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Gross et al.

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[54] **COIL SPRING BIASED PRINTING WHEELS**

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[73] Assignee: **Gross Cash Register Limited,** London, England

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[30] **Foreign Application Priority Data**

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Aug. 21, 1970 Great Britain 40,285/70

[52] **U.S. Cl.** **101/95,** 101/110
[51] **Int. Cl.** **B41j 23/16**
[58] **Field of Search** ..... 101/93 R, 93 H, 95, 101/96, 99, 110, 7

[56] **References Cited**

UNITED STATES PATENTS

1,964,455	6/1934	Cook	101/28
2,363,253	11/1944	Larson	197/44
2,746,384	5/1956	Bradley et al.	101/93 R
2,818,801	1/1958	Hart et al.	101/99
2,891,469	6/1959	Payne et al.	101/76
2,996,977	8/1961	Friedman	101/7 X
3,221,645	12/1065	Adler	101/95
3,269,510	8/1966	Peter	197/53
3,307,676	3/1967	Hickerson	197/18
3,422,754	1/1969	Bakarojiev et al.	101/99 X

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[57] **ABSTRACT**

The invention provides a printing device including a printing wheel which carries peripheral printing characters and peripheral ratchet teeth whereby it can be stopped at required printing positions. The wheel is of reduced width at and adjacent the ratchet teeth so that the printing characters can be of full width while a spring can be located at the part of reduced width and can extend out of the wheel to an external position of anchorage.

11 Claims, 6 Drawing Figures

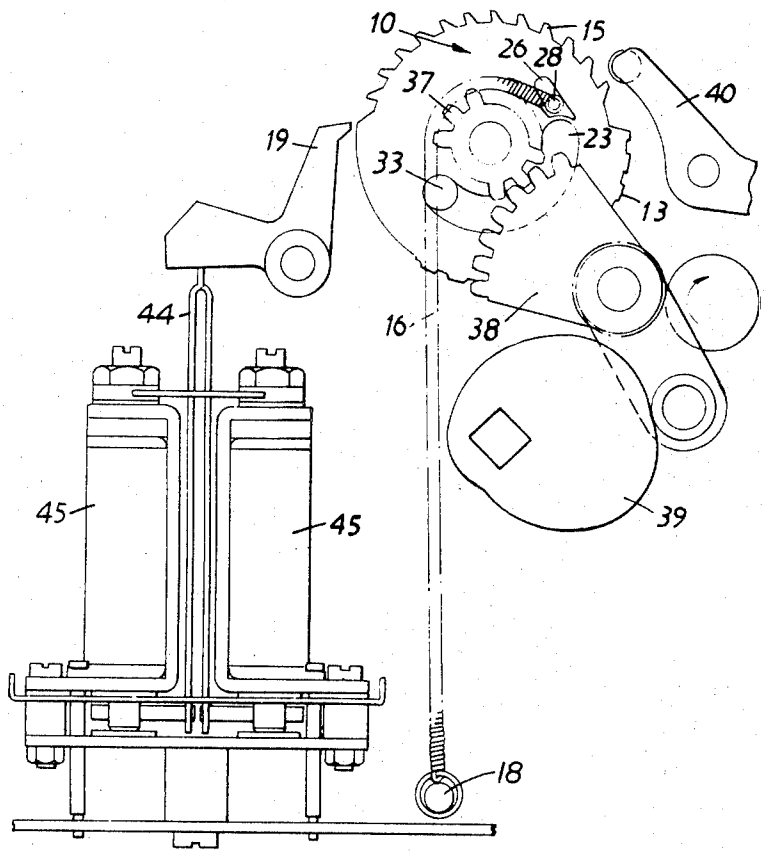

FIG. 1

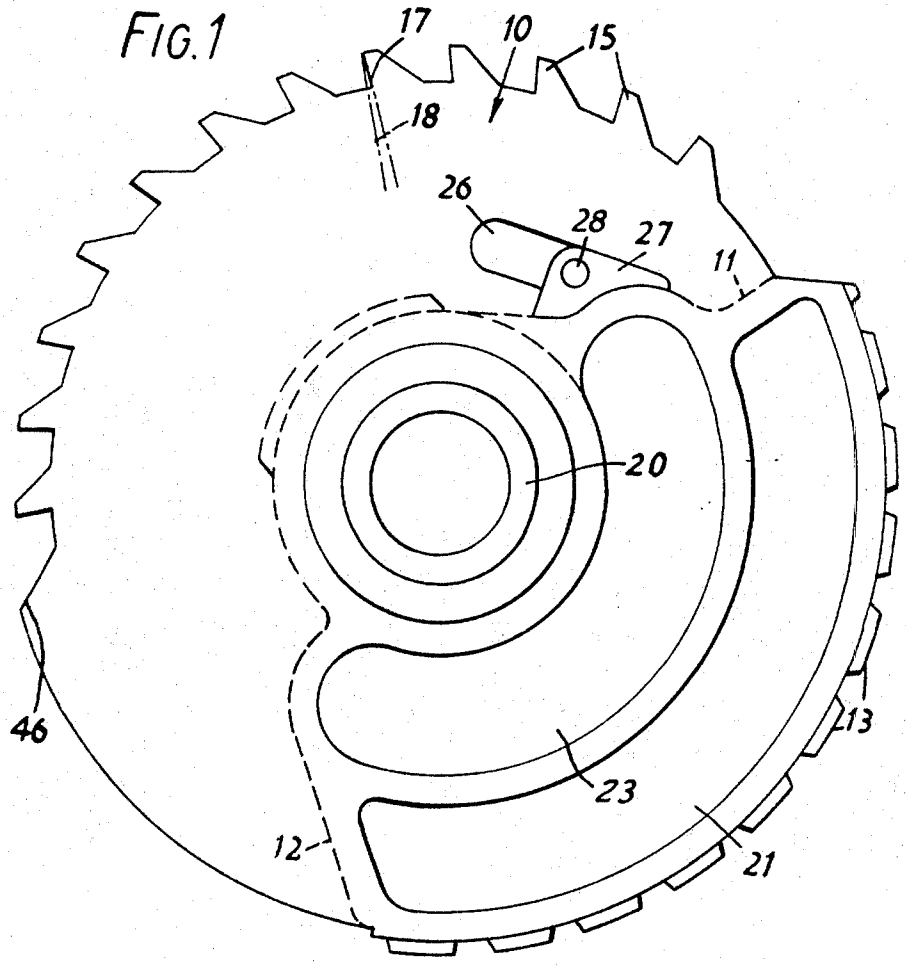

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FIG. 2.

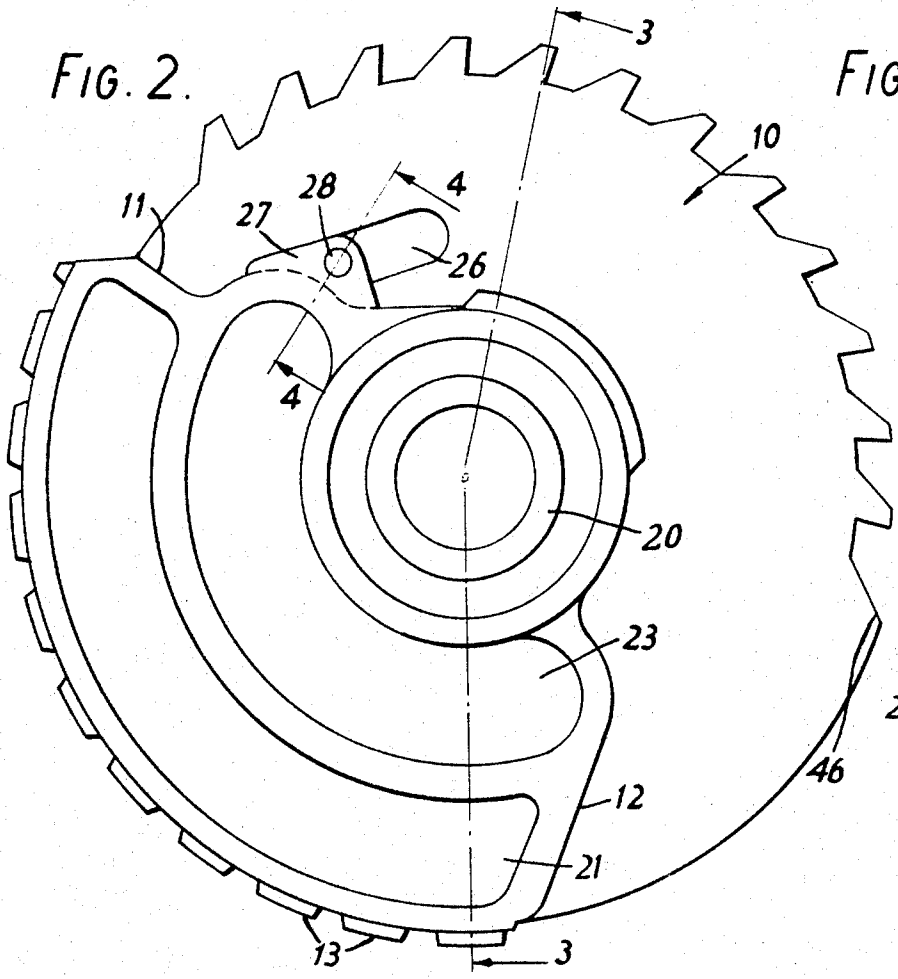

FIG. 3.

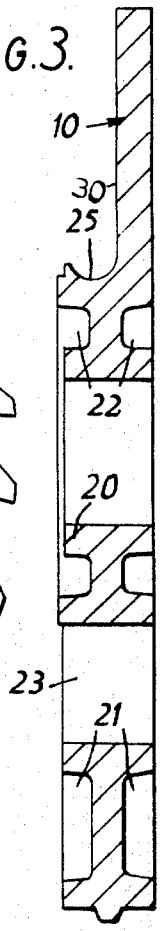

FIG. 4.

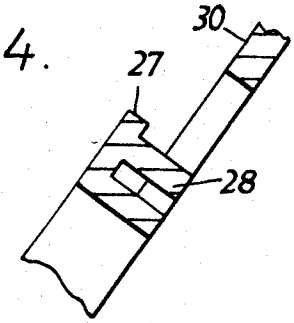

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FIG. 5.

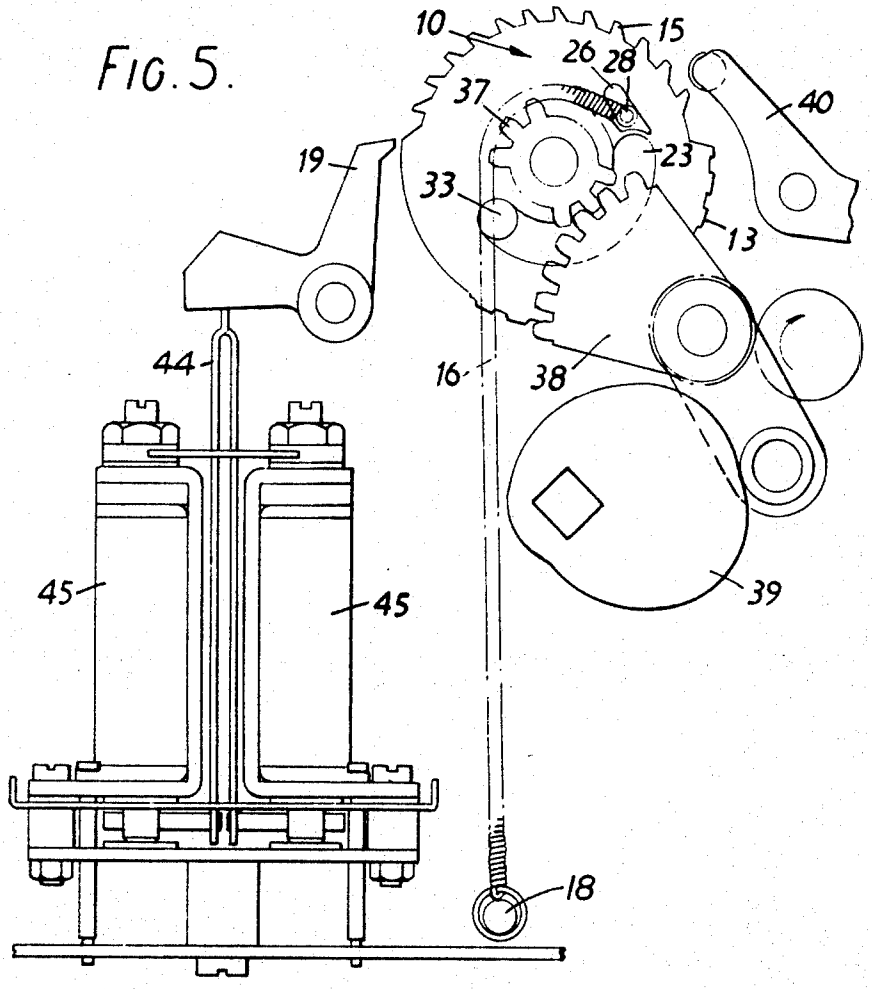
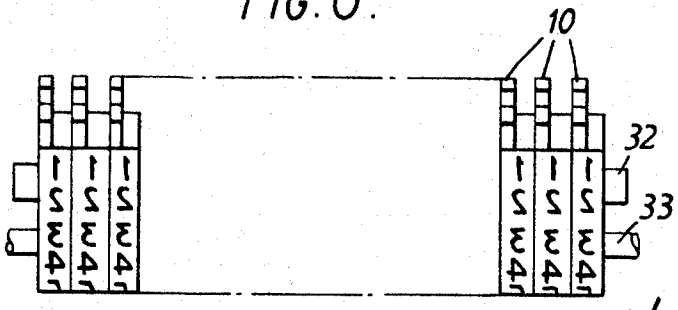


FIG. 6.



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COIL SPRING BIASED PRINTING WHEELS

This invention relates to printing devices for use as part of a cash register, computer weighing machine or other machine involving a printing head especially of a kind in which the required data is transmitted to the devices in the form of electric impulses.

It is known to provide such devices with a continuously rotating printing cylinder but this involves a printing period of very short duration, e.g. one to two microseconds and this, in turn, involves critical control and great accuracy in construction with consequent high cost of production.

It is also known to provide printing wheels with driving mechanism which is stopped while printing is in progress. This gives good results with cheaper construction but nevertheless involves difficulty of accurately positioning the printing wheels during printing to take up backlash in the driving mechanism.

According to the present invention we provide a printing wheel having printing characters on one part of its periphery, ratchet teeth on another part of its periphery, a part of reduced thickness to receive a spring, and means for attachment of one end of the spring whereby the spring can be located within the overall width of the wheel. Thus the pawl-engaging teeth are integral with or fixed to the printing wheel so that there is no problem of backlash. A further important feature of the invention consists in providing the wheel with a concentric slot receiving a rod which serves to bring all the wheels back to their starting positions and which also is moved to allow the wheels to move until stopped by their pawls. The rod may be mounted on two arms pivotally arranged to rock about the same axis as the printing wheel.

The invention is illustrated by way of example in the accompanying drawings wherein:

FIG. 1 is an axial view from one direction of a printing wheel made in accordance with the invention;

FIG. 2 is a similar view but from the opposite direction;

FIG. 3 is a sectional view on the plane 3—3 on FIG. 2;

FIG. 4 is a sectional view on the plane 4—4 on FIG. 2;

FIG. 5 is an axial view of the wheel with some associated parts; and

FIG. 6 is a view of a number of wheels and associated parts seen at right angles to the axis.

The wheel **10** is a single integral member which may be formed by injection moulding of metal or a synthetic resinous material, e.g. polythene or a polyamide. The wheel has a segmental part from **11** to **12** which is thicker axially than the remainder segment **12** to **11**. The thicker part **11** to **12** is provided with peripheral printing characters **13** and the part **12** to **11** carries peripheral ratchet teeth **15**. These teeth have their pawl engaging surfaces **17** undercut at a small angle to the adjacent radius **18** so as to hold a pawl **19** (FIG. 5) in the ratchet by the pressure of the surface **17** on the pawl under pressure of a spring **16**.

The wheel has a central boss **20** which preferably has a marginally greater axial width as the part **11** to **12**. The part **11** to **12** has grooves **21** on both sides and the boss **20** has grooves **22** on both sides, these grooves being only for the purpose of reducing the weight of the wheel. The grooves **21, 22** are omitted from FIG. **5** for the sake of clarity. The part **11** to **12** also has a slot **23**

concentric with the axis of the wheel. The boss **20** has a groove **25** (FIG. **3**) on its periphery at the part **12** to **11**, this groove serving to assist in holding the spring **16** in position.

The width of the part **11** to **12** which includes the teeth **15** is greater than the width of part **12** to **11** by an amount larger than the diameter of the spring so that the spring is located within the thickness of the printing wheel. This enables the spring **16** to extend out of the diameter of the printing wheel to an anchorage in the form of a pin **18** on a suitable part of the frame of the machine.

In the part **12** to **11** and adjacent one end of the slot **23**, and the part **11** is an opening **26** axially through the wheel. Extending over part of this opening is a flange **27** which carries a pin **28** which enters the opening **26** and serves to receive the end of the spring so that the spring will be partially guided by the surface **30** of the part **12** to **11** on to the pin.

A series of the printing wheels are mounted on a common spindle **32** so that adjacent wheels are in contact with each other as shown in FIG. **6**. In other words, the wheels are not spaced apart by any mechanical devices.

A rod or bail **33** parallel to the spindle **32** passes through the slots **23** of all the printing wheels. This rod **33** is carried by arms (not shown) which are fixed to a pinion **37** driven by a toothed segment **38** from cam **39** so that the rod **33** can be driven in one direction to bring all the printing wheels to their rest positions and can be driven in the opposite direction to allow the printing wheels to rotate under the influence of the springs **16** until the printing wheels are arrested by the pawls **19**. When all the printing wheels have been thus arrested a pressure member **40** is actuated to press a strip of paper and inking ribbon against all the printing characters along a generatrix of the assembly of printing wheels.

The pawls **19** are actuated by stems **44** which, in turn, are controlled by means including electro-magnetic devices **45**.

The undercut surfaces **17** of the ratchet teeth hold the pawls in engagement even when the stems **44** descend which occurs gravitationally or by springs when the current in the electro-magnetic devices ceases.

Each of the printing wheels has a part **46** of large enough radius to serve as a projection to carry the pawl out of the radius of the ratchet teeth when the wheels are moved back to starting positions. The pawls do however tend to drop out gravitationally at this time.

At least 250° of the periphery of the wheel may be occupied by the print and ratchet teeth each occupying approximately the same peripheral distance.

Instead of a helically wound wire spring it is possible to use a flat torsion spring in a recess in the wheel. The end of the spring may engage the shaft.

The wheel may have a greater or less number of printing positions depending on the size of the wheel and size of the printing characters. The wheel movement will generally not exceed 145°.

We claim:

1. In a printing device having printing wheels rotated by coil springs, a printing wheel having a segmental part which is thicker axially than the remainder segmental part; printing characters on the periphery of one segmental part of the wheel;ratchet teeth on the periphery of the other segmental part of said wheel; the

segmental part of the wheel that carries the printing characters including a central boss having an axial thickness at least as great as the width of the printing characters axially of the wheel; the remainder segmental part of the wheel which includes the ratchet teeth and the part of the wheel between the ratchet teeth and the boss thereby being of reduced thickness to receive a coiled spring of smaller diameter than the difference in thicknesses between the said segmental parts, and means for attachment to one end of said spring, said means being located in the remainder segmental part of reduced thickness, whereby the spring can be located within the overall axial width of the wheel to extend partly around the boss and to extend beyond the periphery of the wheel for attachment to a fixed support.

2. A printing wheel as claimed in claim **1**, said printing device including a pawl adapted to be moved into and out of engagement with pawl engaging faces on the said ratchet teeth; and the pawl engaging face of each tooth being undercut in the direction such that the outer end of this face will normally overlie the outer end of the pawl, whereby the face can hold the pawl engaged due to the pressure on said pawl by said face exerted by the said spring until said pawl is forced out.

3. A printing wheel as claimed in claim **2**, said thicker segmental part having an arcuate slot thereon concentric with the axis of said wheel, a sprindle rotatably carrying said wheel; a rod passing through said arcuate slot and disposed parallel with said spindle; means in the printing device for supporting said rod whereby same can be driven in one direction to bring the printing wheel to a "starting" position, and can be driven in the opposite direction to allow the printing wheel to rotate under the influence of the spring until the wheel is arrested by said pawl; said rod serving to bring the wheel back to "starting" position by engagement with the end of said slot.

4. A printing wheel as claimed in claim **2**, said remainder segmental part having at one end a peripheral portion of sufficient radius to serve to force the pawl out of engagement with the ratchet teeth.

5. A printing wheel as claimed in claim **1**, said remainder segmental part having an opening therethrough at one end; and said attachment means comprising a projection on the wheel extending partly over the said opening, a pin on the projection located for attachment thereto of one end of said spring, said pin being located within the opening whereby the spring will be held onto the pin by engagement with the said remainder segmental part.

6. A printing wheel as claimed in claim **1**, wherein the entire wheel is made in a single integral moulded piece.

7. A printing wheel as claimed in claim **1**, having a groove in the boss to receive the said spring.

8. In a printing device as set forth in claim **3**, said printing device having a series of wheels located side by side on a common spindle, together with said related coil springs acting thereon continuously urging the wheels in one rotary direction; the outer ends of the springs being anchored outside the diameter of the wheels, means to release all the wheels simultaneously whereupon they are rotated by the springs, and related pawls engageable with said teeth to stop the wheels in required positions.

9. A printing device as claimed in claim **8** wherein adjacent wheels are in contact with each other.

10. A printing device as claimed in claim **8**, wherein each wheel has a peripheral part of large enough radius to serve to force its related pawl out of engagement with the ratchet teeth, and wherein the pawls are two-armed, electromagnetic means for actuating the pawls, one arm of each pawl engaging the ratchet teeth and the other arm being actuated towards the ratchet teeth by said electromagnetic means, said pawls being held in the ratchet teeth by the pressure of the springs when the electromagnetic means is switched off until forced out of the ratchet teeth by said peripheral parts of large enough radius.

11. A printing device as claimed in claim **8**, wherein each of the wheels has a concentric slot and a single rod engages in the slots of all the wheels, said rod being movable around the same axis as the wheels to restore the wheels to normal in one direction and to allow the wheels to move under the action of the springs in the other direction until stopped by the pawls.

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