May 19, 1931. W. BELSHAW 1,806,326

DOUGHNUT MACHINE

Filed Oct. 21, 1930 2 Sheets-Sheet 1

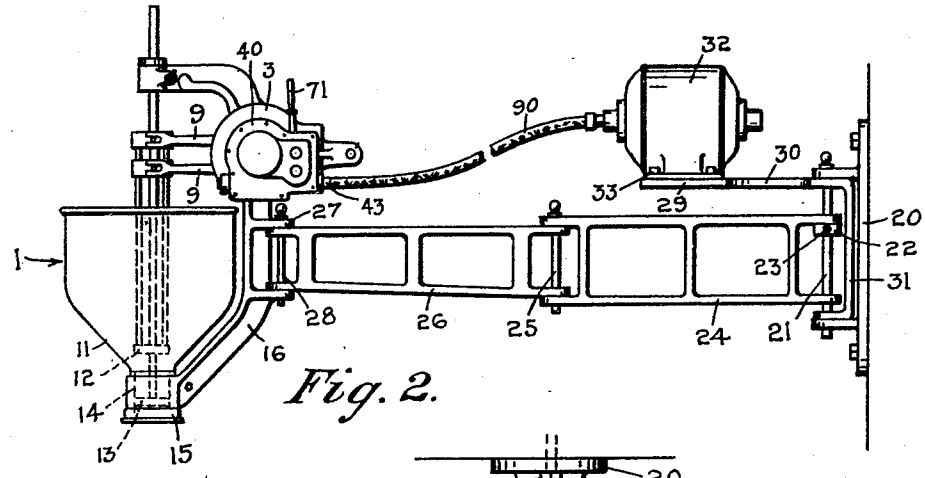


Fig. 2.

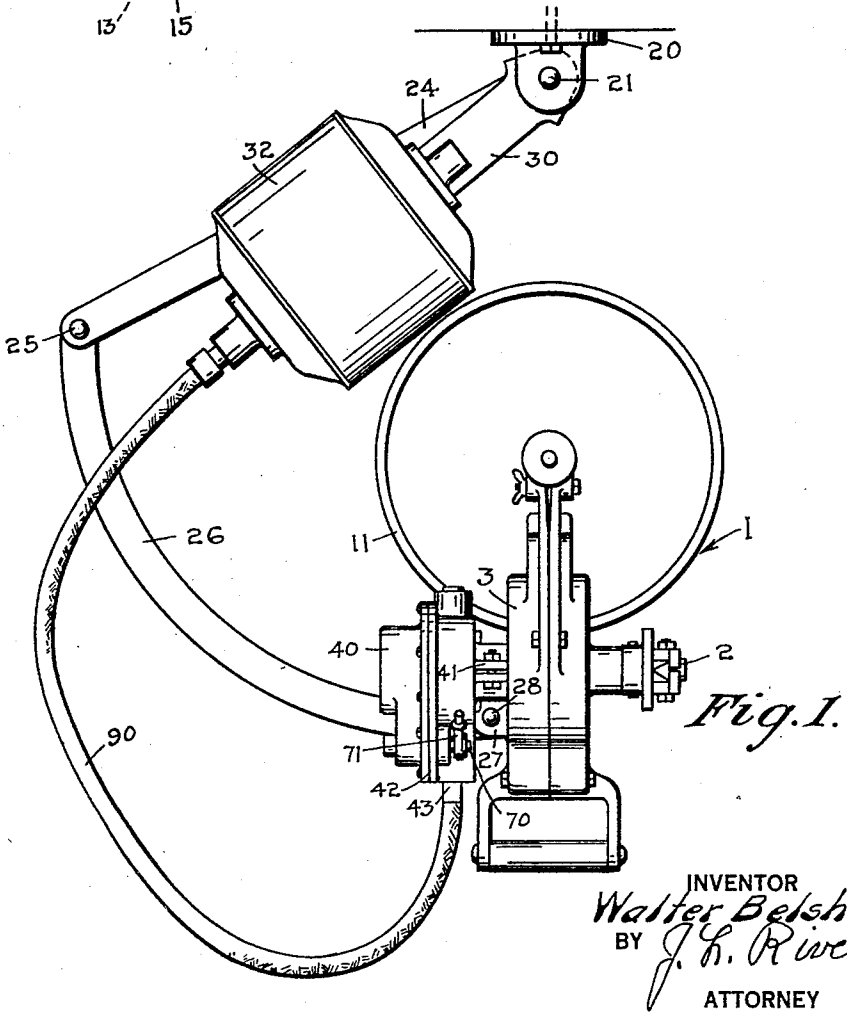


Fig. 1.

INVENTOR
Walter Belshaw
BY J. L. Rivers,
ATTORNEY

May 19, 1931. W. BELSHAW 1,806,326

DOUGHNUT MACHINE

Filed Oct. 21, 1930 2 Sheets-Sheet 2

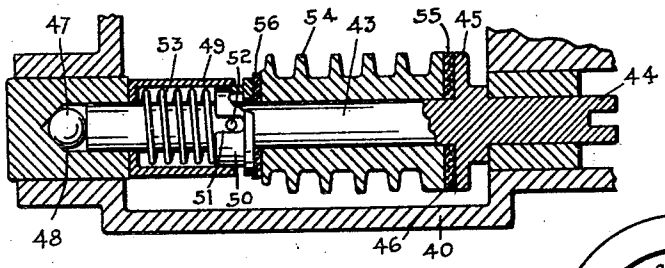


Fig. 6.

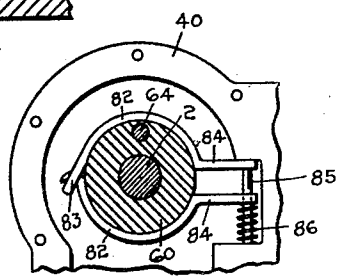


Fig. 5.

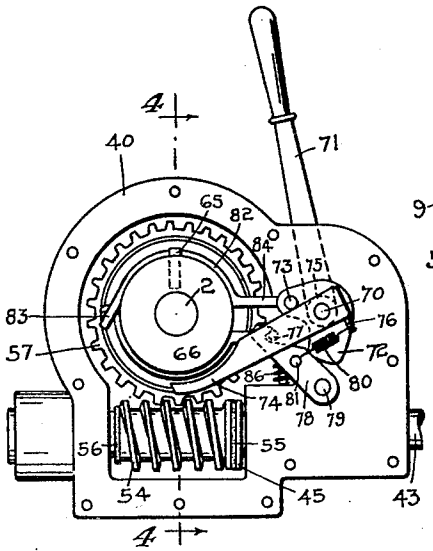


Fig. 3.

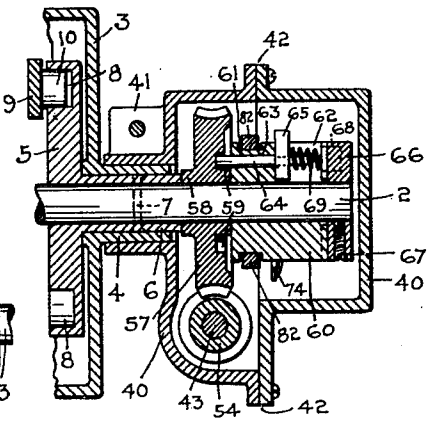


Fig. 4.

INVENTOR
Walter Belshaw
BY J. L. Rivers,
ATTORNEY

Patented May 19, 1931

1,806,326

UNITED STATES PATENT OFFICE

WALTER BELSHAW, OF SEATTLE, WASHINGTON

DOUGHNUT MACHINE

Application filed October 21, 1930. Serial No. 490,175.

My invention has reference in particular to improvements in the type of hand-operated doughnut machines for which Letters Patent of the United States, No. 1,738,033 were issued to me on December 3, 1929, wherein a pair of spaced and cam-actuated pistons operate in conjunction with a hopper and a cylinder connected thereto, and whereby, in cooperation with other instrumentalities, a raw doughnut may be formed and deposited in a separate receptacle for cooking.

The objects of the invention, generally stated, are:

To provide electric driving means for said machine, including a motor, a reduction gearing between the motor and said machine, and a driving shaft connecting said motor and machine;

To provide a clutch device adapted in its duties to start and stop the pistons of said machine in predetermined positions;

To provide in said gearing a safety slippage device to protect the working parts of the machine, should said machine become jammed while the power is applied thereto; and,

To provide mountings for said machine and motor which will impart flexibility of movement to the machine relative to a cooking vat or a plurality of said vats over which said machine is designed to operate, and also permit flexibility of movement to said machine relative to the motor, the machine at all times being relieved of the weight of said motor.

Other objects will appear as the description of the invention progresses.

In the accompanying drawings—

Figure 1 is a top view of the entire device in usual working position, the same including a wall bracket carrying a seat for an electric motor, an electric motor installed thereon, a pair of arms extending from said bracket, said doughnut machine carried by said arms, and driving mechanism connecting said motor and said machine.

Fig. 2 is a side elevation of the same, said arms being shown as extended beyond their normal working positions to indicate more in detail said doughnut machine, said seat and arms, and the pivotal connections of the same with said bracket.

Fig. 3 is a side elevation of said reduction gearing with a section of the casing therefor removed, the driven shaft for actuating the same being shown as broken away, said view also particularly showing said clutch device and including the driving shaft of said doughnut machine.

Fig. 4 is a vertical section drawn on the line 4—4, of Fig. 3, showing said gearing and other details of said clutch device, the view indicating said driving shaft as broken away and certain other parts of said doughnut machine, including a portion of a cam casing carrying a sleeve, a cam, and a cam lever connected with said cam.

Fig. 5 illustrates in cross section a clutch collar mounted on said driving shaft, a portion of the enclosing casing being included, and brake mechanism operative on said collar for slowing up said shaft as the power is cut off.

Fig. 6 is a detail view of said safety slippage device, the same including a worm and associated parts, some of which are shown in section and as broken away.

Similar numerals refer to similar parts throughout the several views.

Referring more particularly to the drawings, 1 denotes generally said doughnut machine, certain parts of which obviously are connected to or particularly associated with the present device. Said parts comprise a driving shaft 2, a cam casing 3 carrying a sleeve 4, and a cam 5 provided on one side of its body portion with an integral and excentrically disposed sleeve 6, said cam being mounted in said casing and on said shaft, the sleeve 6 being fixedly secured to said shaft by the pin 7 and rotatable in the sleeve 4. Said cam is also provided with a groove 8 and a cam lever 9 having at one end a roller 10 operative in said groove. Said cam and lever connected therewith are indicated in Fig. 4 and are illustrative of a pair of cams and levers mounted in said casing and which control piston means associated mainly with the hopper 11, said means including an upper piston 12, a lower piston 13, and a piston cylinder 14 at

the lower end of said hopper, as shown by dotted lines in Fig. 2. Said pistons as they cooperate with said cylinder in forming and depositing a raw doughnut from dough placed within the hopper differ in their range of movement, the upper piston being adapted to travel in said hopper and cylinder and the lower piston being operative within said cylinder and below the outer terminal thereof. 15 denotes a flared guard member designed to protect said cylinder when the machine is moved about, and 16 a frame portion.

For suspending said doughnut machine over a cooking receptacle a wall bracket 20 is provided, which supports a pivot rod 21, having a collar 22 adjustably secured in place by the set screw 23. 24 denotes a straight arm swingingly secured at one end to said rod, and supported in adjusted position on the rod by said collar. The other end of said arm carries a pivot rod 25 to which is swingingly secured a second and curved arm 26, said curved arm being connected pivotally with the doughnut machine by the bracket 27 extending from said portion and the pivot rod 28 carried by the bracket.

A member consisting of a substantially rectangular seat portion 29 and a neck portion 30 terminating in a right angular support 31, swingingly connected to the bracket 20 by the pivot rod 21, provides a seat for an electric motor 32, said motor being bolted to said seat portion, as at 33. As it may be noted particularly in Fig. 2, said motor is supported by said bracket and adapted to swing therein independently of the elements also associated with said bracket and which swingingly support the doughnut machine, thereby affording a free swinging movement for each, unhampered by the other.

Said reduction gearing and the clutch and safety slippage devices heretofore referred to are designed to be mounted on the shaft 2 of the doughnut machine in place of the crank and handle provided in the hand-operated machine.

A casing 40 for enclosing these new instrumentalities is secured to the sleeve 4 by a clamp 41 integral with said casing and adapted to embrace said sleeve, said casing being in two sections secured together, as at 42. A shaft 43, designed to be driven by said motor, is journaled in the casing, said shaft being provided with a notched end 44 and an integral flange 45 having an inner circular face 46. The other end of the shaft is provided with a ball thrust bearing, the same consisting of a ball 47 disposed in a suitable recess 48 in the journal bearing for this end of the shaft. 49 denotes a housing around said shaft, and 50 a flanged sleeve provided with oppositely disposed notches 51, said sleeve being loosely mounted on said shaft and held against rotation by a pin 52 extending through the shaft and engageable with said notches. A spiral spring 53 is disposed around said shaft and between the inner ends of said housing and sleeve. Said sleeve is thus adapted to perform a double duty, serving as a cover for one end of said housing and as a sliding abutment for said spring. A worm 54 is mounted on said shaft and rotatable thereon, a fiber washer 55 being interposed between one end of said worm and the face 46, and a second and smaller fiber washer 56 being disposed between the other end of the worm and the sleeve 50. Through the tension of said spring and the instrumentalities described which cooperate therewith said worm is so held as to be normally rotatable with said shaft.

A worm wheel 57, mounted on the shaft 2 and rotatable thereon, is adapted to mesh with said worm and is provided on one side with a shoulder 58 which bears on the sleeve 6 and on the other side with a pair of oppositely disposed openings 59 adapted to accommodate a clutch pin of the clutch device heretofore mentioned and which will be hereinafter particularly described.

Said gearing, interposed as it is between the driven shaft 43, which takes the speed of the driving shaft of the motor as will more fully appear, and the shaft 2, which transfers the power of the motor to the doughnut machine, is designed to be of such a character so as to reduce said speed, as desired, and transmit to said shaft a power which will best meet the requirements of said machine.

Said clutch device comprises a clutch collar 60 mounted on said shaft 2 and rotatable therewith, the same being more particularly shown in Fig. 4. The collar carries adjacent its inner end a circumferential groove 61 for holding a brake band, and is provided with a slot 62 extending from the outer end of said collar for about half the length thereof and communicating with the central bore provided for said shaft, and 63 a bore extending from said slot and terminating at the inner end of said collar. A clutch pin 64, having fixedly secured thereto and adjacent one of its ends a right angular lug 65, is slidably mounted in the bore 63, said lug slidably engaging the slot 62 and projecting laterally from said collar. 66 designates a cap for said collar, the same being mounted on the shaft 2 and also rotatable therewith, said cap being secured to said shaft by the set screw 67 and keyed to said collar, or detachably secured to the collar in any other suitable way. Said cap is provided with a recess 68 adapted to house one end of a spiral spring 69, the other end of said spring being mounted on an end of said pin 64, the spring, as is evident, affording tension for said pin and lug. This clutch pin is designed to work on the worm wheel 57 and when operatively connected therewith engages one of the openings 59 therein and the lug 65 then occupies the po-

sition at the inner and closed end of the slot 62, as shown in Fig. 4.

A shaft 70, journaled in the casing 40, carries at its outer end a handle 71 clampingly secured in place and operative exteriorly of said casing, and at its inner end and interiorly of the casing a cam 72, fixedly secured thereto and having a laterally extending pin 73. Said pin serves to limit the upward movement of a cam member 74 which is pivotally connected with the shaft 70 and spaced from the cam 72 by the washer 75. The cam member 74, as may be seen in Fig. 3, is made conformable to the outer surface of the cylindrical clutch collar 60, and said cam member when in operative position is designed to hug said collar. 76 denotes a pin extending from the cam member 74 in approximately the same plane thereof and 77 another pin projecting laterally from the underside thereof. A hooked trigger bar 78 is pivotally connected with the casing by the pin 79, said trigger bar being placed under tension by the spring 80 secured to said pin 76 and a pin 81 extending from said bar, the hook of said bar being adapted to engage the pin 77. The mechanism just described is for applying and releasing the clutch pin to and from said worm wheel, effective when power is applied to the device, and its mode of operation will be described in order.

A brake of the band variety is provided for the clutch collar, the same consisting of a pair of members each having a semicircular band portion 82 disposed in the groove 61 so as to embrace said collar and interlocked by their reversely curved ends, as at 83. Each of said members is also provided with a right angular arm 84, mounted for sliding movement on a rod 85 fixedly secured to the casing 40, one of said arms abutting against said casing, and the other arm having a spiral spring 86 disposed between it and said casing, the spring being mounted on said rod and obviously affording tension for said members.

Power is applied to the device by connecting the shaft 43 with said motor, the connection being effected by the flexible shaft 90 coupled to said motor and the shaft 43, through its notched end 44.

Assuming that the doughnut machine has been put in condition for forming raw doughnuts and suspended over a cooking receptacle by the supporting elements described, power from said motor is then applied, the same driving the shaft 43, which turns the worm 54, and the worm wheel 57 now rotatable on the shaft 2. To cause said power to be transmitted to shaft 2 of said machine, through said worm and wheel, the clutch device is now applied. This is effected by moving the handle 71 to the left and imparting motion to the shaft 70 and the cam 72 secured to said shaft, and the pin 73 projecting from said cam and bearing against the upper edge of the cam member 74 forces said cam member away from the clutch collar 60, as indicated in Fig. 3, thereby affording clearance for the lug 65 and permitting the clutch pin 64 to slip into and engage one of the openings 59 in the worm wheel 57 as said wheel rotates. By providing a pair of said openings in the worm wheel, as is done, the connection of the clutch pin with said wheel may be more quickly accomplished. Said clutch collar being rotatable with the shaft 2 and now being secured to said worm wheel, it is obvious that motion conveyed to the worm wheel by the worm 54 will be transmitted to said shaft for running said doughnut machine.

To release the clutch, the handle 71 is moved to the right. The cam 72, operating on the upper edge of the hooked trigger bar 78, forces said bar out of engagement with the pin 77 in the cam member 74, thereby causing said member, under tension as it is by the spring 76, to snap into engagement with said clutch collar, said member now occupying a position against said collar. As the worm wheel 57 rotates the lug 65 comes in contact with the face of said cam member and rides thereon, said cam member then forcing the lug along its slot 62 and serving to withdraw the clutch pin 64, connected with said lug, from its engagement with said worm wheel.

As it may be noted, when said handle is moved as last described, the release of the clutch pin is effected automatically, the instrumentalities provided acting so as to withdraw said pin from the worm wheel at a fixed definite point in the path of rotation of the clutch collar.

The brake described is designed to have a strength sufficient to overcome any momentum attained by the clutch collar and the shaft 2 during the operation of the doughnut machine, consequently when the clutch is released, said clutch collar will stop at the point where the clutch pin leaves said worm wheel.

As set forth in detail in my said Patent No. 1,738,033, a pair of cams in said doughnut machine, and their connections, serve to impart the necessary movements to a pair of upper and lower pistons for forming raw doughnuts, the lower piston during the doughnut-forming operation extending outside of the piston cylinder for the purpose particularly of cutting off said doughnuts as formed. During the cutting operation, said lower piston is exposed, and should the machine be moved about at this particular time, said piston might be subjected to injury.

The lug 65 is placed in said clutch collar in a position relative to said cams of the doughnut machine, so that when the clutch is thus released said cams will be positioned at

points whereby said lower piston will be withdrawn within the piston cylinder, permitting said machine to be moved from one cooking vat to another or otherwise handled without injury to said piston. As will be evident said lug will then occupy a predetermined position in company with the clutch pin.

While the worm 54 is normally held rotatable with the shaft 43, as heretofore referred to, and thus able to perform its functions as a part of said gearing, the parts provided and arranged as described will also permit it to turn on said shaft when occasion requires. Assuming that the action of the doughnut machine should be interrupted to the extent that the mechanism thereof became jammed, then obviously the force applied to said worm would be increased, and the elements which hold it operative as a part of said gearing in transmitting motion to the shaft 2 would be unable to resist the additional strain to which they would be thus subjected. Under such conditions, said ball bearing and spring-controlled means at one end of the shaft 43, cooperating in particular with the fiber washer 55 at the other end of said shaft, will cause said worm to slip and turn on the shaft, thereby protecting parts of the machine from injury in the emergency then existing and particularly useful until the power can be shut off. When subjected to said strain the worm has a tendency to pull itself from the friction elements located as described at the flanged portion of the shaft 43, which is a contributing factor in causing it to slip on said shaft. Said worm as arranged also serves to relieve the gearing of shock to a certain extent when the clutch is being applied, and of shock which might be incident to the coupling of the flexible shaft 90 to the shaft 43.

In addition to the advantages to be gained by the use of the special mountings for the doughnut machine and motor already enumerated, said machine is relieved of any resistance from said flexible shaft as the machine may be moved, the motor, through the movement provided for it, accommodating itself to any changes in position of said shaft.

While I have shown and described one embodiment of my invention, I may, however, provide other arrangements and constructions for carrying out the invention without departing from the spirit or scope of the same as defined by the appended claims.

I claim:

1. A device of the class described, comprising in combination a doughnut machine having a driving shaft, means for swingingly suspending said machine over a cooking receptacle, an electric motor, means for swingingly supporting said motor independently of said machine, gearing interposed between said motor and the driving shaft for transmitting motion from said motor to said shaft, driving means for connecting up said motor with said gearing, and clutch mechanism operative on said shaft and gearing.

2. A device of the class described, comprising in combination a doughnut machine having a driving shaft, a casing mounted to said machine and housing said shaft, an electric motor, speed reduction gearing mounted in said casing for transmitting motion from said motor to said shaft, a flexible driving shaft connecting said motor and said gearing, clutch mechanism operative on the first-named shaft and said gearing, a mounting for swingingly suspending the doughnut machine as thus assembled over a cooking receptacle, and a mounting for swingingly supporting said motor independently of said machine.

3. In a doughnut machine having doughnut-forming instrumentalities including a piston cylinder and a piston operable in the cylinder and exteriorly thereof, a driving shaft, and a cam member rotatable with said shaft for controlling the movement of said piston; a motor, gearing interposed between said motor and the driving shaft for transmitting motion from said motor to said shaft, driving means for connecting up said motor with said gearing, clutch mechanism operative on said shaft and gearing, and a brake, said mechanism and brake being adapted to stop said shaft at a predetermined position and whereby said cam member is made to assume a position effective in raising said piston within said cylinder.

4. In a doughnut machine having a pair of cam-actuated pistons and an outwardly projecting piston cylinder for forming raw doughnuts, and a driving shaft; a motor, a casing secured to said machine and adapted to house said shaft, speed reduction gearing for transmitting motion from said motor to said shaft, comprising a driven shaft journaled in the casing and operatively connected with said motor, a worm mounted on said driven shaft and rotatable therewith, a worm wheel mounted on said driving shaft and rotatable thereon, said wheel meshing with said worm and provided with an opening for a clutch pin, a clutch collar fixedly secured to said driving shaft, a clutch pin disposed in said collar and engageable with said opening, and means associated with said collar and pin for withdrawing said pin from said wheel at a predetermined point and whereby said pistons may be stopped in raised positions above the outer terminal of said cylinder.

5. In a doughnut machine having an upper piston and a lower piston and a piston cylinder for forming raw doughnuts, a driving shaft, and a pair of cam members rotatable with said shaft for controlling the movements of said pistons; a driven worm, a worm wheel mounted on said shaft and rotatable thereon, said wheel meshing with said worm

and having an opening, a cylindrical clutch collar fixedly secured to said shaft, a brake for said collar, a clutch pin having a laterally extending lug slidably mounted in said collar, said lug having a fixed location on said collar relative to said cam members, a tension element for said pin and lug, said pin being adapted to engage said opening on rotation of said wheel, a curved cam member releasably engageable with said collar, and means for bringing the curved cam member into engagement with said collar to permit said lug to engage said curved cam member for withdrawing said pin from said wheel on rotation thereof.

6. In a doughnut machine having a pair of doughnut-forming pistons, a driving shaft, and a pair of cam members rotatable with said shaft for controlling the movements of said pistons; a driven gear, a gear wheel rotatable on said shaft, said wheel meshing with the driven gear and having an opening, a clutch collar rotatable with said shaft, a brake for said collar, a spring-controlled clutch pin having a laterally extending lug slidably mounted in said collar, said pin being engageable with said opening, and a curved cam member under tension and engageable with said lug, said lug being adapted, on rotation of said wheel and in cooperation with said brake, to ride said cam and withdraw said pin from said wheel at a predetermined point, and whereby said pair of cam members are made effective in causing said pistons to occupy raised positions within said machine.

7. In a doughnut machine having an electric motor, mountings for said machine and motor, comprising a support, an arm swingingly secured to said support for suspending said machine over a cooking receptacle, a flexible driving shaft connecting said machine and motor, and a seat for said motor swingingly secured to said support, providing movement for said motor and shaft independently of said machine.

8. In a doughnut machine having an electric motor, mountings for said machine and motor, comprising a wall bracket, a rod mounted in said bracket, a collar adjustably secured to said rod, an arm swingingly secured to said rod and bearing on said collar, a second arm swingingly connected with the first arm and swingingly secured to said machine, and a seat for said motor, said seat hoving a right angular supporting member swingingly secured to said rod and adapted to swing independently of said arms.

WALTER BELSHAW.