Feb. 28, 1967 E. J. ZEITLIN 3,306,537

ALIGNING DEVICE FOR THE PRINTING WHEELS OF AN ELECTRO-MAGNETIC COUNTER

Filed Feb. 3, 1965

2 Sheets-Sheet 1

Fig. 1.

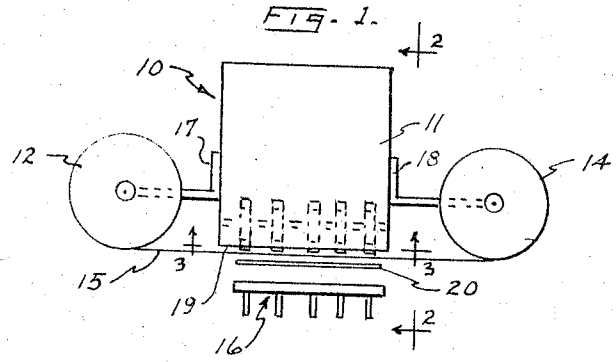


Fig. 2.

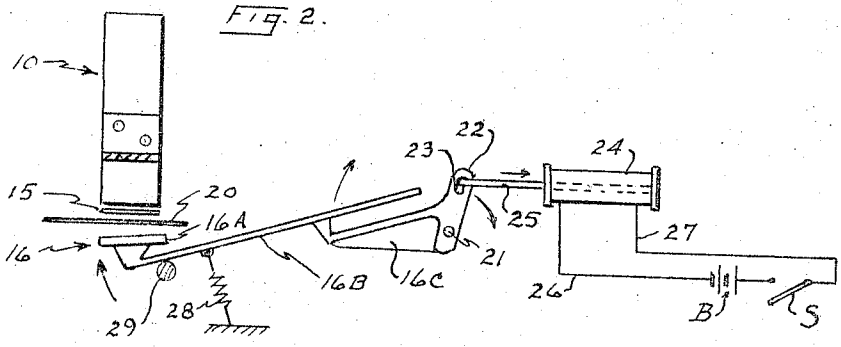


Fig. 5.

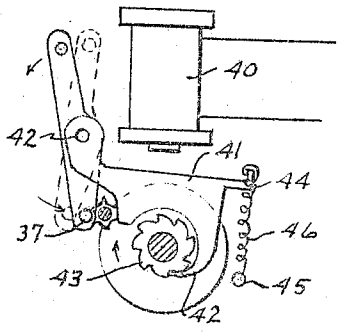


Fig. 7.

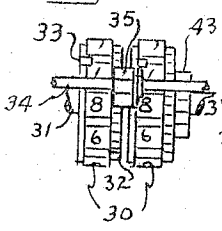
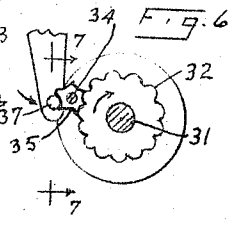


Fig. 6.



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Filed Feb. 3, 1965 2 Sheets-Sheet 2

FIG. 3.

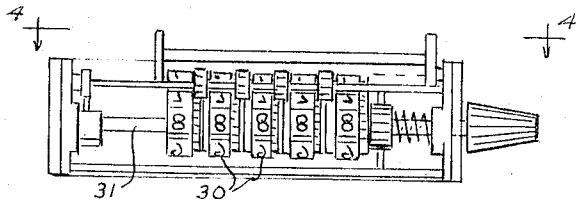


FIG 4

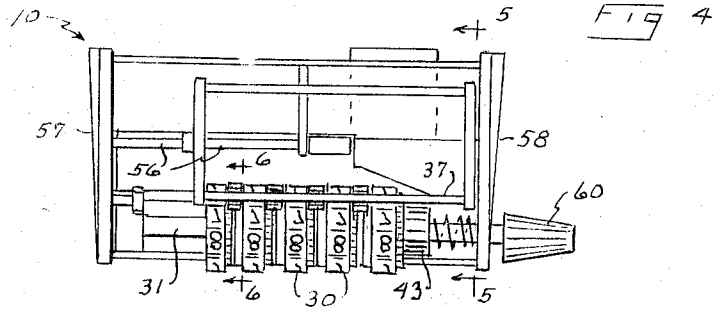
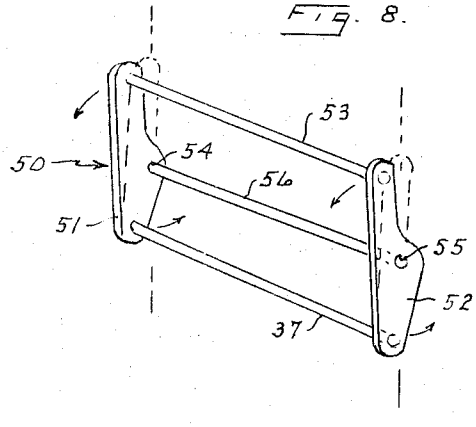


FIG. 8.



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ALIGNING DEVICE FOR THE PRINTING WHEELS OF AN ELECTRO-MAGNETIC COUNTER

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2 Claims. (Cl. 235—131)

This invention relates to counting and printing apparatus for driving a number or letter wheel and arresting the same in a print position and more particularly to apparatus for stopping the same so that all characters or type face elements on the print wheel are aligned in print position and in addition particularly to a gravity balanced alignment bar for maintaining the print wheel in a print position after each step of advance of said print wheel.

In this device the characters face outwardly from the periphery of the print wheel to be rotatably advanced into printing position. As the characters reach the printing position they will immediately pass therefrom or will be held in position for a printing operation. If any print wheel is being advanced it must be moved to an aligned position that is in alignment so that the characters on the wheel moved will be in alignment with the characters on the other wheels, otherwise the wheels will not be in print position and the misalignment would provide very poor print copy.

Because of the alignment bar to selectively arrest the print wheel, the invention is particularly suited to be incorporated in record card or tape printing machines such as recording and accounting machines. Of course the impulse for energizing the printing hammers may come from any source.

Accordingly the prime object of this invention is to provide an improved arrangement of apparatus for driving and stopping a plurality of digit type face printing wheels so that all type thereof can be brought to rest in a predetermined aligned position.

Another object of this invention is to provide an improved arrangement of apparatus which enables a gravity means of positioning the print wheels.

A more specific object of this invention is to provide a detent means on the tens transfer pinion for positioning a plurality of print wheels in aligned relationship with each other after each movement of a wheel.

Other objects of this invention shall be apparent by reference to the accompanying detailed description and the drawings in which

FIG. 1 is a front elevational view of the counter mechanism,

FIG. 2 is a side elevational view taken on line 2—2 of FIG. 1,

FIG. 3 is an end plan view of the counter taken on line 3—3 of FIG. 1,

FIG. 4 is a side elevational view taken on line 4—4 of FIG. 3,

FIG. 5 is a side detailed view taken on line 5—5 of FIG. 4,

FIG. 6 is an enlarged detail illustrating the contact of the alignment bar,

FIG. 7 is a front elevational view taken on line 7—7 of FIG. 6, and

FIG. 8 is a perspective illustration of the alignment bar.

Referring to the drawings and particularly FIG. 1 there is illustrated an electrically driven counting and printing apparatus **10** that includes a counter **11**, a pair of ribbon supporting reels **12** and **14**, that retain an inked ribbon **15**, and a printing hammer **16**. The reels **12** and **14** are supported on either side of said counting and printing apparatus **10** by means of brackets **17** and **18** so

that ribbon **15** may be fed from one reel to the other and pass directly under the printing end **19** of apparatus **10**. The printing hammer **16** is positioned directly below ribbon **15** and in alignment with the printing end **19** of apparatus **10**. A card, tape or paper **20** to be printed upon is interposed between the ribbon **15** and the hammer **16** so that when the hammer is actuated for a printing operation it will press said paper **20** against said tape **15** causing the raised numbers or letters then positioned at the printing end **19** to be recorded on said paper due to the inked ribbon **15**. The operation of said printing hammer **16** is illustrated in FIG. 2. Hammer **16** is comprised of a head **16A** and an arm **16B**. Arm **16B** is fixed or integral with a second arm **16C** that is pivotally mounted on a pivot **21**. Arm **16C** is provided with an extended portion **22** having an aperture **23**. Solenoid **24** has a reciprocable plunger **25** that is pivotally connected to aperture **23** of portion **22**. Solenoid **24** is connected by conductors **26** and **27** in series to a battery B and a switch S. Thus when switch S is closed solenoid **24** is energized and plunger **25** will move to the right FIG. 2. This produces a pivotal movement of portion **22** about pivot **21** and in turn a pivotal movement of **16A**, **16B**, and **16C**, thus causing hammer **16** to produce the necessary pressure stroke for printing. Hammer **16** is returned after each printing stroke by spring **28** and limited in its movement by a stop **29**. The counting and printing apparatus **10** is comprised of a plurality of counting and printing wheels **30** mounted on a common shaft **31**. All wheels are freely rotatable on shaft **31** and all wheels are inter-connected, that is, each wheel in addition to its numbered or lettered printing figures (1 thru 90 in this embodiment) it is provided with a toothed integral gear **32** on one side and a single tooth pocket **33** on the opposite side (FIG. 7). There is a second shaft **34** that supports a small gear **35** situated between each pair of adjacent wheels **30**. Gear **35** is continually in mesh with gear **32** however gear **35** is only actuated one step for each complete revolution of the wheel **30** situated on its right (FIGS. 3, 4, and 7). This is due to the single tooth pocket **33** of wheel **30** picking up the gear **35** on each complete revolution. Thus the transfer count from 9 to 0 on one wheel moves the next wheel from 0 to 1 showing the count of 10 and similarly the count of 99 transfers to the third wheel showing 100 etc. In the rapid transfer operation of printing counters, the inertia of the movement can cause the misalignment of one wheel to another, that is the number or letter sightings or printing positions to vary and produce a poor misaligned or partially printed copy. To remedy this condition it is necessary to impose a stop for each wheel to insure the wheel stopping so that its printing face is aligned with the printing face of the adjacent wheels. Since the wheels are freely rotatable on shaft **31** and gears **35** are freely rotatable on shaft **34** no stop can be imposed on the shafts, however since gears **35** are the means of producing the transfer step the alignment of all gears **35** will produce an alignment of all wheels **30** therefore an alignment bar **37** (FIGS. 4, 6, and 8) is provided. Bar **37** fitting the curvature of the space between teeth on gear **35**, so that when pressed into engagement with all gears **35** a perfect alignment of all wheels **30** will be attained.

Referring to FIG. 5 there is illustrated the stepping relay **40** operated by a counting circuit (not shown). Each time the relay **40** is energized the armature **41** that is pivotally mounted at **42** will be picked up. Armature **41** has a curved drive finger **42** that moves counter-clockwise over a drive gear **43** when armature **41** is lifted. Armature **41** is connected at its outer limit **44** to a stationary point **45** by a spring **46**. This armature **41** is snapped down when relay **40** releases and in turn pushing

finger 42 clockwise. Finger 42 is pressed against gear 43 and it will engage a tooth thus turning gear 43 one step clockwise. Since gear 43 is attached to the first wheel 30 it will advance the first wheel 30 one step for each time relay 40 is energized. The first wheel 30 will make 9 stops when gear 35 will pick up pocket 33 and advance the second wheel one stop as already described. As gear 43 steps clockwise wheel 30 will be moved clockwise and gear 35 will be moved counterclockwise. When any gear 35 is moved counter-clockwise the alignment bar 37 will be forced outward to the left (FIG. 6) and will immediately fall back into the next notch of gear or gears 35 stopping them all in an aligned relationship. Referring to FIG. 8 it is apparent that the alignment bar 37 is part of a frame 50. Frame 50 is comprised of two parallel end supports 51 and 52. The frame 50 includes bar 37 at the bottom and a bar 53 at the top to hold the rectangular frame in the relationship as shown. The ends 51 and 52 are provided wtih aligned apertures 54 and 55 to permit mounting the frame 50 in a pivotal relation on a shaft 56. Shaft 56 is supported between the sides 57 and 58 of the counter-printer 10. It is to be noted that the ends 51 and 52 of frame 50 are shaped so that the apertures 54 and 55 are offset so that the frame 50 may hang by gravity as illustrated in FIG. 8 and because of the unequal weight distribution bar 53 will tend to hang or swing out (counterclockwise) while bar 37 will tend to swing in (counterclockwise). This unbalancing of frame 50 permits the alignment bar 37 to move outward when forced outward by gear 35 (FIG. 5 dotted position) but alignment bar 37 swings in (counter-clockwise) by gravity and aligns all gears 35 and in turn all wheels 30 for each step of movement of wheels 30

Shaft 31 is also provided with a hand or finger setting knob 60 to permit resetting the counter.

Although the counter may be operated at a high speed it is to be noted that gear 35 will move the alignment bar only once for each complete revolution of a wheel 30 thus the gravity positioned alignment bar 37 has ample time to drop back and hold all gears 35 in alignment and in turn all wheels 30 in alignment.

Although FIG. 8 shows the principle of operation it is to be understood that the unbalance may be increased or decreased as desired and of course the weight of unbalance may be accurately designed for the most desirable effect.

Although this invention has been described with relation to a counting and printing apparatus it is to be understood that the principles of aligning a plurality of wheels to provide a visual or recorded record shall apply to any other device having similar structure without departing from the spirit of this invention and this invention shall be limited only by the appended claims.

I claim:

1. In a counting and printing apparatus having a counteractuating drive

a plurality of counting wheels mounted in a row in adjacent relationship on a single shaft and freely rotatable thereon,

a first counting wheel connected to said counter-actuating drive,

each wheel provided with indicia on its surface,

each wheel provided with an integral gear on one side and a single gear pocket on the opposite side,

a plurality of inter-connecting gears mounted on a second shaft and freely rotatable thereon,

said interconnecting gears provided with a plurality of teeth and having a rounded curvature from tooth to tooth,

each inter-connecting gear positioned between two adjacent counting wheels and meshed with the integral wheel gear and meshable with the single pocket of the adjacent gear,

a pivotally mounted frame that is mounted on one side of said counting wheels and is provided with a straight alignment bar that extends from one side of said row of counting wheels to the other side.

said alignment bar positioned to abut with each interconnecting gear and to fit the curvature of said gear between teeth to hold all gears in an aligned relationship,

said pivotal frame being unbalanced so that the force of gravity will always drop said frame when free in a counter-clockwise direction,

said pivotal frame movable in a clockwise direction by the thrust of said interconnected gears when they are driven by the counter drive.

2. In a counting and printing apparatus as set forth in claim 1 in which said indicia are in the form of type, and in which an inked tape is retained under said wheels of said counting and printing apparatus and in which a printing hammer is positioned under said inked tape and in which a paper is positioned above said printing hammer and below said inked tape to receive the transcribed record of the counting and printing apparatus.

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