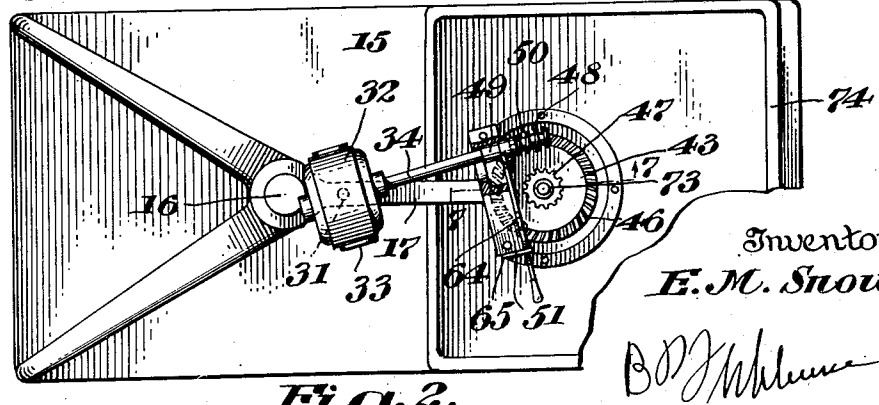


Fig. 2.

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CHURN OPERATING MECHANISM

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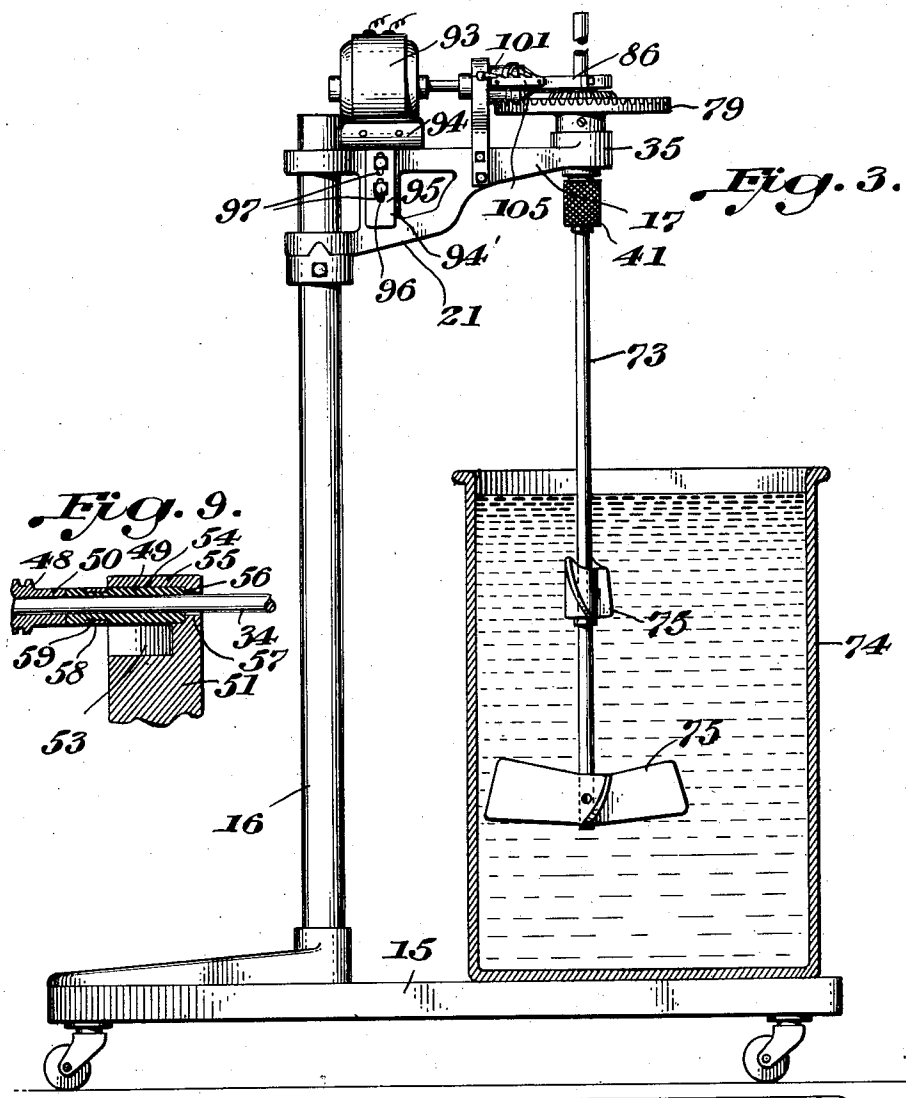


Fig. 3.

Fig. 9.

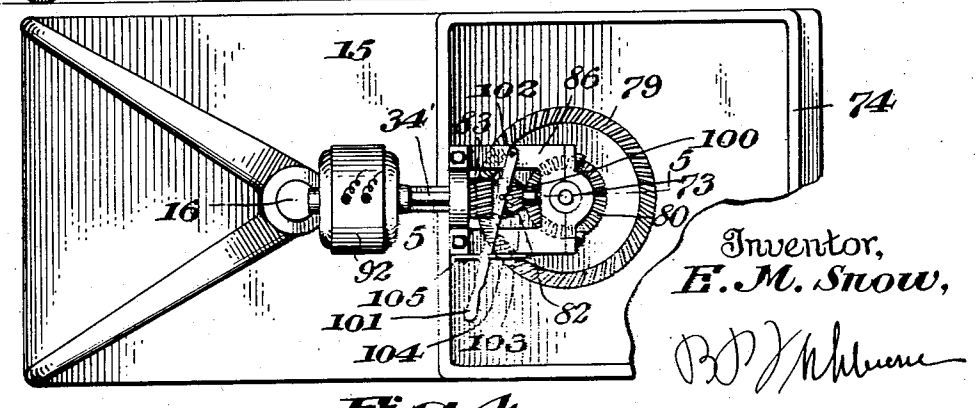


Fig. 4.

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CHURN OPERATING MECHANISM

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Fig. 5.

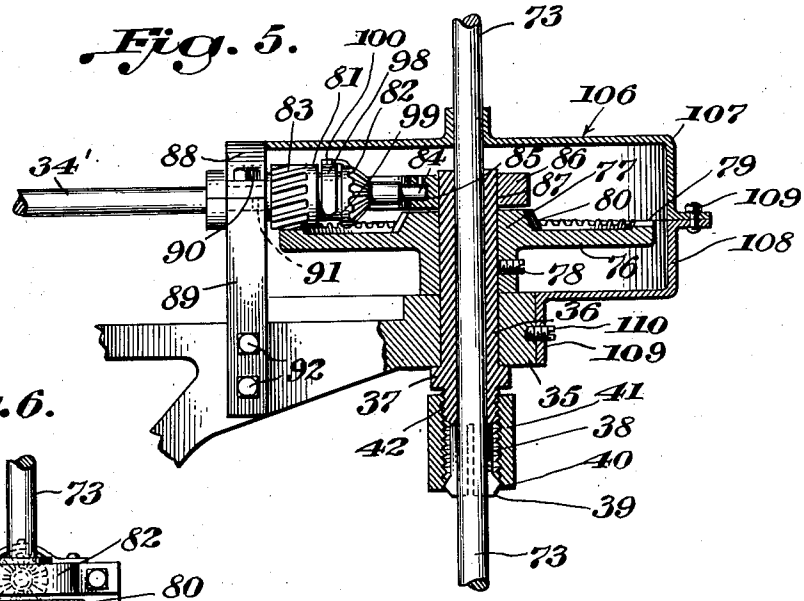


Fig. 6.

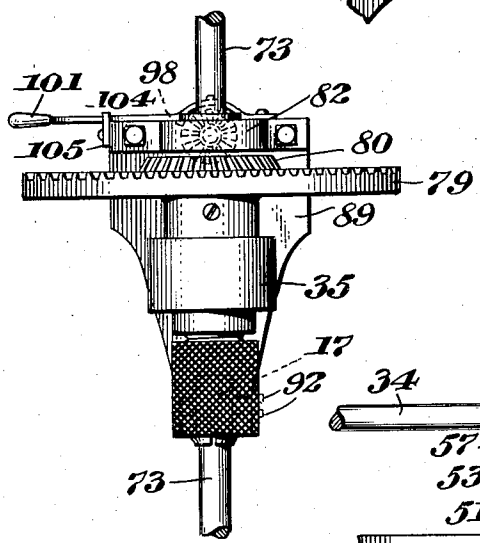
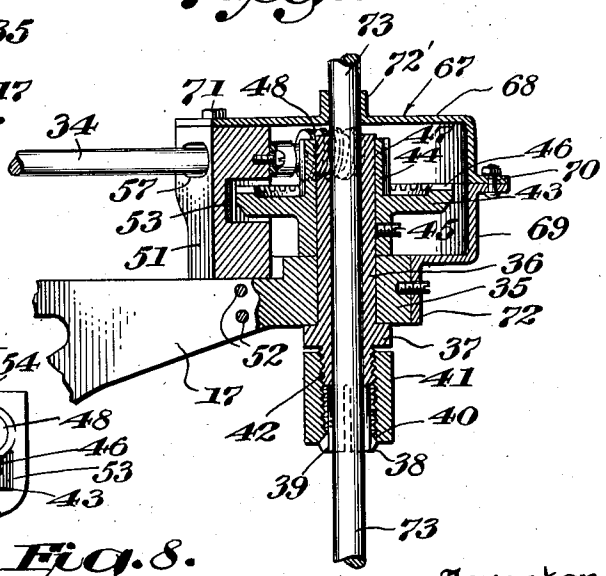


Fig. 7.



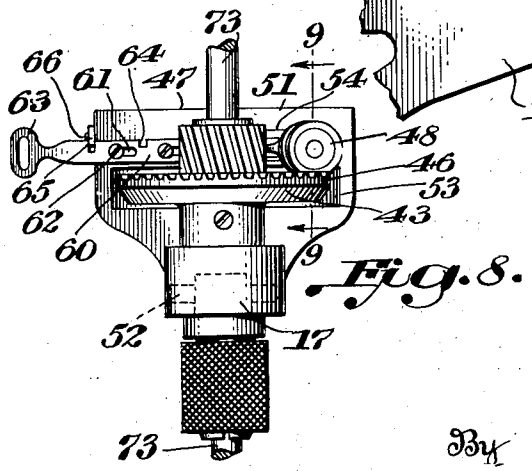


Fig. 8.

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UNITED STATES PATENT OFFICE

2,441,727

CHURN OPERATING MECHANISM

Ernest M. Snow, Greenville, S. C.

Application June 6, 1945, Serial No. 597,833

4 Claims. (Cl. 74—16)

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My invention relates to a machine for churning, beating or mixing materials.

An important object of the invention is to provide a machine of the above mentioned character having variable speed gearing for driving the dasher rod, thus eliminating the use of a belt drive.

A further object of the invention is to provide means for mounting the motor upon the swinging arm of the support and connecting the armature shaft of the motor with the gearing, also mounted upon the swinging arm.

A further object of the invention is to provide adjustable means to mount the motor upon the swinging arm so that motors of different sizes may be used and will be properly correlated with the gearing.

A further object of the invention is to provide means whereby the motor is pivotally mounted and is turned upon its pivot in changing the gear speeds.

A further object of the invention is to fixedly mount the motor upon the arm and to shift the driving gear longitudinally with respect to the armature shaft for changing speeds.

A further object of the invention is to provide change speed gearings for use with low and high speed motors.

A further object of the invention is to provide an arrangement whereby the dasher rod is held in an adjustable chuck and the dasher rod may be vertically raised and lowered with respect to the receptacle so that the dashers will act upon the liquid material at different elevations.

A further object of the invention is to provide means whereby the dasher may be moved above the receptacle without separating the dasher rod from the chuck.

A further object of the invention is to provide a machine of the above mentioned character which is relatively simple, easy to operate, and having the gearing covered to avoid accidents.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application, and in which like numerals are employed to designate like parts of the same,

Figure 1 is a side elevation of a machine embodying my invention, parts in vertical section,

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Figure 1a is a transverse section through the vertical adjustable bracket, taken on line 1a—1a of Figure 1,

Figure 2 is a plan view of the machine, parts broken away and parts omitted,

Figure 3 is a side elevation, parts omitted, of a machine embodying the second form of the invention,

Figure 4 is a plan view of the same, parts omitted,

Figure 5 is a central vertical section taken on line 5—5 of Figure 4,

Figure 6 is a front elevation of the gearing shown in Figure 5, the housing omitted,

Figure 7 is a vertical section taken on line 7—7 of Figure 2,

Figure 8 is a front elevation of the gearing shown in Figure 7, the housing being omitted, and,

Figure 9 is a vertical section taken on line 9—9 of Figure 8.

In the drawings, wherein for the purpose of illustration are shown preferred embodiments of my invention, Figures 1, 2 and 6–9 inclusive show gearing for use in connection with a high speed motor. In these figures, the numeral 15 designates a base upon which is rigidly mounted an upstanding shaft or rod 16, disposed at the longitudinal center of the base. Arranged near the top end of the shaft or rod 16 is a horizontal arm 17, having knuckles 18, slidably mounted upon the shaft or rod 16, to turn and move longitudinally thereon. The lower knuckle 18 is supported by a collar 19, rigidly mounted upon the shaft 16 at a desired elevation. The arm 17 includes horizontal arm sections 20 and 21, connected by a vertical web 22. Any suitable means may be employed to hold the horizontal arm 17 in the selected adjusted position, and for this purpose I preferably employ lug or lugs 23, integral with the collar 19 and arranged to enter notch or notches 24 in the lower collar 18. These elements are preferably spaced for 90 degrees. This is the arrangement shown in my Patent 2,137,547.

A vertically adjustable bracket 25 is arranged upon one side of the web 22, and has elongated slots 26, to receive bolts 27, carried by the web 22 and adapted to clamp the bracket 25 in the selected vertical elevation. At its top, the bracket 25 has a horizontal extension 28, slidably engag-

ing a horizontal boss 29, formed upon a curved supporting element or yoke 30. The supporting element 30 is pivotally connected with the extension 28 by a pivot element or bolt 31. The supporting element 30 receives the bottom of the casing 32 of the high-speed motor, and is attached to this casing by screws 33 or the like. The pivot 31 is arranged at the longitudinal center of the armature shaft 34 of the motor. The motor is therefore mounted, to be bodily turned upon the vertical axis or pivot 31.

The numeral 35, Figures 1 and 7, designates a vertical sleeve or bearing, preferably formed integral with the outer end of the arm 17, and this bearing 35 receives a rotatable vertical sleeve 36. This vertical sleeve is provided near and spaced from its lower end with a stop ring 37, preferably formed integral therewith to limit the upward movement of the sleeve 36. The sleeve 36 is provided at its lower end with a contractible chuck, including resilient spaced longitudinal jaws 38, preferably formed integral with the sleeve and tensioned to move outwardly to the open position so that the bore formed by the annular set of jaws 38 will have a greater diameter than the bore of the sleeve 36 or the same diameter. The resilient jaws 38 are provided at their lower ends with bevel faces 39, to engage a bevel face 40, formed upon a sleeve or collar 41, internally threaded for screw threaded engagement with the lower end of the sleeve 36, as shown at 42.

I provide variable speed gearing for driving the vertical sleeve 36. This gearing comprises a horizontal gear member 43, having a hub 44, mounted upon the vertical sleeve 36, above the bearing 35. The lower end of the hub 44 is clamped to the sleeve 36 by a set screw 45 or the like. The gear member forms concentric horizontal gears of different diameters. The gear member 43 is provided upon its upper face and at its periphery with an annular set of worm teeth 46, forming the larger gear or worm wheel. The hub 44 is provided at its upper end and upon its periphery with an annular set of worm teeth 47, thus providing an upper worm or gear of smaller diameter. A worm wheel 48 is rigidly mounted upon the free end of the armature shaft 34 or to a shaft attached to the armature shaft. This worm wheel 48 is shiftable laterally into engagement with the worm teeth 46 and the worm teeth 47.

The armature shaft 34 at its outer end is journalled in a bearing-sleeve 49, Figure 9, and the end 50 of the worm wheel 48 engages the outer end of the bearing-sleeve 49, which also serves as an end thrust bearing. The numeral 51 designates a vertical bracket, the lower end of which is forked to receive the outer end of the arm 17 and is rigidly secured thereto by bolts 52. This vertical bracket is provided with a lower horizontal recess 53, into which the gear member 43 projects and the bracket 51 is provided with an upper horizontal recess 54, the top of which is defined by a horizontal wall 55. The forward end of the recess 54 is open, while its rear end is closed by a vertical wall 56, having an elongated horizontal slot 57 formed therein. The inner face of the wall 56 is slightly curved and this curvature is concentric with the pivot 51. The end of the bearing-sleeve 49 abuts against the wall 56 and this end of the bearing-sleeve is slightly curved in concentric relation to the curved face of the wall 56. The top of the bearing-sleeve 49 engages the lower face of the horizontal wall 55,

which limits its upward movement. It is thus seen that the bearing-sleeve 49 serves to guide the armature shaft 46 in its swinging movement and will retain the worm wheel 48 in proper engagement with the worm teeth 46 or worm teeth 47, when shifted into such engagement.

Means are provided to laterally shift the bearing-sleeve 49 for shifting the worm wheel 48. This means comprises a collar 58, Figure 9, held within an annular groove 59, formed in the bearing-sleeve 49, and this collar is carried by a horizontal strap 60, having elongated slots 61, receiving screws 62 or the like, mounted upon the bracket 51. The strap 60 is equipped with a handle 63 for manipulation, and the strap 61 has notches 64 in its upper edge, for receiving a latch 65, pivoted at 66 with the bracket 51. By shifting the strap 60 to the right, Figure 8, the worm wheel 48 is brought into engagement with the worm teeth 46, for effecting low speed, and the strap is locked in this position by the latch 65 engaging into the outer notch 64. When the strap 60 is moved to the left, Figure 8, worm wheel 48 is brought into engagement with worm wheel 47, for effecting high speed. The strap 60 is now locked in the shifted position by the latch 65 engaging within the inner notch 64. The gearing, including the gear member 43, is enclosed within a housing 67, which may include upper and lower parts 68 and 69, secured together by bolts 70 or the like. The top of the upper part 68 may extend over the bracket 51 and be secured thereto by bolts 71. The lower part 69 has reduced extension 72, receiving the bearing 35, as shown. This housing will have a suitable opening for the passage of the strap 60. The top portion 68 has an upstanding sleeve 72'.

The vertical sleeve 36 is open at its top and bottom and its bore is of a suitable diameter for slidably receiving a vertical dasher rod 73, extending below the sleeve 36 and its chuck and also extending above the sleeve 36 and the sleeve 72'. The dasher rod 73 extends downwardly into a vertical receptacle 74, mounted upon the base 15, to receive the material to be churned, beaten or mixed. This material may be cream, to be treated for making butter. The dasher rod 73 is equipped with dashes 75. The dasher rod 73 extends through the chuck embodying the jaws 38, and the sleeve 41 is manipulated to clamp the jaws 38 to the dasher rod, whereby the dasher rod will rotate with the vertical sleeve 36. It is thus seen that the dasher rod 73 may be vertically adjusted to bring the dasher 17 at different elevations, and then locked in adjustment to the vertical sleeve 36.

The operation of the machine is as follows.

In the churning of cream in producing butter, it is desirable to adjust the dashes 75 to various depths in the cream being churned. This is rendered possible by the vertical adjustment of the dasher rod 73. I have also found that more satisfactory results are obtained in churning cream for making butter to employ a speed of rotation not to exceed 400 R. P. M. for the dasher. By employing the worm drive before described, this approximate speed of 400 R. P. M. may be had. The gearing provides two speeds for driving the dashers, which has proven to be valuable in producing butter and for beating or mixing many types of food. By slowing down the speed of the dasher, the butter may be gathered. The dashers 75 may be arranged above the receptacle 74, so that the arm 17 may be

swung from over the receptacle, to permit of the ready removal of the receptacle.

In Figures 3, 4, 5 and 6 I have shown a modified form of the invention, wherein a low speed motor is used. In these figures, a horizontal gear member 76 is mounted upon the vertical sleeve 36. The horizontal gear member 76 includes a vertical hub 77, the lower end of which is clamped to the sleeve 36 by a set screw 78 or the like. The gear member 76 is provided at its periphery and upon its upper face with an annular set of gear teeth 79, which are preferably radially inclined. At its top, the hub 77 has an annular set of bevel gear teeth 80. The gear teeth 79 are included in a larger horizontal gear and the bevel gear teeth 80 are included in an upper smaller horizontal bevel gear. Mounted upon the armature shaft 34' is a double gear member 81, having bevel gear teeth 82 at one end and provided upon its periphery and at its opposite end with inclined gear teeth 83. The member 81 is splined upon the armature shaft 34' to move longitudinally thereof, but cannot turn with relation thereto. The bevel gear teeth 82 are adapted to be shifted into engagement with the bevel gear teeth 80 and the gear teeth 83 into engagement with the gear teeth 79. The gear teeth 83 are preferably laterally inclined. The forward end of the armature shaft 34' is reduced, as shown at 84, for insertion within a bearing opening 85, formed in a horizontal plate 86, having a vertical opening 87 for receiving the upper end of the sleeve 36. The horizontal plate 86 is rigidly secured to a vertical cap 88, mounted upon the upper end of a vertical bracket 89 and secured thereto by bolts 90. The cap 88 forms with the top of the bracket 89 a bearing 91 for the armature shaft 34'. The lower end of the bracket 89 is forked and straddles the outer end portion of the arm 17 and is clamped thereto by bolts 92. The armature shaft 34' is included in a low speed motor 93, rigidly mounted upon a curved plate or yoke 94, carried by a vertical bracket 94', mounted upon the web 22 by bolts 96, passing through elongated slots 97. The longitudinal center of the armature shaft 34' is in alignment with the longitudinal center of the sleeve 36, as shown.

Means are provided to longitudinally shift the double gear member 81, including a fork 98, operating within an annular groove 99 of the gear member, and this fork is pivotally connected at 100 with a lever 101, pivoted at 102 with the horizontal plate 86. This horizontal plate has a central recess 103. The pivot 102 is sufficiently loose to permit of a slightly vertical swinging movement of the lever 100, so that this lever may be moved into undercut notches 104, formed in the upper edge of a fixed horizontal plate 105, to lock the lever in the outer or inner position.

The gears are inclosed within a housing 106, including upper and lower parts 107 and 108, secured together by bolts 109. The lower part 107 has a depending sleeve 109 to receive the bearing 35 and to be secured thereto by screws 110 or the like. The housing may be further secured to the bracket 89, if desired.

The operation of the second form of the machine is as follows.

When the lever 101 is swung to the outer position, Figure 4, the gear teeth 83 will engage the gear teeth 79 for effecting a slow drive of the sleeve 36 and dasher rod 73. When it is desired to drive the dasher rod at a high speed, the lever 101 is swung to the right, Figure 4, to the inner position, and bevel gear teeth 82 will then engage bevel gear teeth 80, for effecting high speed. The lever 101 is swung vertically slightly when moved into or out of the notches 104. All other parts of the apparatus are identical with those shown and described in connection with the first form of the invention.

It is to be understood that the forms of my invention herein shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, what I claim is:

1. An upstanding support, a generally horizontal arm mounted upon the support and having a bearing, a generally vertical sleeve held within the bearing, a generally vertical shaft held within the sleeve for rotation therewith, a gear unit mounted upon the sleeve to turn it and including generally horizontal concentric gears of different diameters, a motor having a generally horizontal armature shaft, means to pivotally mount the motor upon the arm to swing generally horizontally, a gear mounted upon the armature shaft to be brought into engagement with the gears of different diameters by the swinging movement of the motor, and means to swing the motor upon its pivot.

2. An upstanding support, a generally horizontal arm mounted upon the support, a generally vertical shaft rotatably mounted upon the arm, a gear unit mounted upon the shaft to turn it and including generally horizontal concentric gears of different diameters, a motor having a generally horizontal armature shaft, means to pivotally mount the motor upon the arm to swing generally horizontally, a gear mounted upon the armature shaft to be brought into engagement with the gears of different diameters by the swinging movement of the motor, and means to swing the motor upon its pivot.

3. An upstanding support, a horizontally swinging arm mounted upon the support, and having a substantially vertical bearing, a substantially vertical sleeve rotatable within the bearing and having its opposite ends open, a substantially vertical rod slidably mounted within the sleeve to project above and below the same and to be moved longitudinally therein, means for detachably locking the rod to the sleeve, concentric gears of different diameters mounted upon the upper end of the sleeve, a motor having a generally horizontal armature shaft, means to pivotally mount the motor upon the arm so that the motor may be swung horizontally, a bracket mounted upon the arm and having an elongated generally horizontal recess having a top wall, a sleeve within the recess and engaging the top wall and receiving the armature shaft therein, a gear mounted upon the armature shaft to engage with the gears of different diameters, and means to shift the sleeve latterly.

4. An upstanding support, a horizontally swinging arm mounted upon the support and having a substantially vertical bearing, a substantially vertical sleeve rotatable within the bearing and having its opposite ends open, a substantially vertical rod slidably mounted within the sleeve to project above and below the same and to be moved longitudinally therein, means for detachably locking the rod to the sleeve, concentric

gears of different diameters mounted upon the sleeve, a motor having a generally horizontal armature shaft, means to pivotally mount the motor upon the arm so that the motor may be swung horizontally, a bracket mounted upon the arm and having an elongated generally horizontal recess having a top wall, a sleeve within the recess and engaging the top wall and receiving the armature shaft therein, a gear mounted upon the armature shaft to engage with the gears of different diameters, an adjustable element connected with the sleeve to shift it latterly, and means to hold the adjustable element in the selected adjusted position.

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