

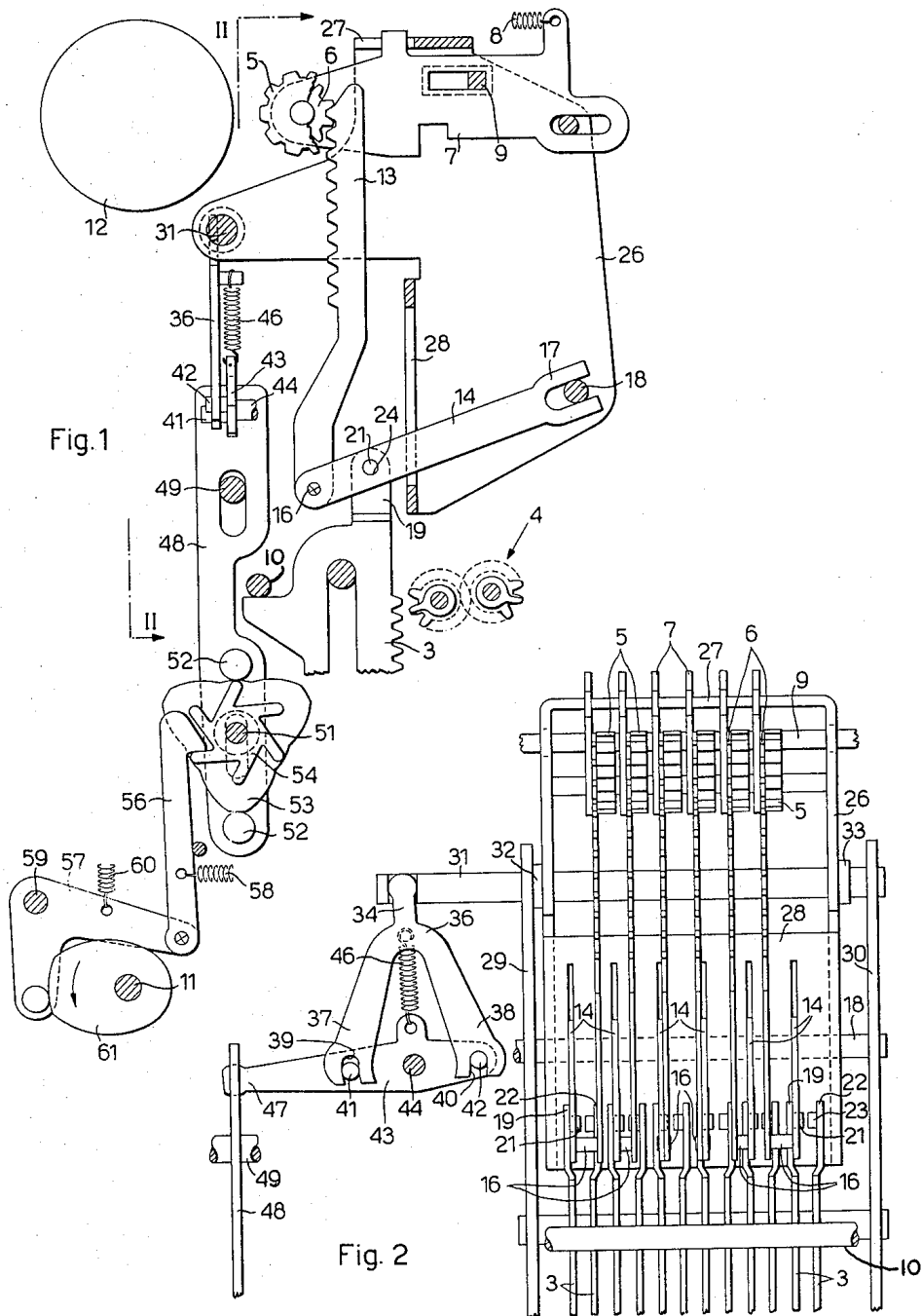
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PRINTING DEVICE FOR ADDING OR LIKE MACHINE

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PRINTING DEVICE FOR ADDING OR LIKE MACHINE

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6 Claims. (Cl. 101-79)

This invention relates to a printing device for an adding or like machine having a set of actuators arranged in paired relationship and differentially movable according to a multiorder amount under the control of a cyclically operable universal bar, said device being adapted to print said amount with orders horizontally spaced a predetermined printing pitch and comprising a plurality of type carriers mutually transversely distanced twice said pitch and each one associated with a pair of adjacent actuators of said set to print said amount during two subsequent cycles, said universal bar.

The printing device of the conventional adding machines comprises a typecarrier for each actuator, whereby the amount is printed in a single cycle and according to a printing pitch equal to the mutual distance of the typecarriers. Due to the transverse size of the typecarriers, this pitch is too wide for some purposes, for example for printing characters to be optically or magnetically recognized.

In a known accounting machine it has been proposed a printing device wherein the typecarriers are mutually distanced twice the printing pitch and are each one associated with a pair of actuators, whereby the amount is printed during two subsequent machine cycles. In this device the actuators control the typecarriers through electromagnets selected by electric switches, whereby the printing device is intricate and expensive to manufacture and not reliable in operation. Furthermore, in order to print the even orders of the amount in the correct position, at the end of each machine cycle the platen is alternately displaced one pitch, whereby the device is unadapted to operate at high speed because of the inertia of the platen.

These disadvantages are obviated by the printing device according to the invention, which is characterized by connecting means for alternately mechanically connecting each one of said typecarriers to the actuators of said pair, shifting means being provided for alternately shifting said typecarriers transversely according to said pitch at the end of each one of said cycles.

Other characteristics and advantages of the invention will become apparent from the following description of a preferred embodiment thereof and from the accompanying drawing, wherein:

FIG. 1 is a left hand longitudinal partial sectional view of an adding machine having a printing device according to the invention;

FIG. 2 is a partial rear view taken on line II-II of FIG. 1.

With reference to the drawing, the adding machine comprises a set of twelve vertically reciprocable actuators 3 arranged in paired relationship and differentially movable upwards according to a multiorder amount represented by either a set up device not shown in the drawing or a totalizer 4 under the control of a universal bar 10 cyclically operable in a known manner by a conventional main shaft 11. The actuators 3 are mounted at a mutual distance different than the printing pitch. Namely the actuators 3 are distanced $\frac{1}{2}$ inch, whereas the printing pitch is $\frac{1}{4}$ inch.

The adding machine is provided with a printing device comprising a plurality of typecarriers formed of six typewheels 5 mutually distanced twice the printing pitch, namely $\frac{1}{4}$ inch. Integral with each typewheel 5 is a pinion 6

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rotatably mounted on a horizontal slide 7 normally urged by a spring 8 to contact another universal bar 9 which is reciprocable in a known manner by the main shaft 11 to cause the typewheels 5 to effect an impact on a conventional paper platen 12.

Each typewheel 5 is associated with a pair of adjacent actuators 3, connecting means being provided for alternately mechanically connecting each typewheel to the actuators of said pair. More particularly, each pinion 6 constantly meshes with a rack 13 connected through an element or pivot 16 to a corresponding lever 14 having a forked end 17 cooperating with a shaft 18. The levers 14 are mutually distanced twice the mutual distance of the actuators 3, namely $\frac{1}{2}$ inch, and are located each one between two adjacent actuators 3. Consequently the various elements 16 connecting the various levers 14 to the corresponding racks 13 have different length from element to element. The actuators 3 of the odd orders (beginning from the left in FIG. 2) are provided with a lug 19 off set leftwards and having a pin 21 directed rightwards. On the contrary, the actuators 3 of the even orders are provided with a lug 22 off set rightwards and having a pin 23 directed leftwards. Each lever 14 is provided with a hole 24 (FIG. 1) adapted to alternately engage the pins 21 and 23 (FIG. 2) of the corresponding pair of actuators 3.

Furthermore, the printing device comprises a common support 26 provided with a comb 27 guiding the slides 7 of the typewheels 5 and with a comb 28 guiding the levers 14. Secured to the support 26 is also the shaft 18 which projects out of the support 26 (FIG. 2) and is axially slidable in a pair of stationary machine frames 29 and 30. Another shaft 31 secured to the support 26 and axially slidable in the frames 29 and 30 is provided with a pair of flanges 32 and 33 adapted to cooperate with the frames 29, and 30 respectively, in order to define a transverse shifting stroke of one printing pitch, namely $\frac{1}{4}$ inch.

The printing device is also provided with shifting means for alternately shifting the typecarriers according to the printing pitch. More particularly, said shifting means comprise a lever 43 pivoted at 44 and provided with a pair of pins 41 and 42 adapted to alternately engage after a lost motion of a pair of notches 39 and 40 provided on two arms 37 and 38 of a forked member 36. Another arm 34 of the member 36 engages a notch provided on the shaft 31, whereas a spring 46 is tensioned between the lever 43 and the member 36 for transmitting motion from the lever 43 to the member 36 yieldably in the two opposite directions.

An end 47 of the lever 43 engages a slot of a vertical slide 48 (FIG. 1) slidably mounted on two stationary shafts 49 and 51 and provided with a pair of pins 52 cooperating with a multilobed cam 53 rotatably mounted on the shaft 51. Secured to the cam 53 is a ratchet wheel 54 adapted to be cyclically advanced one step by a pawl 56. The lobes of the cam 53 are mutually angularly distanced twice the angular pitch of the ratchet wheel 54. The pawl 56 is fulcrumed on a lever 57 and is urged by a spring 58 to engage the wheel 54. The lever 57 is pivoted at 59 and is urged by a spring 60 to contact a cam 61 of the main shaft 11.

The printing device operates as follows.

At the depression of each motor key the main shaft 11 effects in a known manner two subsequent machine cycles of 360 degrees. In the case an add or subtract key is depressed, the totalizer 4 is engaged with the actuators 3 during the second cycle only and the set up device is zeroized at the end of said second cycle. In the case a total key is depressed, during the first cycle the totalizer 4 (FIG. 1) is engaged with the actuators 3 as in a conventional subtotal taking cycle, whereas during the second cycle the totalizer 4 is engaged as in a conventional total taking cycle. Therefore, in both the above cases

the actuators 3 will be differentially moved twice during the two cycles according to the amount to be accumulated into, or to be taken from the totalizer 4.

Normally the multilobed cam 53 holds the slide 48 in its lower position, whereby the lever 43 is located in its counterclockwise position as shown in FIG. 2. In such a position the pin 42 contacts the upper end of the notch 40, whereas the pin 41 is distanced from the end of the notch 39 by a clearance. The support 26 is thus held by the spring 46 in the left position shown in FIG. 2, wherein the holes 24 of the levers 14 engage the pins 21 of the actuators 3 of the odd orders.

During the first part of the first cycle of the shaft 11 (FIG. 1) the actuators 3 of the odd orders rock the levers 14 clockwise around the shaft 18. The racks 13 are thus moved upwards and rock the typewheels 5 according to the figures of the actuator 3 connected thereto. Finally the slides 7 cause the typewheels 5 to print in a manner known per se said figures on the paper platen 12.

During this first part of the cycle of the shaft 11, the cam 61 causes the spring 60 to rock the lever 57 counterclockwise, thus moving the pawl 56 upwards to engage the next following tooth of the wheel 54. Thereafter the cam 61 restores the lever 57 clockwise, whereby the pawl 56 rocks the wheel 54 one step counterclockwise. Now the cam 53 by means of the pins 52 moves the slide 48 upwards, whereby the lever 43 (FIG. 2) is oscillated clockwise.

The lever 43 at first effects a lost motion to cause the pin 41 to contact the end of the notch 39, the spring 46 still urging the member 36 to contact with the end of its notch 40 the pin 42 of the lever 43. Then this lever 43 through the spring 46 rocks the member 36 yieldably clockwise. The shaft 31 is thus shifted rightwards together with the support 26, slides 7, typewheels 5, racks 13 and levers 14, until the flange 33 encounters the frame 30. Since the shaft 31 is now arrested, the member 36 cannot follow the further clockwise oscillation of the lever 43. The pin 42 is now distanced from the end of the notch 40 and the spring 46 is tensioned. The spring 46 urges thus the flange 33 to contact the frame 30 without clearance. The typewheels 5 are thus shifted rightwards a printing pitch, while the levers 14 disengage the pins 21 of the odd actuators 3 and engage the pins 23 of the even actuators 3.

The second cycle of the shaft 11 (FIG. 1) is effected in a similar manner as the first cycle. However during the second cycle the typewheels 5 are rocked according to the figures represented by the even actuators 3, said figures being printed in interspersed positions with respect to the figures printed during the first cycle. In turn the cam 61, through the lever 57, and the pawl 56, rocks the wheel 54 one step together with the cam 53. The slide 48 is thus returned in the lower position and oscillates the lever 43 (FIG. 2), which through the spring 46 returns the member 36 yieldably counterclockwise. The shaft 31 is thus returned leftwards until the flange 32 contacts the frame 29, whereby the pin 41 is again distanced from the end of the notch 39 as shown in FIG. 2.

The support 26 thus returns leftwards the wheels 5 and the levers 14, which reengage the pins 21 of the odd actuators 3.

It will be thus clear that the connecting levers 14 alternately mechanically connect each typewheel 5 to the actuators 3 of the associated pair, and that the shifting lever 43 alternately shifts the typewheel 5 according to the printing pitch.

It is intended that modifications, improvements and additions of parts may be made to the described printing device without departing from the scope thereof.

What we claim is:

1. In an adding and like machine having a set of actuators arranged in paired relationship and differentially movable according to the multiorder amount under the control of a cyclically operable universal bar, and a

printing device for printing said amount with orders horizontally spaced a predetermined printing pitch, said device comprising a plurality of typecarriers mutually transversely distanced twice said pitch and each one associated with a pair of adjacent actuators of said set, said device being adapted to print said amount during two subsequent cycles of said universal bar, the combination comprising:

(a) connecting means for alternately mechanically connecting each one of said typecarriers to the actuators of said pair,

(b) and shifting means for alternately shifting said typecarriers transversely according to said pitch at the end of each one of said cycles.

2. In an adding and like machine having a set of actuators arranged in paired relationship differentially movable according to a multiorder amount under the control of a cyclically operable universal bar, and a printing device for printing said amount with orders horizontally spaced a predetermined printing pitch, said device comprising a plurality of typecarriers mutually transversely distanced twice said pitch and each one associated with a pair of adjacent actuators of said set, said device being adapted to print said amount during two subsequent cycles of said universal bar, the combination comprising:

(a) a plurality of connecting members associated with said typecarriers and each one adapted to alternately connect the associated typecarrier to the actuators of said pair,

(b) a common support for said typecarriers and said members,

(c) means for mounting each one of said members between the actuators of said pair,

(d) and shifting means for alternately shifting said common support transversely according to said pitch at the end of each one of said cycles.

3. In an adding and like machine having a set of actuators arranged in paired relationship and differentially movable according to a multiorder amount under the control of a cyclically operable universal bar, and a printing device for printing said amount with orders horizontally spaced a predetermined printing pitch, said device comprising a plurality of typecarriers mutually transversely distanced twice said pitch and each one associated with a pair of adjacent actuators of said set, said device being adapted to print said amount during two subsequent cycles of said universal bar, the combination comprising:

(a) a plurality of connecting members associated with said typecarriers and each one adapted to alternately connect the associated typecarrier to the actuators of said pair,

(b) a common support for said typecarriers and said members,

(c) means for mounting each one of said members between the actuators of said pair,

(d) shifting means operable for alternately shifting said common support between two transverse positions distanced one pitch at the end of each one of said cycles,

(e) and a multilobed cam adapted to be cyclically advanced one step for operating said shifting means, the lobes of said cam being sequentially effective at each odd step thereof.

4. In an adding and like machine having a set of actuators arranged in paired relationship and differentially movable according to a multiorder amount under the control of a cyclically operable universal bar, and a printing device for printing said amount with orders horizontally spaced a predetermined printing pitch, said device comprising a plurality of typecarriers mutually transversely distanced twice said pitch and each one associated with a pair of adjacent actuators of said set, said device being adapted to print said amount during two subsequent cycles of said universal bar, the combination comprising:

(a) a plurality of connecting members associated with said typecarriers and each one adapted to alternately

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- connect the associated typecarrier to the actuators of said pair,
- (b) a common support for said typecarriers and said members,
- (c) means for mounting each one of said members 5 between the actuators of said pair,
- (d) a shifting lever cyclically oscillatable for alternately shifting said support transversely according to said pitch at the end of each one of said cycles,
- (e) and means for transmitting motion from said lever 10 to said support yieldably in two opposite directions.
5. In an adding and like machine having a set of actuators arranged in paired relationship and differentially movable according to a multiorder amount under the control of a cyclically operable universal bar, and a printing 15 device for printing said amount with orders horizontally spaced a predetermined printing pitch, said device comprising a plurality of typecarriers mutually transversely distanced twice said pitch and each one associated with a pair of adjacent actuators of said set, said device being 20 adapted to print said amount during two subsequent cycles of said universal bar, the combination comprising:
- (a) a plurality of connecting members associated with said typecarriers and each one adapted to alternately connect the associated typecarrier to the actuators 25 of said pair,
- (b) a common support for said typecarriers and said members,
- (c) means for mounting each one of said members 30 between the actuators of said pair,
- (d) a shifting lever cyclically oscillatable for alternately shifting said support transversely according to said pitch at the end of each one of said two cycles,
- (e) a pair of pins on said lever, 35
- (f) a forked member connected to said support and having a pair of arms alternately engageable by said pair of pins after a lost motion,
- (g) and a spring tensioned between said forked member and said lever for transmitting motion from said 40

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lever to said forked member yieldably in two opposite directions.

6. In an adding and like machine having a set of actuators arranged in paired relationship and differentially movable according to a multiorder amount under the control of a cyclically operable universal bar, and a printing device for printing said amount with orders horizontally spaced a predetermined printing pitch, said device comprising a plurality of typecarriers mutually transversely distanced twice said pitch and each one associated with a pair of adjacent actuators of said set, said device being adapted to print said amount during two subsequent cycles of said universal bar, said actuators being mounted at a mutual transverse distance different from said pitch, the combination comprising:

- (a) a plurality of connecting members associated with said typecarriers and mutually distanced twice the mutual distance of said actuators, each one of said members being adapted to alternately connect the associated typecarrier to the actuators of said pair,
- (b) an element for connecting each one of said members to the associated typecarrier, the various elements having different length from element to element,
- (c) a common support for said typecarriers and said members,
- (d) means for mounting each one of said members between the actuators of said pair,
- (e) and shifting means for alternately shifting said common support transversely according to said pitch at the end of each one of said two cycles.

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