United States Patent

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[33] **Great Britain**
[31] **37992/67**

[54] **VALUE-SETTING MEANS FOR PRINTING WHEELS IN POSTAL FRANKING MACHINES**
2 Claims, 12 Drawing Figs.

[52] U.S. Cl. **101/91,** 101/110
[51] **Int. Cl.** **B41j 1/22,** B41j 1/34
[50] **Field of Search** 101/91, 92, 93, 110, 99; 235/101

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Primary Examiner—William B. Penn
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ABSTRACT: A franking machine having a printing head in which the values to be printed are manually selected by the rotation of value-selecting wheels, one for each printing wheel, by way of a tooth-engaging pinion integral with each value-selecting wheel and in which each toothed wheel is provided with an axial bore with gear teeth therein, which are engaged by a pinion integral with a coarse helical screw having a cooperating nut thereon. Each printing wheel is provided with a pinion which engages a toothed rack joined to each nut by a bar passing through the bore in the toothed wheel. The axes of rotation of the value-selecting wheels, the toothed wheels and the coarse helical screws are all parallel to the axis of rotation of the printing head, while the axes of rotation of the printing wheels is transversal of the axis of rotation of the printing head.

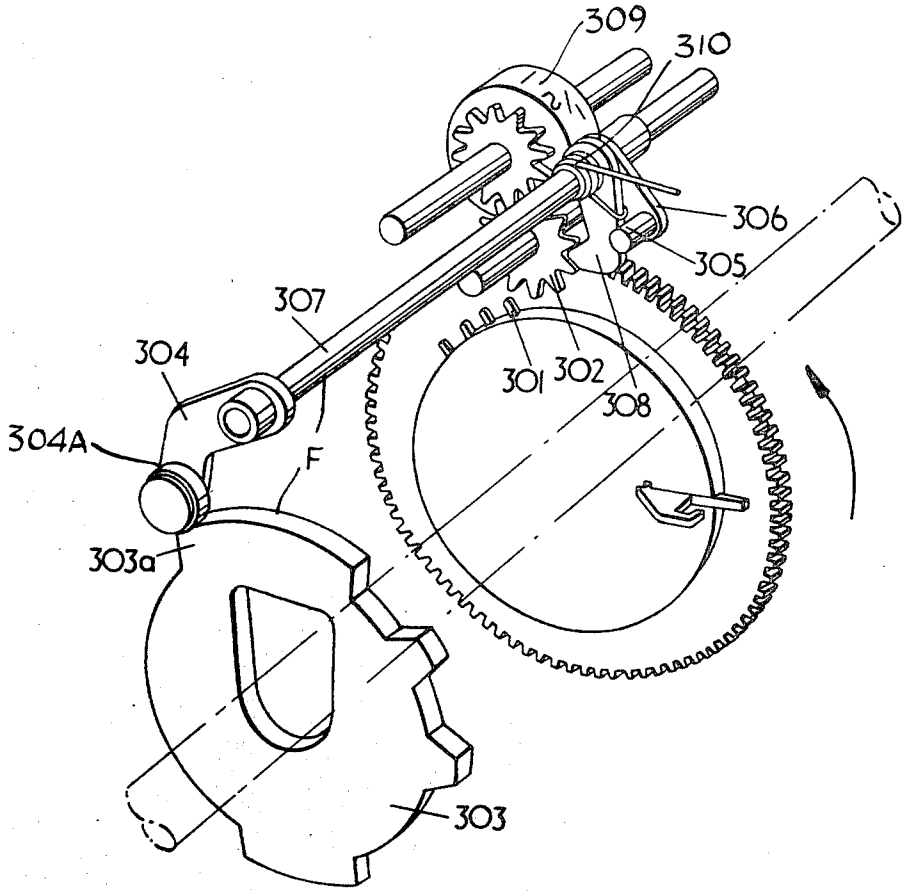
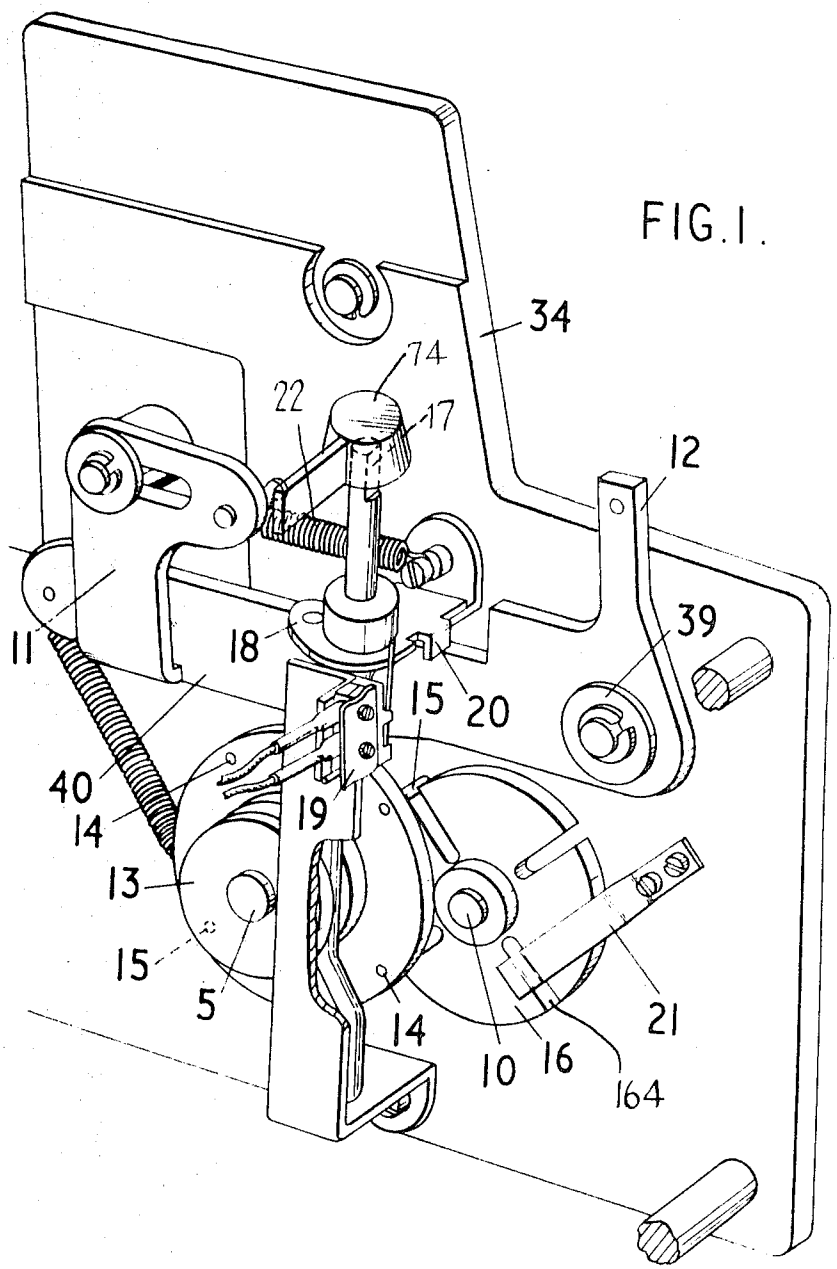


FIG. 1.



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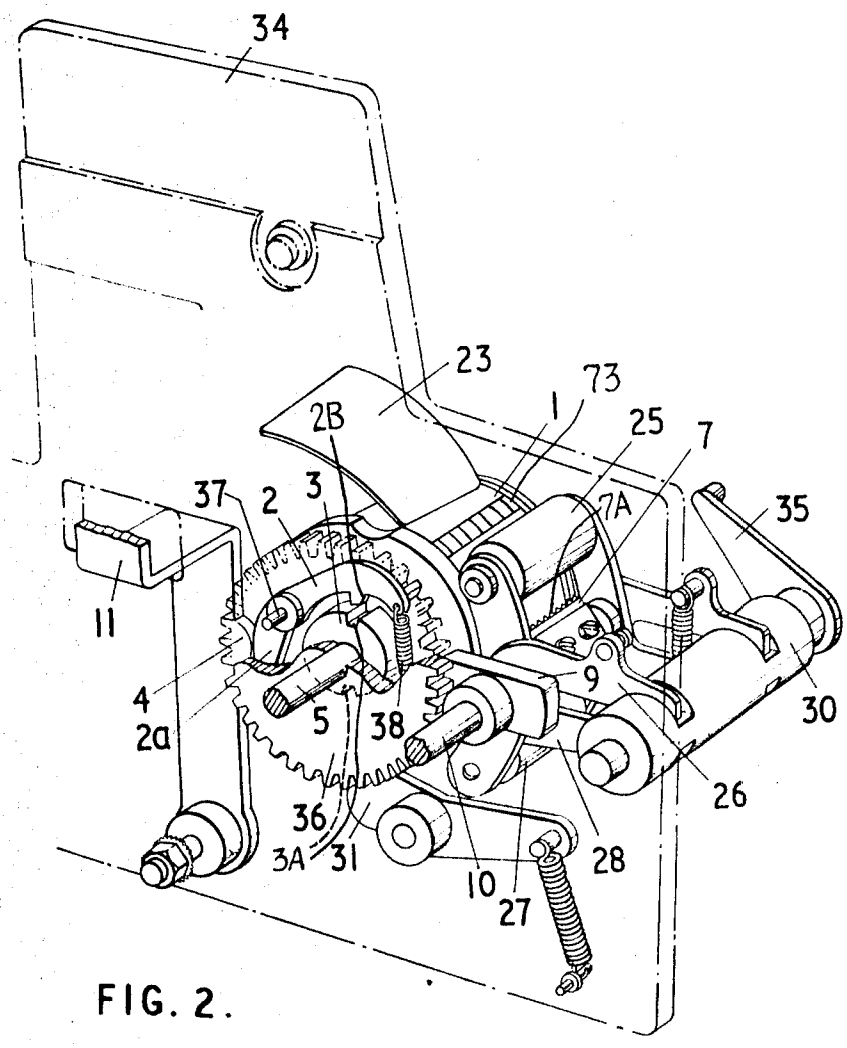

FIG. 2.

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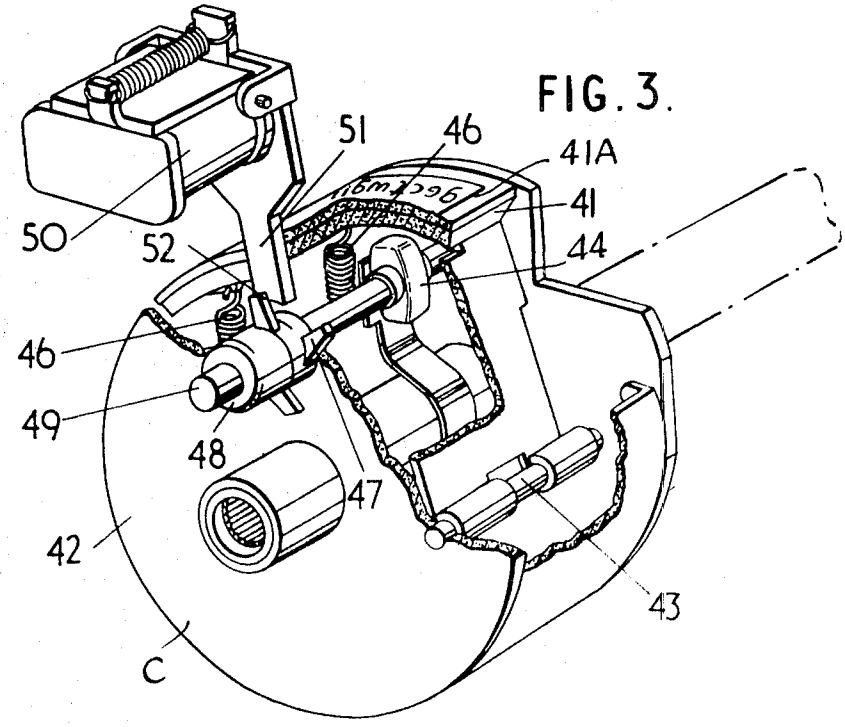

FIG. 3.

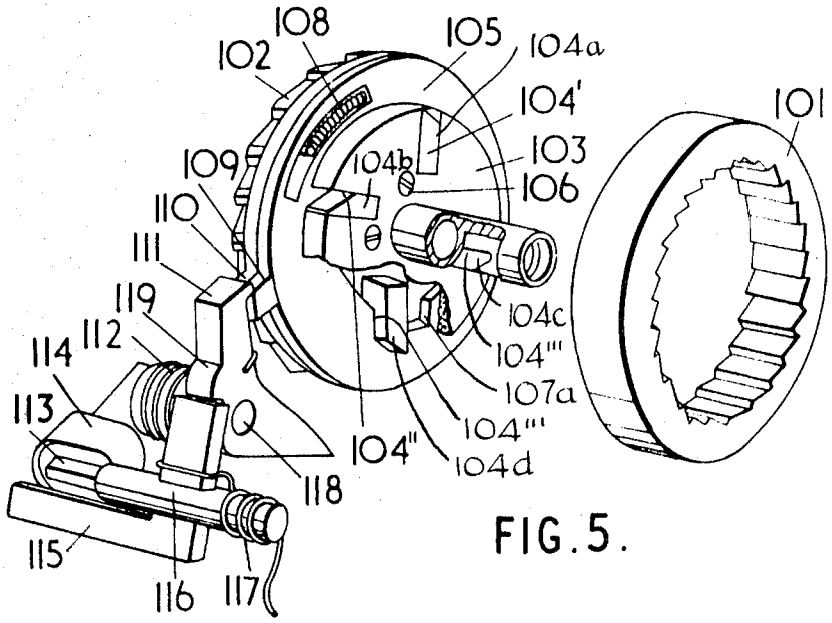

FIG. 5.

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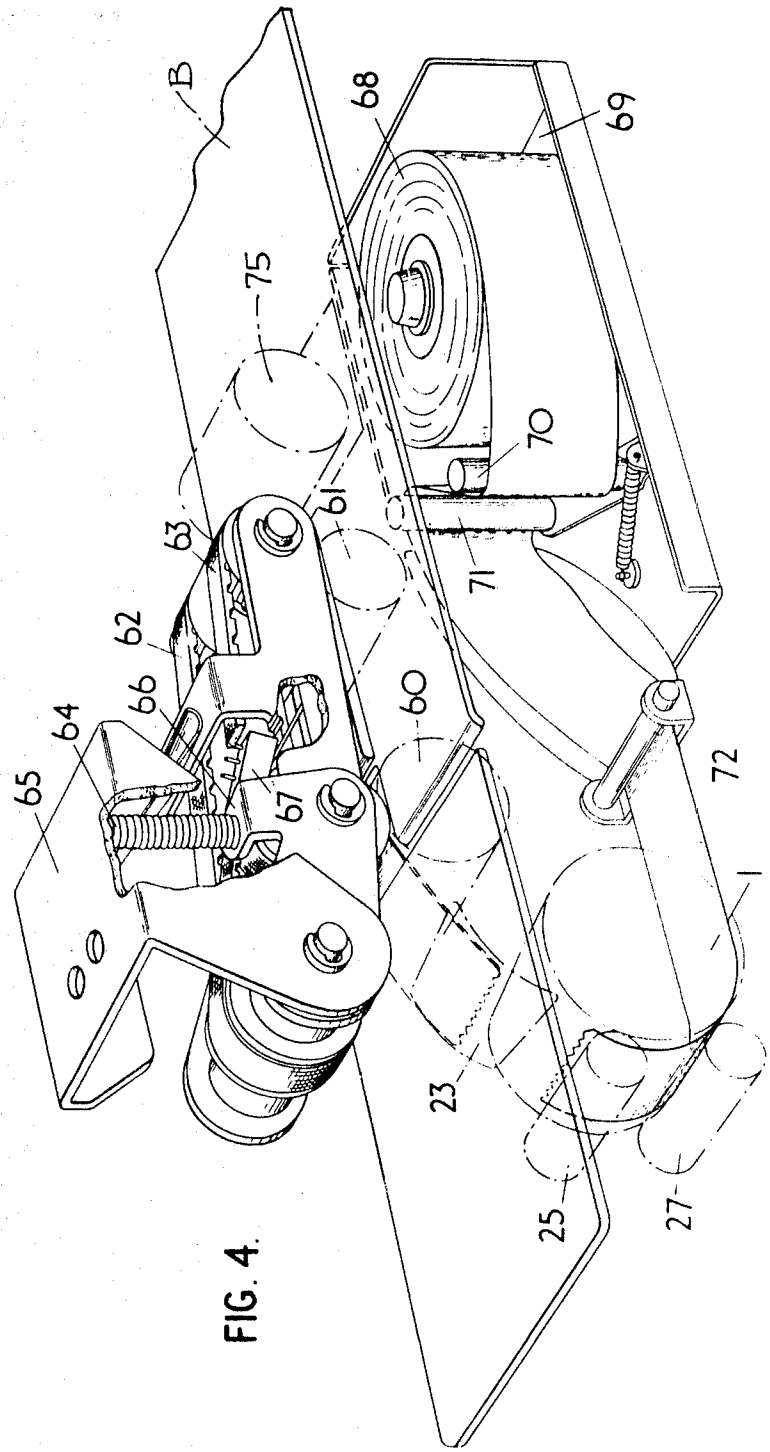

FIG. 4.

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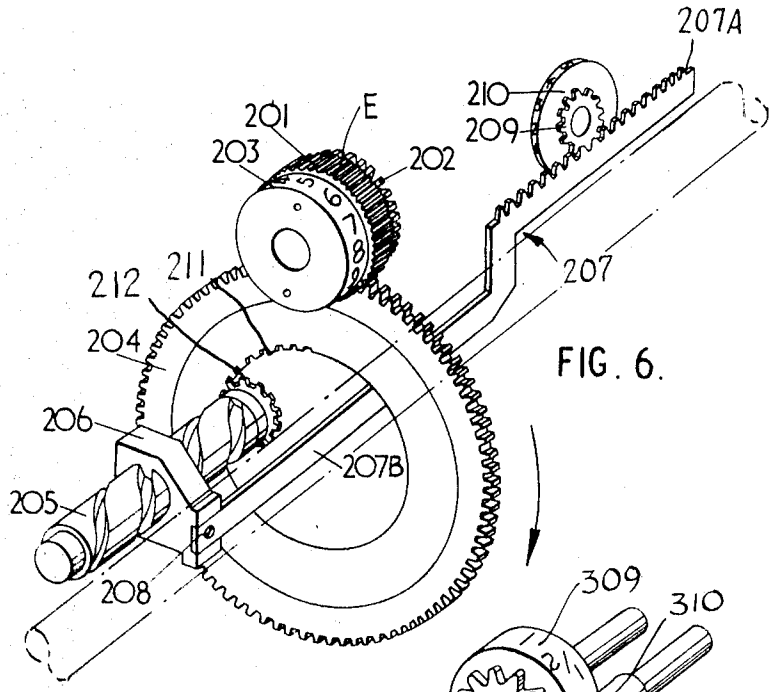

FIG. 6.

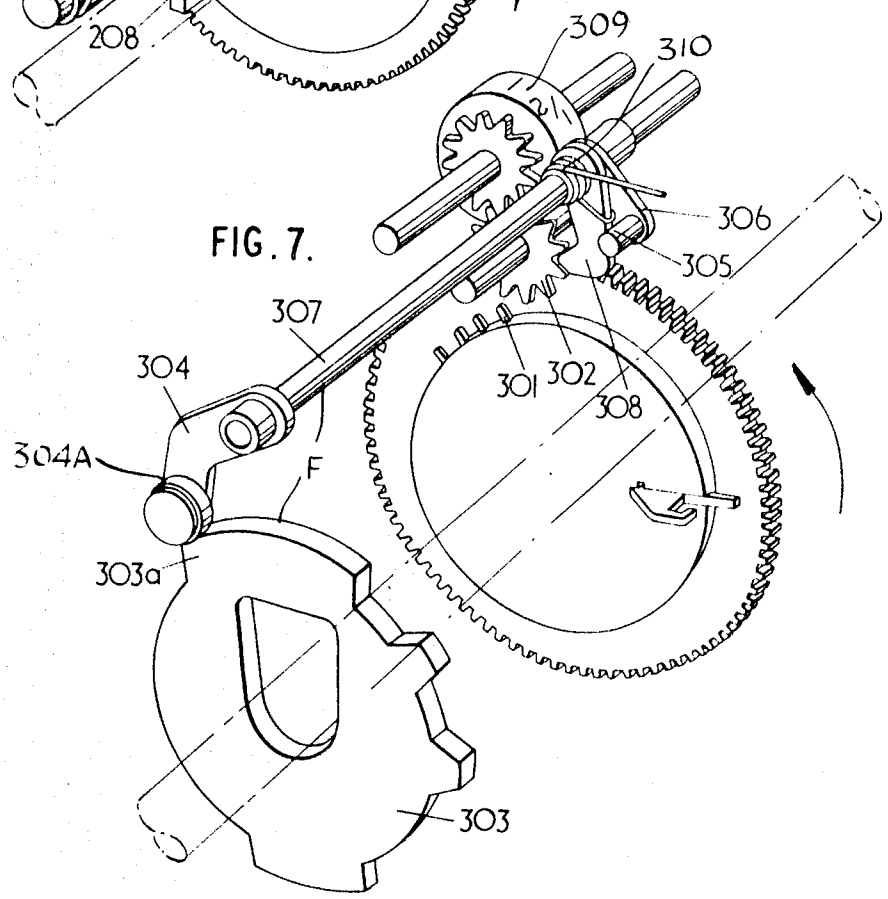

FIG. 7.

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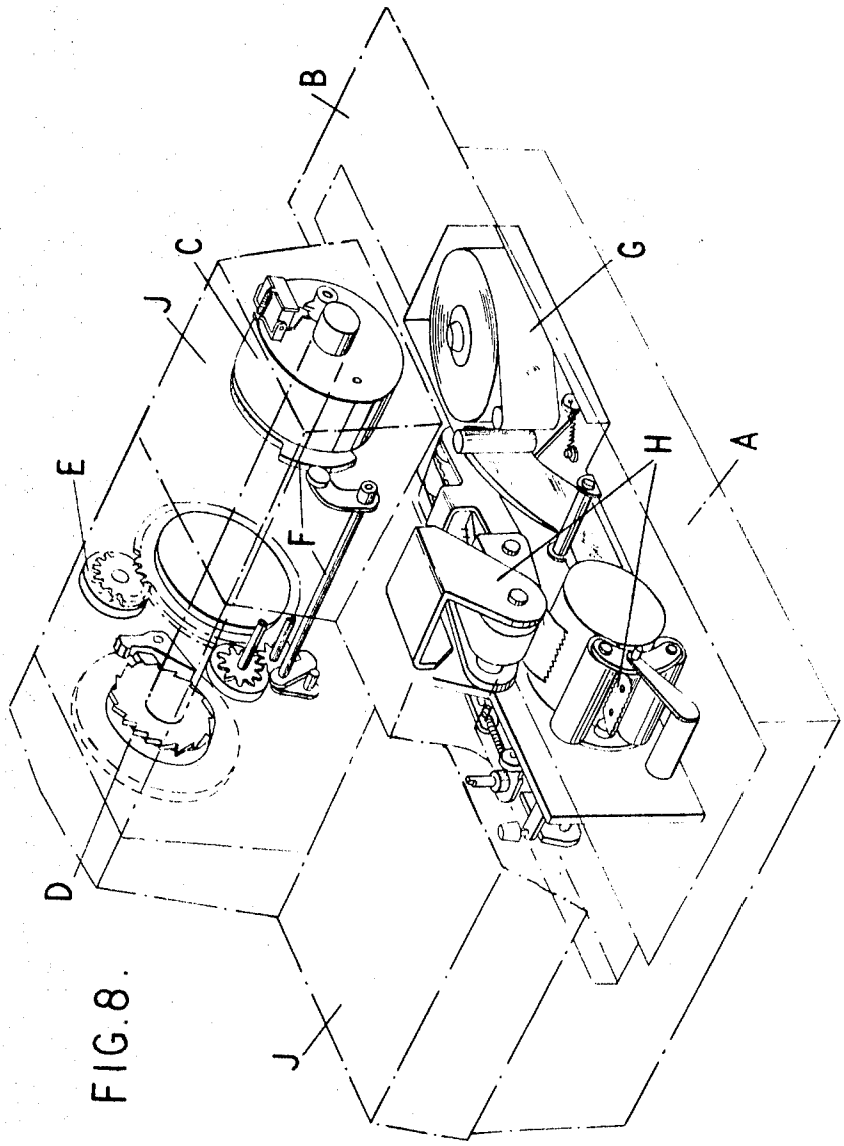

FIG. 8.

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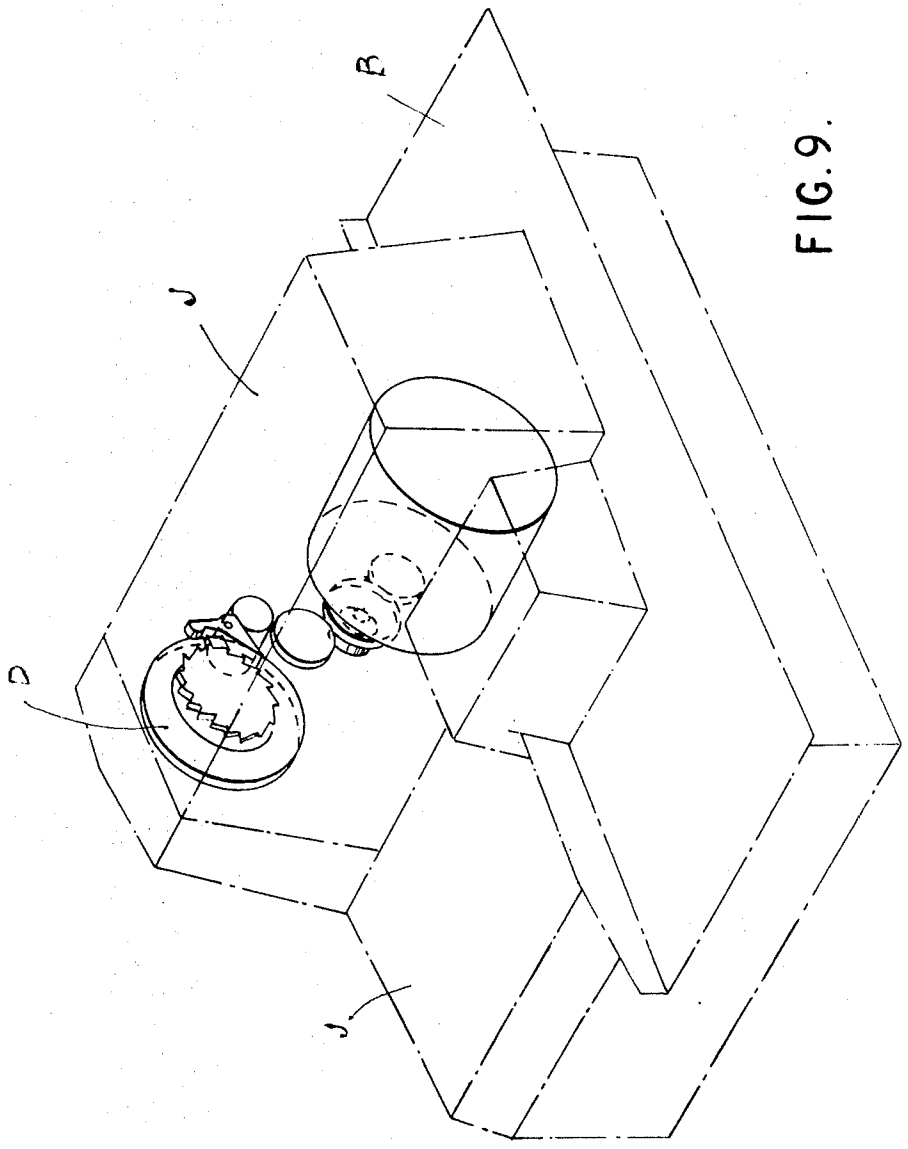

FIG. 9.

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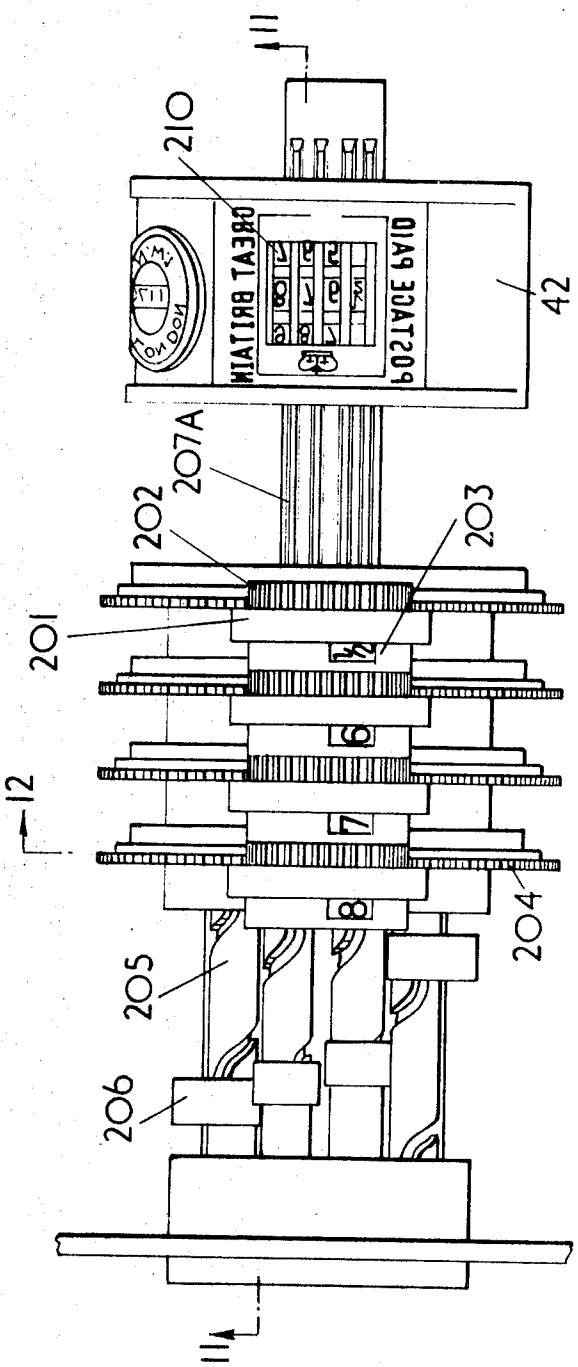

FIG. 10.

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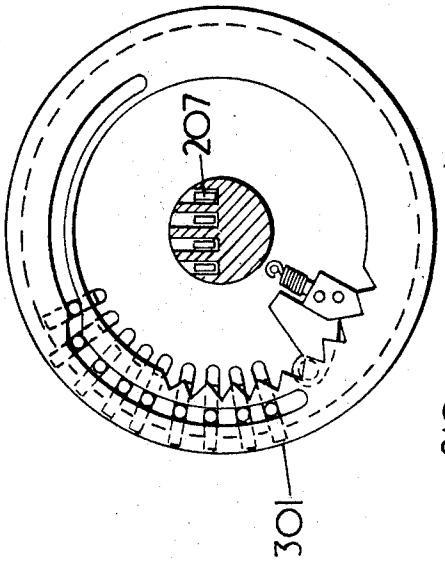

FIG.12.

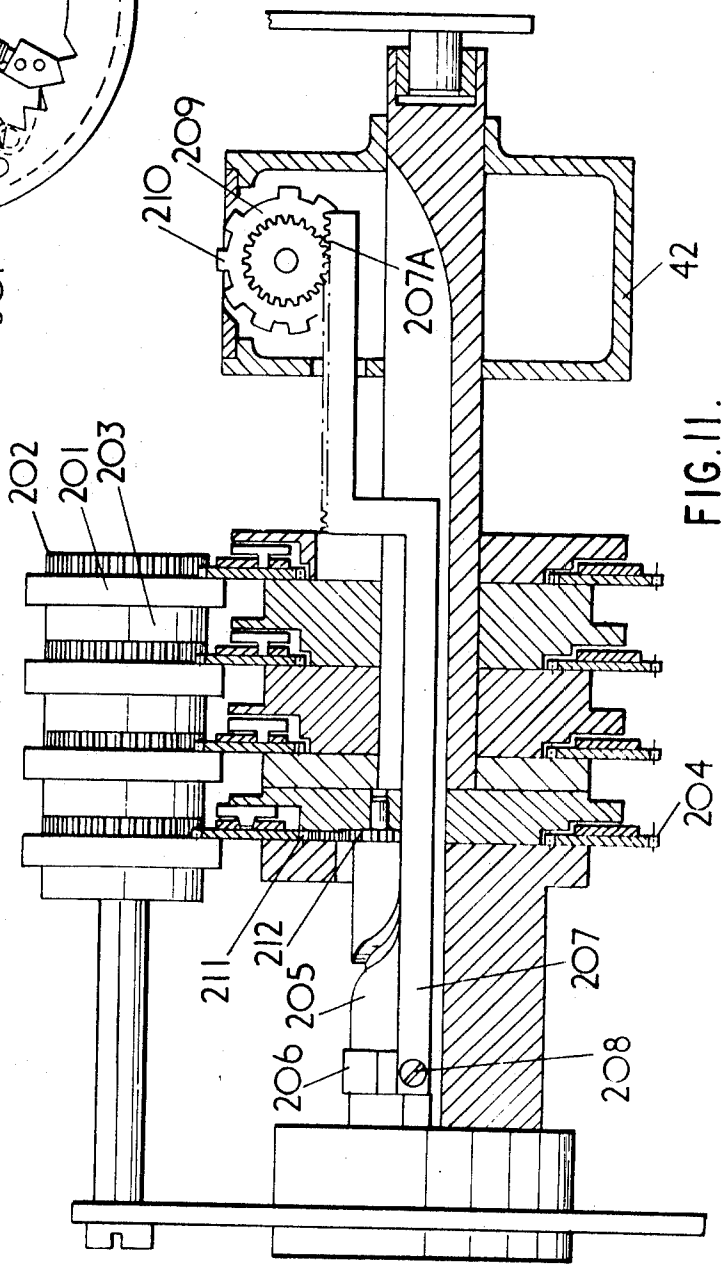

FIG.11.

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VALUE-SETTING MEANS FOR PRINTING WHEELS IN POSTAL FRANKING MACHINES

BACKGROUND OF THE INVENTION

The invention relates to franking machines of the kind which besides being capable of franking envelopes, is adapted to provide printed labels for attachment to postal packets which cannot be inserted into the machine for franking in the normal way, while the object of the invention is to provide a franking machine of the kind above referred to, which is positive in action, and is more reliable in use than machines heretofore proposed.

SUMMARY OF THE INVENTION

The invention consists in a franking machine having a printing head in which the values to be printed are manually selected by the rotation of value-selecting wheels, one for each printing wheel, by way of a tooth-engaging pinion integral with each value-selecting wheel, characterized in that each toothed wheel is provided with an axial bore with gear teeth therein, which are engaged by a pinion integral with a coarse helical screw having a cooperating nut thereon, each printing wheel being provided with a pinion which engages a toothed rack joined to each nut by a bar passing through the bore in the toothed wheel.

The invention further consists in a franking machine as set forth in the preceding paragraph in which the axes of rotation of the value-selecting wheels, the toothed wheels and the coarse helical screws are all parallel to the axis of rotation of the printing head, while the axis of rotation of the printing wheels is transversal of the axis of rotation of the printing head.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings show, by way of example only, one embodiment of the invention in which:

FIG. 1 is a view in perspective of the label paper feed mechanism;

FIG. 2 is a view in perspective of the other side of the frame illustrated in FIG. 1;

FIG. 3 is a view in perspective, partly broken away, of slogan control;

FIG. 4 is a view in perspective of the interlock;

FIG. 5 is a perspective view of the clutch with the outer ring removed for clarity;

FIG. 6 is a perspective view of the value change mechanism;

FIG. 7 is a perspective view of the meter locking means;

FIG. 8 is a general perspective view of the machine showing the relationship of the mechanism shown in FIGS. 1 to 7;

FIG. 9 is a view in perspective along the lines of FIG. 8 illustrating the manner in which the printing head is driven, via a clutch, by an electric motor;

FIG. 10 is a diagrammatic view in elevation of the mechanism for changing the position of the printing wheels;

FIG. 11 is a view taken along line 11–11 of FIG. 10, the view looking in the direction of the arrows; and

FIG. 12 is a view taken along line 12–12 of FIG. 10, the view looking in the direction of the arrows.

DETAILED DESCRIPTION OF THE INVENTION

It may be seen from FIG. 8 that the machine comprises a hollow boxlike base member A which forms a common support for the internal mechanism of the machine. There is provided a horizontal plate B, upon which, at the nearer end, the piece of mail to be franked is placed, and along which it is conveyed to pass under a printing head C.

The printing head C is driven by an electric motor, mounted below a clutch D, and connected thereto by a gear drive (FIG. 9). The motor runs continuously and the drive is initiated by the clutch D during each cycle of operation.

The value to which the printing wheels in the head C are selected by means of selector wheels, of which one E is shown.

To ensure that the total of the values printed are correct and no errors can be introduced, the register meter is locked by means of a pawl and cam mechanism F.

Besides franking pieces of mail such as envelopes, the machine is adapted to print upon labels cut from a roll of paper G. The paper strip is fed to the printing head C by a feed and cutting mechanism H which is adapted to provide labels of two different lengths, and also to control the printing of a slogan or otherwise advertising display upon each label at the choice of the operator of the machine.

The mechanism of the machine is protected by a cover J which is removable for servicing of the machine.

The features of the machine above referred to are each described in detail hereinafter with reference to the respective FIGS. 1—7.

The label paper feed mechanism and the slogan control and interlock device are provided in order that one can obtain long or short labels according to the setting of a hand control, and includes means for suppressing the printing of the slogan or advertising display when short labels are selected.

FIG. 1 shows a main bearing side frame **34** with the nearer part of the mechanism in view, and FIG. 2 shows the assembly on the other side of the main frame. A drum **1**, FIG. 2, is mounted integrally on the shaft **5**, as also is disc **3** which has two notches **3A** cut to 180°. The drum **1** is of such diameter that its periphery is equal to the length of a long label. Half its periphery is equal to a short label. By operating a handset lever **35** a cam shaft **30** can be rotated, raising and lowering levers **26** and **28** respectively. The bearings of pressure rollers **25** and **27** are mounted in these levers so that the rollers are lifted clear from the drum **1** for purposes of loading the machine with paper. The free end of a roll of paper on a mounting, not shown, is threaded around the drum **2** and over a "seesaw" pallet **23**. The pressure of rollers **25** and **27** is then restored.

With the power switched on, a gear **36** rotates continuously. A clutch sprag **2** rotates with this gear and is pivotally mounted on a stud **37** which is integral with the gear **36**. The gear **36** is free to move around the shaft **5**. A tooth **2B** of the sprag **2** would engage in the notch **3A** in the disc **3** but for the presence of a lobe **4** on lever **11**. The top end of lever **11** passes through side frame **34**, FIG. **1**, having a slotted hole and a strong spring **22** urging it to the right hand of the figure as shown. The spring **38**, FIG. **2**, is not strong enough to overcome the pressure existing at the lobe **4**, and so that the tooth **2B** on sprag **2** would "jump" or ride clear of the notch **3B** in disc **3**. Similarly, the presence of a double-lobed cam **9** on shaft **10** prevents engagement of the sprag in second and 180° opposite notch. No drive will therefore be transferred to the drum shaft **5**.

Drum shaft **5** comes through a disc **13** with a grooved hub which is capable of being moved laterally to-and-fro having a key, not shown, which engages with a slot in the shaft **5**. The disc **13** therefore revolves with the drum **1** and shaft **5**. Disc **13** has four pins, two long ones **15**, one not being visible, and two short ones **14**. These pins **14** and **15** engage in radial slots **16A** in a Geneva wheel **16**. The Geneva wheel **16** is fixed to the shaft **10**, which is integral with cam **9**, see FIG. **2**, and knife assembly **7**.

The knife assembly **7** has a double-edged blade **7A** (only one side of which is shown) with sharp V-shaped points at two opposite 180° apart. The drum **1** has two inserts **73** diametrically opposite (only one of which is shown) which have V grooves exactly complementary to the serrations of blade **7A**. These two inserts **73** are locked into drum **1**, but have springs underneath urging them outwards. The blade **7A** is of such a size as to interfere slightly piercing the label paper to the maximum extent. Damage to the insert is avoided because of the give in the spring insert.

In FIG. **6** there is illustrated the mechanism for changing the printing wheel within the printing head C with a change of setting of the value required to be printed by the selective wheel **201**. While this figure illustrates but one such selective wheel **201**, it is to be understood that a selective wheel **201** is

provided for each printing wheel and each selective wheel is operated by a similar mechanism from the Geneva wheel 16. In this position, short pins 14 cannot engage in the slots 16A of the Geneva wheel 16.

The action which occurs on the demanding of a "long" label is as follows:

A slide 12, FIG. 1, has a slotted hole behind washer 39. The slide can therefore be moved by hand operation to the left by a thumb knob not shown, with stepped end at 40 also carrying lever 11 to the left. Lobe 4, FIG. 2, ceases to influence sprag 2 which now engages disc 3 and rotates the shaft 5 with the drum 1 in a counterclockwise direction. After 90° only of revolution, the pin 15, FIG. 1, on the underside of disc 13 approaches one of the radial slots in the 16A Geneva wheel 16.

During the next 90° of revolution, Geneva wheel 16 is rotated also through 90°, taking with it shaft 10, cam 9 and the knife blade assembly 7. By virtue of the cam 9 rotating in a clockwise direction, it clears lobe 2A of sprag 2, thus allowing sprag 2 to continue driving disc 3. Should the hand operation of slide 12 have been unnecessarily prolonged, no repeat can occur while slide 12 is raised clear of lever 11 by the action of pins 15 as they revolve with disc 13.

The drum 1, shaft 5 and disc 13 continue to rotate until sprag 2 has again become engaged by the restored presence of lobe 4 and lever 11. During the last 90° of revolution, the pin 15, FIG. 1, will have passed the Geneva wheel 16 causing blade 7A, FIG. 2, to become engaged with the paper and the insert 73 in drum 1. The paper becomes perforated severely, but not quite separated. At the moment of piercing, the leading edge of the paper has entered the first feed rolls of the printing head feed, not shown, and is pulled tightly over the pallet 23, FIGS. 2 and 4. This member is mounted on a single shouldered stud which is offset, so that when the paper tightens thereover, it "seesaws" raising one side. This occurs when the perforation passes over it, thus triggering off a tear, which is then easily completed by the tug of the feed rolls.

The paper thus is separated before it passes under the franking head. The length of paper is equal to the total circumference of the drum 1. In this setting, it is assumed that a slogan or display is to be printed. Feed rolls 60 and 61 carry the label forward to the printing drumhead, and have thereabove, as shown in FIG. 4, flexible pressure bands 62 and 63, which are pressed downwards by spring 64 between support bracket 65 and carriage 66. The rotation of the printing drum head is initiated by the contacting of the arm of a switch 67, either by a label, when these are being used, or by an envelope when it is inserted into the pinch or nip of the roll 60. A roll 68 of paper strip is housed in a means 69 in the side of the machine, and passes over guide pins, 70, 71 and 72 and thence around the feed drum 1 as previously described. The method of demanding the slogan printing automatically is now described:

In FIG. 3 is seen the part of a printing drum head 42 provided with a slogan die carrier 41. The carrier 41 is pivoted at 43, and its underside rides on cam 44, mounted on shaft 49, while also on shaft 49 are two wheels 47 and 48, each having two teeth projecting at 180° opposite. These wheels are set at 90° to one another. As previously mentioned in the description relating to FIG. 1 for demanding a "long" label, the plate 28 and the lug 20 do not close the microswitch 19. Therefore, the electrical circuit is not closed and electromagnet 50, FIG. 3, is not energized. The armature therefore is at rest in the position shown.

When the printing head is operated, it revolves counterclockwise. The lower extremity of armature 51 lies in the path of wheel 47, and as it sweeps past it will be revolved in a clockwise direction, turning shaft 49 through 90° raising the slogan die carrier 41 by means of the cam 44. This is retained by springs 46. A die 41A mounted on the carrier 41, is now in its raised or printing position, and will remain so, during further cycles of operation, because the tooth of wheel 47 is over to the right hand. Also, because the shaft 49 has been moved through 90°, tooth 52 of the nearer wheel 48 is now around in a position where it will engage the tip of armature 51 should the magnet 50 become energized.

The setting of a short label is now described in reference to FIG. 1. The control knob, 74 is operated and turns the cranked rod 17 through 90° to bring the lug 20 around to close the microswitch 19 which causes the operation of the electromagnet 50, FIG. 3. The disc 13, FIG. 1, moves nearer to the Geneva wheel 16. The short pins 14 now operate in the radial slots 16A of the Geneva wheel 26, in addition to the long pins 15. With the hand operation of slide 12 which pushes lever 11, this operates the sprag 2, FIG. 2, after the manner previously described, and the drum 1 revolves. During the first 90° of rotation, pin 14 moves the Geneva wheel 16, shaft 10 and knife assembly 7, FIG. 2, and also cam 9. During the next 90° of rotation, the Geneva wheel 16, FIG. 1, is again moved. The result of this repeated operation in the first 180° of revolution of drum 1, FIG. 2, is that the cam 9 now presents a high portion in the path of sprag 2 and also the knife assembly 7 serrates the paper. Sprag 2 is disengaged from the disc 3 and drum 1 comes to rest after 180° movement only. Enough paper feed only for a short label is half the circumference of the drum 1. The paper is parted as before described. The slogan die 41A does not print ink on the impression roller because the magnet armature 51, being attracted, has caused wheel 48 to turn shaft 49 and cam 44 back to low position.

In FIG. 1, detent spring member 21 retains the Geneva wheel 16, so that it remains in the true position for the entry of the pins 14 and 15. The plate 18 is so shaped that the slide 12 can only be operated in the correct settings of shaft 17. Detent member 31 retains drum 1 and shaft 5 in the true at rest position and avoids overthrow when the sprag 2 is disengaged.

The printing head C is driven by an electric motor, FIG. 9, by way of clutch D. The motor runs continuously while the machine is in use, and each franking process is initiated by the engagement of the Clutch D. The clutch is operated remotely, and it is of vital importance that the printing and recording head should make one revolution and that it should be arrested at a precisely predetermined position, and be prevented from rotating further until demanded to do so by the remote control.

Details of the clutch are shown in FIG. 5 in which outer toothed ring 101 is shown separated, so that the pawl mechanism housing may be clearly seen. The outer ring 101 is driven continuously by the electric motor and fits freely over pawl housing 103 which contains and retains four driving pawls 104*a*, 104*b*, 104*c* and 104*d*, each of which is urged in an outward direction by a spring, not shown, under each pawl. Screws 106 secure pawl housing 103 to drive plate 102, and also secure pawl housing 103 and drive plate 102 to the end face of a printing/recording head shaft, not shown, which is required to make only one revolution before being arrested by means of projections 109 and 110 being caught under hooked end of pawl 111. A pawl control plate 105 is located between pawl housing 103 and the drive plate 102, and is free to move radially by a predetermined amount, in relation to drive plate 102 and pawl housing 103. Pawl control plate 105 is cut away internally to provide four internal cam faces 107*a*, 107*b*, 107*c*, and 107*d*, of which only the first can be seen, and each of which engages a projection provided on the inner face on the four driving pawls 104*a*, 104*b*, 104*c*, and 104*d*, retained in the slots in the pawl housing 103.

A trigger stop 111 is pivoted on a shaft 118 and the hooked end of this trigger stop is urged away from the clutch components 102, 103, and 105 by a torsion spring 112.

When the shaft to which the pawl housing 103 and drive plate 102 are rigidly attached, is required to make one revolution, an electric current passing through coil 114 energizes magnet 113, which then attracts the horizontal portion of armature 225, pivoted on shaft 116, thereby withdrawing the top end of the vertical portion of armature 225 from under a projection 119 on trigger stop 111.

When the top end of armature 115 is withdrawn from under the projection 119 on trigger stop 111, torsion spring 112

causes the hooked end of trigger stop **111** to move away from the projection **110** on drive plate **102**.

One end of spring **108** is secured to pawl plate **105**, and the other end of the spring is secured to drive plate **102**. When the hooked end of the trigger stop **111** is withdrawn from projection **109** and projection **110**, spring **108** causes pawl plate **105** to rotate in a clockwise direction to the limit provided by an internal stop, and the internal cam faces **107***a*, **107***b*, **107***c*, and **107***d*, in pawl control plate **105** permit the four driving pawls **104***a*, **104***b*, **104***c*, and **104***d* to be urged upwards and outwards, each by its own spring, not shown, against the inner toothed bore of outer ring **101**.

The pawls **104***a*, **104***b*, **104***c*, and **104***d*, are unequally spaced around pawl plate **103**, and are positioned in such a manner that only one of the four pawls **104***a*, **104***b*, **104***c* and **104***d*, can locate against any one of the internal ratchet teeth in the outer ring **101**.

The pawls are spaced so that the radial difference between each pawl is equal to one-fourth of the pitch of the internal teeth in outer ring **101**. If, therefore, one pawl just misses contact with the radial face of any one of the internal teeth in outer ring **101**, the next pawl will engage one-fourth of a pitch of the internal teeth in the outer ring **101** later.

When any one of the pawls **104***a*, **104***b*, **104***c* and **104***d* engage in any one of the internal teeth in outer ring **101**, the constantly rotating outer ring **101** drives the printing head via one of the pawls and causes the printing head to rotate.

When the hooked end of trigger stop **111** is withdrawn from projections **109** and **110**, the pointed end of trigger stop **111** is advanced towards the peripheries of pawl control plate **105** and the drive plate **102**, the pointed end of trigger stop **111** advances to within an appropriate distance such that when during the rotation of the printing head the projections **109** and **110** impinge on the pointed end of trigger stop **111**, the projections **109** and **110** cause trigger stop **111** to partially rotate around its spindle **118**, and cause hooked end of trigger stop **111** to be placed in the path of projections **109** and **110**.

The vertical portion of armature **115** is urged by torsion spring **117** against the projection **119** of trigger stop **111**. When the hooked end of trigger stop **111** is urged inwards by projections **109** and **110**, pushing the tail end of trigger stop **111** forward, the extreme end of the vertical portion of armature **225** is able to move under projection **119**, on the backface of trigger stop **111**, and hold this component in such a position that the hooked end trigger stop **111** is held firmly in the path of the rotating projections **109** and **110**.

At the commencement of rotation of the shaft, the projection **109** has been moved radially out of line with respect to the projection **110** by virtue of the spring **108** which is secured at one end to the pawl plate **105** and at the other end to the drive plate **102** rotating by a small amount. Consequently, the projection **109** can reach the underside of the hooked end of trigger stop **111** in advance of the projection **110** on the drive plate **102** and when the projection **109** meets the undersurface of the hooked end of the stop **111**, the projection is arrested in such position and thus causes the slots **104'**, **104''**, **104'''** and **104** **''''** in the pawl control plate **105** to be rotated out of line with the slots in the pawl housing **103**. This action forces downwardly the pawls **104***a*, **104***b*, **104***c* ,and **104***d* into the pawl housing whereby the projecting rim of the plate **105** retains the pawls in their downward position and out of engagement with the internal teeth in the outer toothed ring **101**. Drive plate **102** continues to rotate until the projection **110** also contacts the undersurface of the hooked end of trigger stop **111**.

When the projection **110** meets the underface of the hooked end of trigger stop **111**, drive plate **102** is arrested, and as this plate is rigidly attached to the printing head shaft, the printing head is also arrested in a desired position. When the printing head and drive plate **102** are arrested by the underface of the hooked end of trigger stop **111**, a pawl, not shown, engages in one of the teeth on the periphery of the drive plate **102** and prevents the drive plate rotating in an anticlockwise direction.

FIGS. **6** and **10** to **12** show the mechanism for changing the position of the printing wheels within the printing head C with change of setting of the value required to be printed by means of selector wheel **201**, only one is shown in FIG. **6**, while in fact one is provided for each printing wheel (see FIGS. **10** and **11**), each operated by a similar mechanism.

When a value selecting wheel **201** is rotated by an appropriate amount, to change the value to be printed upon a piece of mail passed through the machine, printing wheel **210** prints a value identical with the number selected. It will be observed that the value selector wheel **201** and the printing wheel **210** rotate about axes which are at right angles to one another.

The value selecting wheel **201**, which has on one face pinion **202** and on the other face a projecting drum on the periphery of which are numerals indicating values required to be printed, is one of a number of wheels mounted coaxially with one another, and each meshes with the teeth on the periphery of a disc **204**, coaxial with one another, and rotates it by an appropriate amount. Each disc **204** engages its internal teeth **211** with a gear **212** on the end of a screw **205** provided with one or more coarse helical grooves.

A nut **206** with a corresponding thread is located on the screw **205**, and moves along the latter with rotation of the value selecting wheel **20**l. There is a screw **205** for each wheel **201** and disc **204**, which are spaced circumferentially around the axis of the disc **204**. A rack **207** is provided for each nut **206** and has a tooth portion **207A** and a bar portion **207B** integrally connected therewith. The bar portion **207B** is attached to the nut **206** by a screw **208** and the teeth of the tooth portion **207A** mesh with a pinion **209** of a printing wheel **210**. All printing wheels are on the same axis (FIG. **10**).

The gear ratio of pinions **202**, discs **204**, screws **205**, and toothed portions **207A** of the racks **207** and pinions **209**, are so chosen that when the value selecting wheel **201** rotate a corresponding amount precisely related to the amount of rotation of the value selecting wheels **201**.

One or more of the mechanisms illustrated in FIG. **6** may be used in each postal franking machine allowing a plurality of value-selecting wheels **201** to be used independently or collectively to operate one or a plurality of printing wheels **210**.

In FIG. **7**, there is shown a locking mechanism associated with the register meter, which indicates the total value which has been printed by a machine, and is provided in order to prevent errors in the readings given. The printing head is provided in known manner with a toothed wheel, in which the number of teeth which project are caused to correspond to the value to which the associated printing wheel is set. The means for permitting radial movement of the teeth is by a cam track and pins and reference is made to U.S. Pat. No. 2,727,687.For example, in FIG. **7** there are four teeth projecting, of which the last tooth is tooth **301**. Consequently, when the printing head is rotated in an anticlockwise direction during the franking process, gear **302** is moved four teeth, with the tooth **301** having just left the gear **302**. The gear **302** engages the gear beside the numbered drum and the latter has just moved four units.

In order to prevent any overthrow taking place after the least tooth **301** which is at all times the last tooth to pass the intermediate transfer gear **302** which engages with a gear integral with the value recording wheels **309** has left the gear **302**, a disc **303** is provided with a cam **303A** thereon, which engages follower **304A** on a lever which is fixed to the shaft **307**, on which there is also provided a lever **306** with a pin **305**, which engages the back of pawl **308**, and positively prevents further rotation of the gear **302**. Prior to the last tooth **301** passing gear **302**, the pawl **308** is held in mesh by spring **310**. The timing of the cam is such that the pawl **308** commences to engage between two teeth of the gear **302** before the last rising tooth **301** has left the gear **302**, thus ensuring that no overthrow is possible.

It is to be understood that the above description is by way of example only and that details for carrying the invention into effect may be varied without departing from the scope of the invention claimed.

I claim

1. A franking machine of the type having a rotatable printing head in which the values to be printed are manually selected, comprising rotatable printing wheels, a value-selecting wheel for each printing wheel rotatably mounted and the manual rotation of such selecting wheels the values to be printed, a pinion integral with each value-selecting wheel, a rotatable disc having external teeth in mesh with each pinion, each disc having an axial bore provided with internal gear teeth, a coarse helical screw provided with an integral pinion in mesh with the internal gear teeth of each disc, a nut threadedly engaging each screw, a pinion for each printing wheel, a rack having a toothed portion and a bar portion integrally connected thereto, the teeth of the toothed portion meshing with a respective printing wheel pinion, and the integral bar portion passing through the axial bore of the discs and secured to a respective nut.

2. The franking machine as claimed in claim 1 wherein the axes of rotation of the value-selecting wheels, the discs and screws are all parallel to the axis of rotation of said printing head, with the axis of rotation of said printing wheels being transverse with respect to the axis of rotation of the printing head.