Feb. 6, 1962 F. KNOBLOCH 3,019,749

ADJUSTABLE MATERIAL-FEEDER DRIVE FOR SEWING MACHINES

Filed April 6, 1960 5 Sheets-Sheet 1

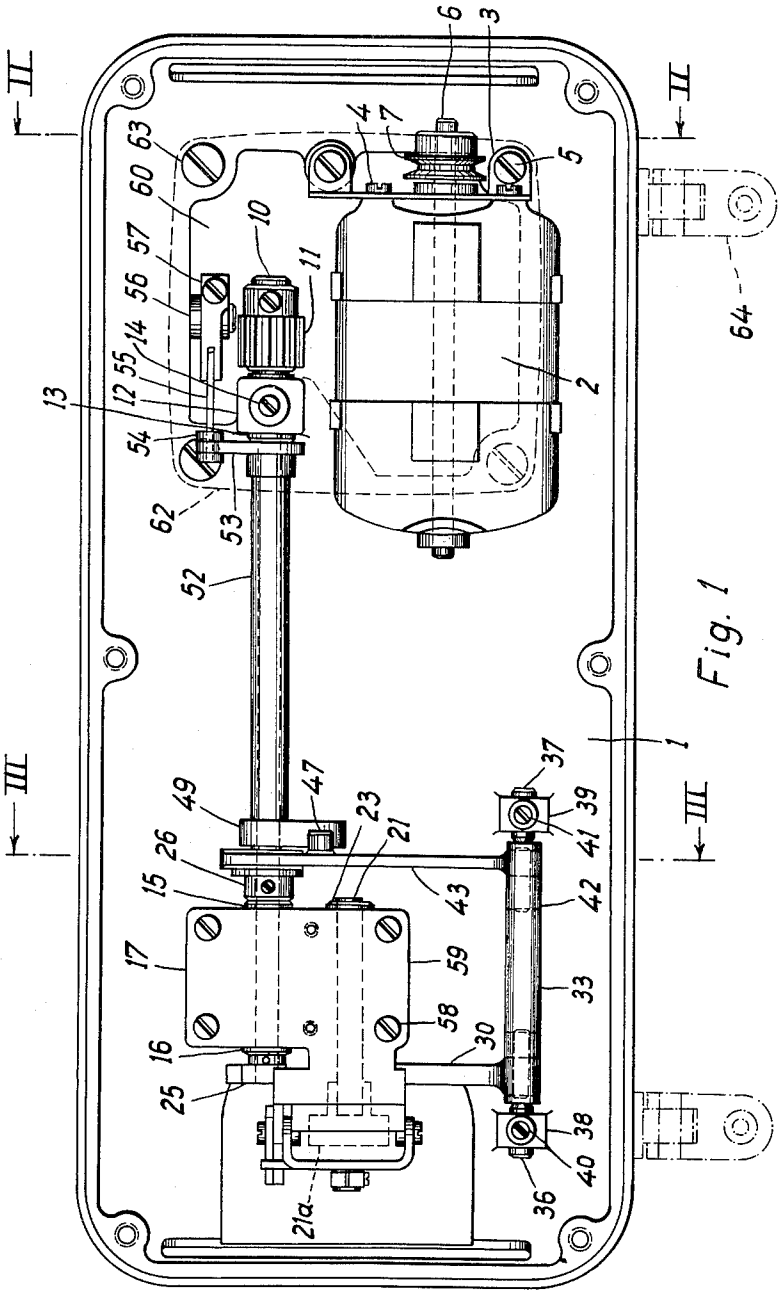


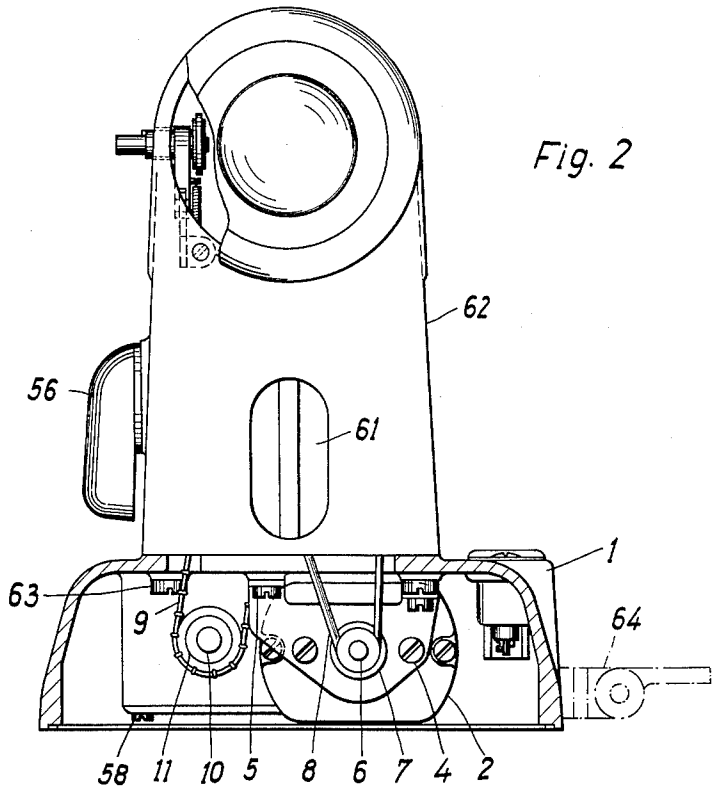
Fig. 1

Feb. 6, 1962 F. KNOBLOCH 3,019,749

ADJUSTABLE MATERIAL-FEEDER DRIVE FOR SEWING MACHINES

Filed April 6, 1960 5 Sheets-Sheet 2

Fig. 2



Feb. 6, 1962 F. KNOBLOCH 3,019,749

ADJUSTABLE MATERIAL-FEEDER DRIVE FOR SEWING MACHINES

Filed April 6, 1960 5 Sheets-Sheet 3

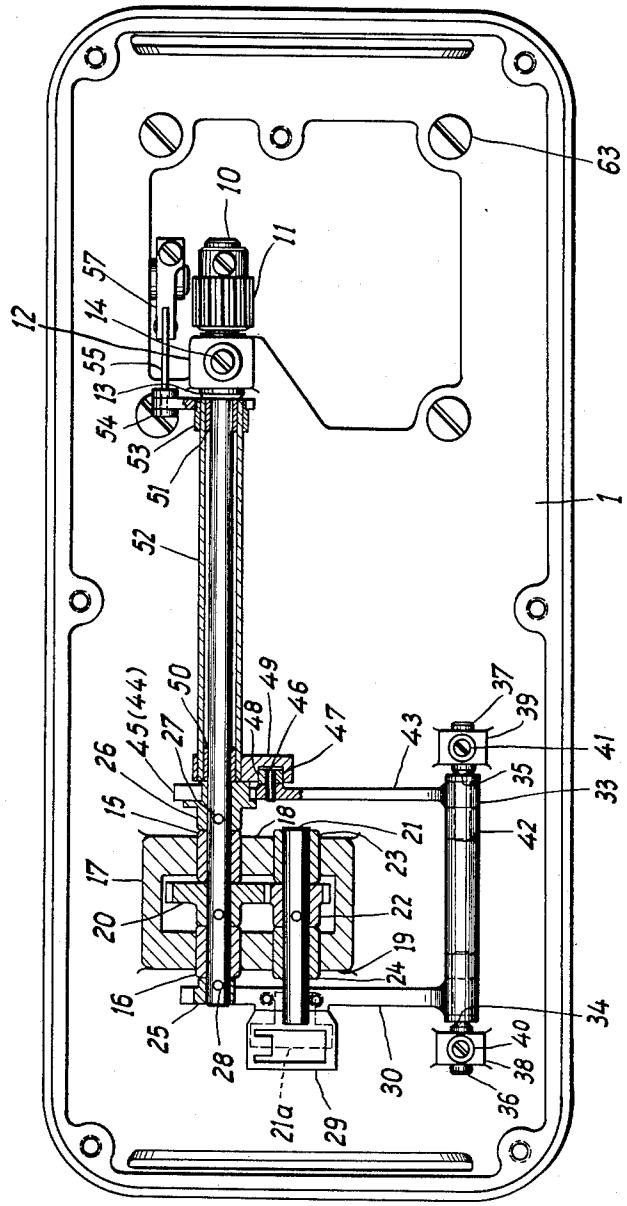


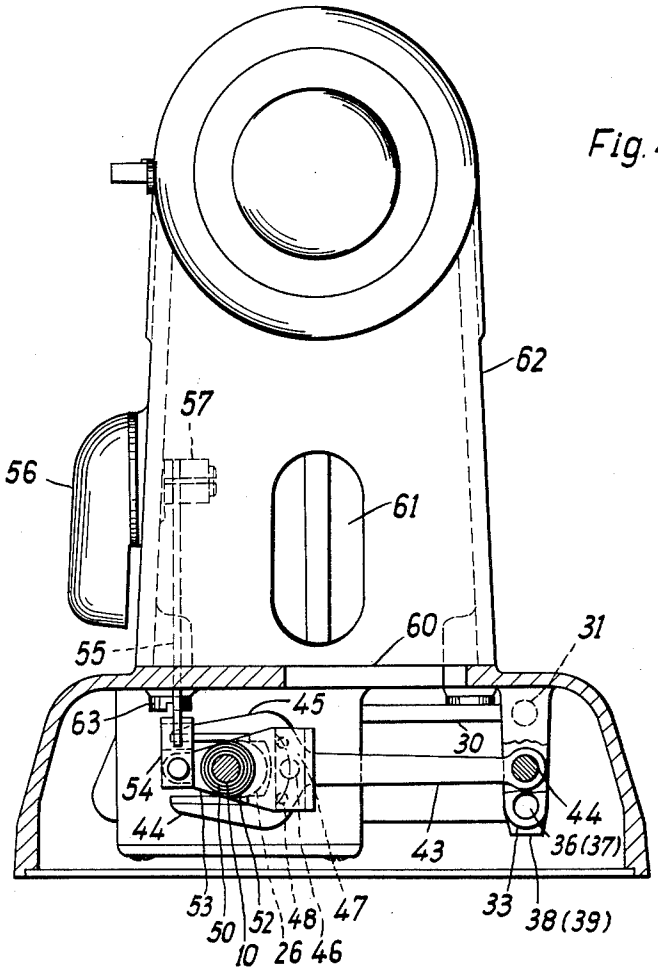
Fig. 3

Feb. 6, 1962 F. KNOBLOCH 3,019,749

ADJUSTABLE MATERIAL-FEEDER DRIVE FOR SEWING MACHINES

Filed April 6, 1960 5 Sheets-Sheet 4

Fig. 4

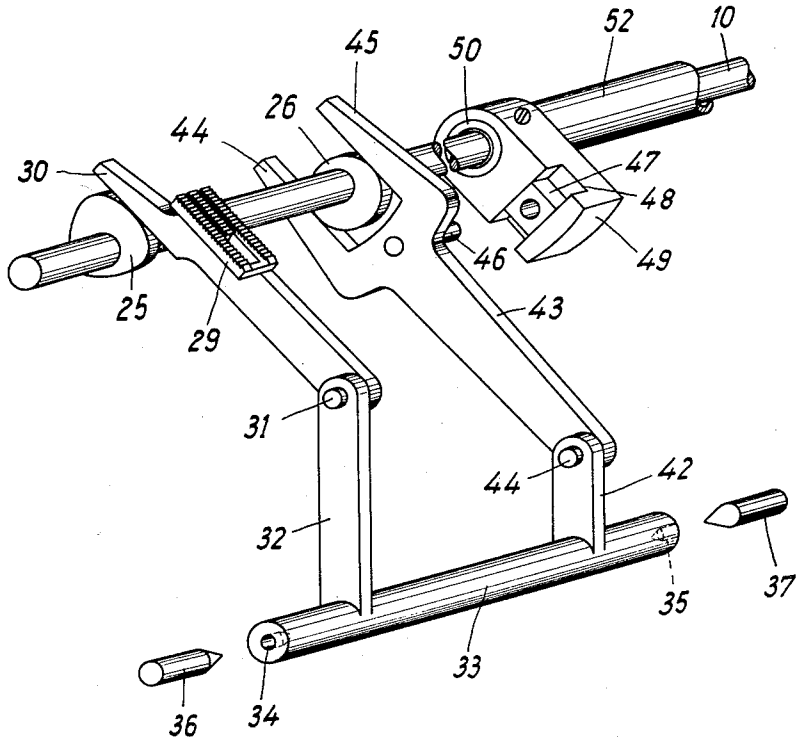


Feb. 6, 1962 F. KNOBLOCH 3,019,749

ADJUSTABLE MATERIAL-FEEDER DRIVE FOR SEWING MACHINES

Filed April 6, 1960 5 Sheets-Sheet 5

Fig. 5



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ADJUSTABLE MATERIAL-FEEDER DRIVE FOR SEWING MACHINES

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8 Claims. (Cl. 112—210)

My invention relates to sewing machines and more particularly to a control device for the material-feeder drive of such a machine.

As a rule, the driving mechanism for operating the serrated feeder or gripper member of a sewing machine is mounted beneath the machine base whose top forms a supporting surface for the material to be sewn. In one known type of machine the gripper of the feeder device is operated by means of a rotating, adjustable eccentric whose drive shaft has a longitudinal slot in which a control bar is displaceable parallel to the shaft axis. The control bar is provided with wedge-shaped projections and permits displacement of the eccentric for varying and locking the effective eccentricity. The displacement of the control bar is effected by means of a sleeve which can be shifted manually by means of a setting device fastened on the base plate of the sewing machine.

In another known type of sewing machine, the feeder drive shaft beneath the top of the machine base carries two triangular cams of which one produces the constant lifting amplitude of the gripper and the other the horizontal feeding motion of the gripper. An angular lever, pivoted for rotation about a pin converts the motion of one of the cams into a vertical component of gripper motion and the pivot pin is mounted on a slider that can be displaced from the outside so that the pivot point of the lever can be raised or lowered. The guide-way for the slider in this machine is mounted on a separate control shaft which can be adjusted by hand.

The known material-feeder drives comprise adjusting devices whose driving members are mounted in the interior of the machine base and require a careful machining of the machine-base structure for properly journalling these driving members. This requires a considerable amount of machining work to be done with high-precision machine tools such as drilling machines, milling machines and the like.

It is an object of my invention to provide a simple yet reliable feeder drive mechanism for sewing machines which can be manufactured at reduced cost, and which eliminates the disadvantage resulting from the above-mentioned spacial arrangement and the resulting additional space requirements of the adjustable feeder control means heretofore available.

To this end, and in accordance with a feature of my invention, the guide-way member to be displaced for controlling the operation of the material-feeding gripper member in the base of the sewing machine is rotatably seated on the gripper drive shaft itself.

As a result, the mounting and journalling places in the base plate of the sewing machine which heretofore had to be produced by careful machining are fully eliminated. Furthermore, the amount of material required for the controllable feeder mechanism is appreciably reduced, and the exact mounting of the individual components can readily be checked prior to mounting the gripper drive shaft into the machine base structure. In consequence, the assembling work for the entire gripper drive including the feed control devices is considerably simplified.

The foregoing and more specific objects, advantages and features of my invention, said features being set forth with particularity in the claims annexed hereto, will be apparent from the embodiment of a sewing machine according to the invention illustrated by way of example on the accompanying drawings in which:

FIG. 1 is a bottom view of the machine base and the feeder drive mounted therein.

FIG. 2 is a side view of the machine, partly in section, the cross section being taken along the line II—II in FIG. 1.

FIG. 3 is a bottom view of the machine base, similar to FIG. 1 but with some components removed and others shown in cross section.

FIG. 4 is a side view of the machine, similar to FIG. 2 but showing a different portion in cross section, the section being taken along the line III—III in FIG. 1.

FIG. 5 is a perspective illustration of a number of cooperating components of the feeder drive mechanism.

The drive motor 2 of the sewing machine is mounted in the interior of the machine base 1 (FIG. 1) by means of a supporting block 3 and screw bolts 4, 5. Fastened on the shaft 6 of the drive motor 2 is a V-belt sheave 7 which drives the am shaft (not illustrated) of the machine by means of an endless V-belt 8 (FIG. 2). The arm shaft, which actuates the needle bar of the machine, drives another endless belt 9 which is provided with entrainer teeth and is entrained about a sprocket sheave 11 fastened on a feeder drive shaft 10. The gripper drive shaft 10 (FIG. 3) is journalled in a bearing 12 formed by the machine base 1 by means of a bushing 13 which is fixed in the bearing block 12 by means of a set screw 14. The shaft 10 is further journalled in bushings 15 and 16 fastened in respective walls 18 and 19 (FIG. 3) which form part of a gear housing 17, these walls being integral with the structure of the machine base 1. A spur gear 20 fastened on the feeder drive shaft 10 in the gear housing 17 meshes with a spur gear 22 fastened on gripper shaft 21. Shaft 21 is journalled in bushings 23, 24 which are fastened in the respective walls 18 and 19. Further mounted on the feeder drive shaft 10 are two cam discs 25 and 26 (FIGS. 3, 5), fastened to the shaft by means of cross pins 27 and 28 respectively. The cam disc 25 is shaped as a triangular eccentric and acts upon a lever 30 which carries the serrated material-feeding gripper member 29. The lever 30 is linked by a pivot pin 31 (FIGS. 4, 5) with an arm 32 of a swing member 33. The swing member 33 has coaxial bores 34, 35 engaged by pointed bearing pins 36 and 37 respectively which are adjustably fastened in respective eyes 38 and 39 of the machine base 1 with the aid of set screws 40 and 41 respectively.

The swing member 33 has another arm 42 which is articulatedly linked with the cam follower 43 at 44. The follower 43 which straddles the above-mentioned control cam 26 with the two fork arms 44 and 45 carries a pivot pin on which a slider block 47 is rotatable. The slider block 47 is displaceable in a straight guide-way formed by a groove 48 in a guide member 49. Guide member 49 is fastened to a tubular shaft 52 which is coaxially journalled at one end on the feeder drive shaft 10 by means of bushings 50 and 51 (FIG. 3). Attached to the other end of the tubular shaft 52 is a control arm 53 (FIGS. 1, 3, 4) which is in connection through two links 54 and 55 with an arm 57 firmly secured to the shaft of a control knob 56 accessible from the outside of the sewing machine housing. The knob 56 permits a selective adjustment of the feed by hand. If desired, the adjustment may also be effected automatically by means of a feed control cam as conventionally used in automatic zigzag sewing machines.

The gear housing 17 (FIG. 1) is covered by a lid 59 fastened by means of screws 58. The top portion of the machine base 1, on the right side thereof relative to FIG. 1, has an opening 60 (FIGS. 1, 4) through which

the two belts 8, 9 and the link 55 pass into the interior 61 of the upright standard 62 that forms part of the machine housing. The standard 62 is firmly joined with the machine base 61 by bolts 63 but, if desired, may be produced together with the base as a single integral piece.

If the base 1 is to be used for insertion into a cabinet or other furniture, it can be additionally provided with hinges 64 (FIG. 2) that can be fastened to the furniture by screws.

The operation of the above-described feed control devices is as follows:

When the knob 56 (FIGS. 1, 4) is turned to a different position, the arm 57, acting through the links 55, 54 upon the arm 53 of the tubular shaft 52, turns the shaft 52 and the guide member 49 about the axis of the feeder drive shaft 10. This angular displacement which, relative to FIG. 4 may be downwardly or upwardly, results in a corresponding displacement of the straight guiding groove 48 about the axis of shaft 10 so that the guiding groove is placed at a given selected angle relative to the longitudinal direction of the cam follower 43 (FIG. 5). As a result, the slider block 47, during rotation of the control cam 26, must perform not only a vertical upward and downward motion but must simultaneously perform an additional motion in the horizontal direction due to the slanting position of the guiding groove 48. The horizontal motion of slider block 47, acting through pin 46, causes the follower 43 to turn the swing member 33. The arm 32 of the swing member, being connected with the second cam follower 30 that carries the feeder member 29, thus controls and changes the active leverage of the follower 30, this leverage being determined by the distance of the pivot point 31 from the point of engagement between follower 30 and cam 25.

Depending upon the active length of the just-mentioned leverage, differently directed feeder movements of different magnitudes are imparted to the feeder member 29 in accordance with the design of the lifter cam 25 and control cam 26.

It will be obvious to those skilled in the art, upon a study of this disclosure, that my invention permits of various modifications with respect to details not critical to the invention proper and hence can be given embodiments other than particularly illustrated and described herein, without departing from the essential features of the invention as set forth in the claims annexed hereto.

I claim:

1. In a sewing machine having a base with a top for supporting the material to be sewed and provided with an opening in said top; a material feeder mechanism mounted in said base beneath said top and comprising a material-engaging gripper member movable in said opening, said feeder mechanism having a drive shaft, a control cam fixedly mounted on said shaft, a follower engaging said cam for transmitting during revolution of said cam constant periodic deflections, said follower being linked to said gripper member for imparting reciprocating feeding motion thereto, a slider connected with said follower, a normally stationary guide member having a guide-way in which said slider is displaceable, said guide member being rotatably mounted on said drive shaft, and adjusting means connected with said guide member for varying the setting of said guide member about the axis of said drive shaft to thereby modify the material-feeding motion of said gripper member.

2. In a sewing machine having a base with a top for supporting the material to be sewed and provided with an opening in said top; a material feeder mechanism mounted in said base beneath said top and comprising a material-engaging gripper member movable in said opening, said feeder mechanism having a drive shaft, a control cam fixedly mounted on said shaft, a follower engaging said cam for transmitting during revolution of said cam constant periodic deflections, said follower being linked to said gripper member for imparting reciprocating feeding motion thereto, said follower forming a pivot whose axis is parallel to that of said drive shaft, a slider rotatable on said pivot, a normally stationary guide member having a guide-way rotatably seated on said drive shaft axially adjacent to said control cam and engaged by said slider so that said slider is movable along said guide-way, said guide-way extending substantially in a tangential direction relative to said drive shaft, and adjusting means connected with said guide member for varying its setting about the axis of said drive shaft to thereby modify the material-feeding motion of said gripper.

3. In a sewing machine according to claim 1, said cam follower comprising an approximately horizontally extending arm having a forked end slidably straddling said control cam, and transmission means linking said arm with said gripper member for imparting thereto a horizontal feed motion due to rotation of said control cam.

4. In a sewing machine having a base with a top for supporting the material to be sewed and provided with an opening in said top; a material feeder mechanism mounted in said base beneath said top and comprising a material-engaging gripper member movable in said opening, said feeder mechanism having a drive shaft, a first control cam fixedly mounted on said drive shaft, a follower engaging said first cam for transmitting during revolution of said first cam periodic deflections at a constant frequency corresponding to the rotational frequency of a given point on said first cam, said follower being linked to said gripper member so as to impart vertical lifting oscillations thereto, a second control cam on said drive shaft, a second follower engaging said second cam and linked to said gripper member so as to impart horizontal oscillations thereto, a slider connected with said second follower, a normally stationary guide member having a guide-way in which said slider is displaceable, said guide member being rotatably mounted on said drive shaft, and adjusting means connected with said guide member for varying the setting of said guide member about the axis of said drive shaft to thereby modify the material-feeding motion of said gripper member.

5. In a sewing machine having a base with a top for supporting the material to be sewed and provided with an opening in said top; a material feeder mechanism mounted in said base beneath said top and comprising a material-engaging gripper member movable in said opening, said feeder mechanism having a drive shaft, a first control cam fixedly mounted on said drive shaft, a follower engaging said first cam for transmitting during revolution of said first cam periodic deflections at a constant frequency corresponding to the rotational frequency of a given point on said first cam, said follower being linked to said gripper member so as to impart vertical lifting oscillations thereto, a tubular shaft coaxially journalled relative to said drive shaft, a second control cam fixedly mounted on said drive shaft, a second follower engaging said second cam and linked to said gripper member so as to impart horizontal oscillations thereto, a slider pivotally connected with said second follower, a normally stationary guide member having a guide-way in which said slider is displaceable, said guide member being fixedly mounted on said tubular shaft for rotation relative to said drive shaft, and adjusting means connected with said guide member for varying the setting of said guide member about the axis of said drive shaft to thereby modify the material-feeding motion of said gripper member, said adjusting means comprising a manually adjustable member and linking means operatively connecting said adjustable member with said guide member for rotating the position of said guide member about said drive shaft to thereby vary the amplitude of said horizontal oscillations imparted to said gripper member.

6. In a sewing machine having a base with a top for supporting the material to be sewed and provided with an opening in said top; a material feeder mechanism mounted in said base beneath said top and comprising a material-

engaging gripper member movable in said opening, said feeder mechanism having a drive shaft, a first control cam fixedly mounted on said drive shaft, a first follower engaging said first cam for transmitting during revolution of said first cam periodic deflections at a constant frequency corresponding to the rotational frequency of a given point on said first cam, said follower being fastened to said gripper member so as to impart constant vertical lifting oscillations thereto, a second control cam on said drive shaft, a second follower engaging said second cam and linked to said gripper member so as to impart horizontal oscillations thereto, a slider pivotally connected with said second follower, a normally stationary guide member having a guide-way in which said slider is displaceable, said guide member being rotatably mounted on said drive shaft, and adjusting means connected with said guide member for varying the setting of said guide member about the axis of said drive shaft to thereby modify the material-feeding motion of said gripper member, a swing member having two axially spaced arms fixedly attached thereto, said swing member being journalled on said base for rotation about the longitudinal axis of said swing member, and said two arms being pivotally linked with said first and second cam followers, respectively.

7. A device according to claim 6, said swing member being axially displaceable in said sewing machine base, and fastening means for fixing said swing member in a selected axial position.

8. In a sewing machine having a supporting plate for the material being sewed, a material feeder mechanism comprising a material-engaging gripper member mounted so as to be capable of lifting and shoving motions, a drive shaft having lifting control means and pushing control means fixedly mounted on said shaft for imparting said respective motions to said gripper, a fork member engageable with said pusher control means for transmitting pushing motion to said gripper, a guide member having a slider block for modifying said shoving motions and arranged beneath said supporting plate in direct operative connection with said drive shaft, said block being constrainedly slidable within said guide member, said guide member being coaxially mounted on and rotatable about said gripper drive shaft on one side of and axially spaced along the axis of said shaft from said pushing control means, and a pivot pin operatively linking said slider block with said fork member, whereby rotation of said guide member about said drive shaft results in a corresponding adjustment in the amplitude of said shoving motions.

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