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UNITED STATES PATENT OFFICE

CAM OPERATED CLUTCH FOR ELECTRIC FOOD MIXERS OR THE LIKE


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6 Claims. (Cl. 192—93)

This invention relates broadly to electric power driven tools having a motor and a flexible shaft to transmit the motor power to a tool affixed to the end of the shaft. Specifically, the invention relates to a domestic electric appliance of the mixer-beater type and to a novel tool mount and means for detachably securing said tool mount to afford a variety of supported positions thereof.

Domestic electric appliances of the mixer or beater type are generally characterized by a unitary assembly of a motor (having permanent sockets for tool attachment) and a relatively heavy stand, there usually being no provision for other than a very limited adjustment of the mixers or beaters. In those appliances wherein the motor may be removed from the stand, the weight of the motor is such as to make the same very fire-some to use.

It is a principal object of the present invention to provide apparatus of this type in which the motor may be conveniently hung or otherwise mounted remote from the location of the tool, and wherein the tool support may be held in the hand when, for example, searing large size pans or pans or stirring or beating foodstuffs while the same are cooking. Pursuant to the present invention, also, the tool mount may be detachably fixed to a support when it is desired to perform a simple mixing or beating operation or to utilize the apparatus with a grinding wheel attachment for sharpening cutlery, a buffing wheel for polishing silver, or the like.

It is an object of the invention to provide a domestic electric appliance which affords a greater field of usefulness than the conventional devices.

It is a further object to provide a tool mount for an electric appliance which incorporates an improved clutch means whereby control over the operation of the tool may be had not only by the motor switch but also at the tool mount itself.

A still further object is that of furnishing a tool mount for a power driven tool, said mount incorporating a clutch which is easily operable by finger pressure and which will not stall in a dead center position either during clutching or declutching.

Another object of the invention is to provide a tool mount which may serve optionally as a convenient handle or as a means whereby the mount may be rigidly but detachably affixed to a standard or support.

Still another object is that of designing an improved support for detachably securing the handle portion of a tool mount of a power driven tool.

With these and other objects in mind reference is had to the attached sheets of drawings illustrating a practical embodiment of the invention and in which:

Fig. 1 is a sectional elevation of the tool mount and clutch, showing the clutch member in disengaged position;

Fig. 2 is a plan section, looking in the direction of the arrows 2—2 of Fig. 1;

Fig. 3 is a transverse sectional elevation taken along lines 3—3 and in the direction of the arrows as indicated in Fig. 1; and

Fig. 4 is a detail of the clutch lever actuator taken at an intermediate stage of clutch operation.

The tool handle and clutch member 40 has a circular opening at one end to receive a mounting member and has a catch or equivalent 41 for cooperation with indentations, whereupon the handle may be rotated to any one of four positions with respect to a supporting member.

As appears in Fig. 2 the tool handle includes a substantially cylindrical clutch barrel portion 42 extending from which is the handle proper 43. The said handle is hollow to form a housing for the clutch actuator members and an open side of the handle may a removable cover plate 44 suitably secured to permit access to the interior.

The clutch is illustrative of the jaw type and as such has a lower jaw member 45 suitably mounted on anti-friction bearings 46 and having a chuck or socket 47 to which the shaft of a tool may be attached. Any conventional means may be employed for removingly hold the tool shaft within the socket 47.

The drive shaft 51 is socketed to receive a sheathed, flexible driving shaft, from a motor. A threaded cap 53 accommodates a clamping nut or the like by means of which the end of the drive shaft may be secured.

The movable clutch member has a jaw 55 for cooperation with the jaw 45, and extending concentrically with respect to said jaw 55 is a sleeve 56 which is slideably on the end of the shaft 51. Suitably secured to said sleeve is an abutment plate 57 between which and a plate 58 there is confined the coil spring 59. Suitable anti-friction bearings 61 are provided. The lower end of the shaft 51 has diametrically opposite keyways 62 within which slidably fit the pin ends of screws 63, which extend through the jaw member 55. Freely rotatable on the sleeve 58 and held between the jaw 55 and the plate 57 is a clutch collar 64 having
diametrically opposed pins 65 for engagement by the forked end 66 of the clutch lever 67. It will be apparent that the clutch jaw 65 and plates 57, 58 will continually rotate with the driving shaft 51; the clutch collar, of course, being held stationary by the clutch wrench. The clutch lever 67 is pivoted on the stud 68. Said clutch lever is rotated by the engagement of a shoulder 70 thereof with a four position cam 71 in which the opposed high faces and the opposed low faces, are respectively equal. Said cam is carried upon and keyed to a shaft 72 fixed to which is a disc-like cam actuator 73. The shaft 72 is mounted for rotation in suitable bearings provided in the respective side walls of the handle, there being a suitable spacing collar 73' if desired. Pivoted vertically within the handle and biased in direction counterclockwise of Fig. 1 by the coil spring 74 is the actuating lever 75 in the finger piece 76 of which extends through a suitable opening in the handle. Associated with the finger piece 75, as being disposed within a suitable socket formed therein, is a pivoted driver 77 the actuating end of which has the two legs 78, 80. The intersection of said legs are arcuate so that the legs straddle the respective drive and indexing pins 81. There are four of such pins, equiangularly spaced about and projecting from the actuator 80, as indicated in Fig. 1. With a pin in position between legs 78, 80, either a high or a low face of the cam will be in proper position with respect to the clutch lever to establish a desired operating position thereof. It will be noted that with the actuator 73 in any of these four operating positions the driver 77 is held in such position with respect to a pin 81 by the action of a coil spring 82 that the leg 80 is substantially vertical and the outboard surface of leg 78 is slightly sloping.

A spring pressed detent has a nose 83 which engages the quadrantly spaced notches in the actuator 73, said notches being relatively equidistant between two adjacent pins 81. It is apparent from Fig. 1 that the detent prevents a clockwise rotation of the actuator.

Finger pressure on the member 75 will cause the leg 78 of driver 77 to cam against the associated pin 81 and to rotate the actuator 73 counterclockwise of Fig. 1, whereupon the clutch lever will drop to the low face of cam 71. The spring 80 will of course be effective to drive the lever into such position, wherein the respective jaw members of the clutch engage and the tool shaft socket 47 will be driven from the shaft 51. A succeeding quarter rotation of actuator 73 will cause the next succeeding high face of the cam to lift with shoulder 70 for disengagement of the clutch.

Positive detent means are provided to hold the actuator 73 in its respective positions of rotation. Mounted pivotally on the shaft 68, for independent movement with respect to the lever 67, is an indexing lever 85 so arranged as to overlie the respective drive pins 81 of actuator 73. A spring loaded clock 86 urges the lever 85 clockwise of Fig. 1 into engagement with a pair of drive pins. During the partial stage of rotation of the actuator, as indicated in Fig. 4, the movement of a drive pin will rotate the lever 85 clockwise against the torsion of its spring. At the highest position of movement of the actuator, the lever will occur after approximately one-eighth rotation of the actuator the transition point between the high and low faces of cam will be slightly past dead center; a slight additional rotation of the actuator will bring the drive pin 81 then in engagement with the indexing lever 85 beyond dead center position. The combined action of the spring 86 and the clutch spring 60 will be sufficient to complete the rotation of actuator 73 whereupon the clutch lever will snap smartly into clutch engaging position. In such position the surface of the lever 85 is in contact with a pair of drive pins 81 thereby indexing the position of the clutch lever 87 and restraining any actuator movement in either clockwise or counterclockwise direction.

Pursuant to the clutch operating mechanism above described, the possibility of clutch stalling on dead center is minimized inasmuch as there is a very sharp line of demarcation between the initial and final stages of throw of the cam 71. If pressure on the finger piece 76 were released before the full travel required to complete clutch actuation, the cam actuator 73 will reverse its direction of rotation insomuch as the indexing lever 85 constantly exerts a counterclockwise rotation of the actuator 73 until a precise dead center point of a pin 81 is reached relative thereto, and at this dead center position, the edge of the cam 71 has gone beyond dead center with respect to the shoulder 70, as appears in Fig. 4. If neither the indexing lever 85 nor the cam 71 has gone beyond dead center, the spring 86 will return the actuator 73 to original position, such return being provided by the spring 80 and the indexing movement of the drive 77 and the relative angularity of the legs 78, 80 thereof. It is difficult if not impossible, therefore, to accidentally clutch or declutch the mechanism by only a partial operation of the driver 77, and stalling on dead center is practically eliminated.

Although the invention has been described by making a fully detailed reference to the certain presently preferred embodiments, such detail of description is to be understood in an instructive rather than a limiting sense, many changes being possible within the scope of the claims hereto appended.

We claim:

1. A tool mount for a power driven tool, comprising a hollow body having a handle portion and a clutch housing; a jaw member having a movable jaw spring-pressed into engagement with a cooperating jaw; a clutch-shift lever pivotted within the handle portion and engageable with said movable jaw; a rotatable cam mounted within said handle in engagement with said lever, said cam having diametrically opposed high and low portions; a disc fixed on the cam shaft for rotation therewith; equiangularly spaced pins projecting from a face of said disc; a driver engageable with each of said pins in turn to rotate said disc and said cam shaft; and a lever disposed within said handle and operatively associated with said driver to effect rotation of said cam shaft upon actuation of said lever, whereby the clutch shift lever assumes a position dependent upon the engagement of the high or the low portion of the cam therewith; and a finger piece operable externally of said handle to rotate the lever associated with said driver.

2. A tool mount for a power driven tool, comprising a hollow body having a handle portion and a clutch housing; a clutch in said housing, said clutch having a pair of disc-like members respectively on driving and driven shafts and movable axially relative to each other; spring means urging said clutch members into power transmitting engagement; a lever pivotally secured within said handle portion and secured
to one of said clutch elements to move the same out of engagement with the other element; a cam shaft extending transversely across said body adjacent said lever, said shaft having fixed for rotation therein a cam having two equal high portions at diametrically opposite locations and two equal low portions at diametrically opposite locations, the said high and low portions following each other at ninety degree intervals, said respective cam positions having sharp lines of demarcation therebetween; a cam follower on said lever riding on said cam, whereby when a high portion of said cam engages with said follower said lever raises to declutching position and when a low portion of said cam engages said follower the lever drops to clutching position; an actuator disc secured to said cam shaft for rotation therewith; pins extending axially from said disc on a circle concentric with said shaft and of larger radius than the maximum radius of said cam, said pins being spaced at ninety degree intervals thereabout; and a spring pressed indexing lever pivoted within said body and riding upon said pins, said indexing lever being so positioned that at each ninety degree rotation of said cam said lever is in contact with a pair of pins, the demarcation point between high and low cam positions being such that when the cam is on dead center between a high and low face, a pin is not at dead center with respect to said indexing lever.

3. A tool mount according to claim 2, in which said handle has a reciprocable, pivoted drive means engageable with said pins successively to rotate said actuator disc and lever means operable externally of said handle to reciprocate said drive means to urge said disc into rotation through an angle of ninety degrees to rotate said cam accordingly.

4. A clutch, including a clutch barrel within which is a fixed member and a member movable into or out of clutching relationship therewith; a handle extending from said barrel; a lever engaging with said movable clutch member to throw the same to one of its two operating positions, said lever being pivotally mounted within said handle; a cam shaft rotatably mounted within said handle and extending transversely of said lever; a cam fixed for rotation on said shaft and engageable with said clutch lever to rotate the same, said cam having a high face to throw the lever to declutching position and a low face at which the lever is in clutching position; a cam actuator keying said cam shaft and comprising a circular disc; a plurality of pins extending from a face of said actuator and being equi-radial with respect to the cam shaft and quadrantly on the circle of rotation thereof; an actuating lever pivotally secured within said handle and having drive means engageable with each said pin in turn to rotate the cam actuator through a ninety degree arc to bring said high or said low cam face into operative position against said clutch lever; a cam actuator index lever pivotally mounted within said handle and overlying said pins, said index lever engaging two of said pins in either cam position to secure said actuator against accidental rotation; and spring means strongly biasing said index lever in the direction of said pins.

5. A clutch, including a fixed member and a member movable into or out of clutch relationship therewith; a pivotally secured lever engageable with said movable clutch member to throw the same to one of its two operating positions; a cam rotatably mounted for engagement with said lever, said cam having a high face and a low face whereupon said lever may be rotated respectively into clutch engaging or clutch disengaging position; a disc-like cam actuator keyed to the cam shaft, said actuator having a plurality of equidistantly spaced drive and indexing pins extending axially from a face thereof; driver means engageable with each said pin to rotate said actuator sufficiently to move said cam from high-face to low-face position; handle means for operating said driver means; an indexing lever pivotally mounted for engagement with a pair of said pins to secure said actuator against further rotation when said cam is in either of its desired operating positions; and spring means biasing said indexing lever strongly in the direction of said pins.

6. In combination with a clutch having a fixed and a movable jaw member, a lever engaging said movable member, pivot means for pivotally mounting said lever, a rotatable cam having a high and a low operating face for engagement with said lever to rotate the same about its pivot, a clutch actuator mounted for rotation with said cam, a plurality of indexing pins secured to said actuator and extending from a side wall thereof, a spring-pressed index lever engageable with an adjacent pair of said indexing pins with the cam member in either high or low face position, and means for engaging said indexing pins successively to rotate the cam actuator over a predetermined arc of rotation.

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