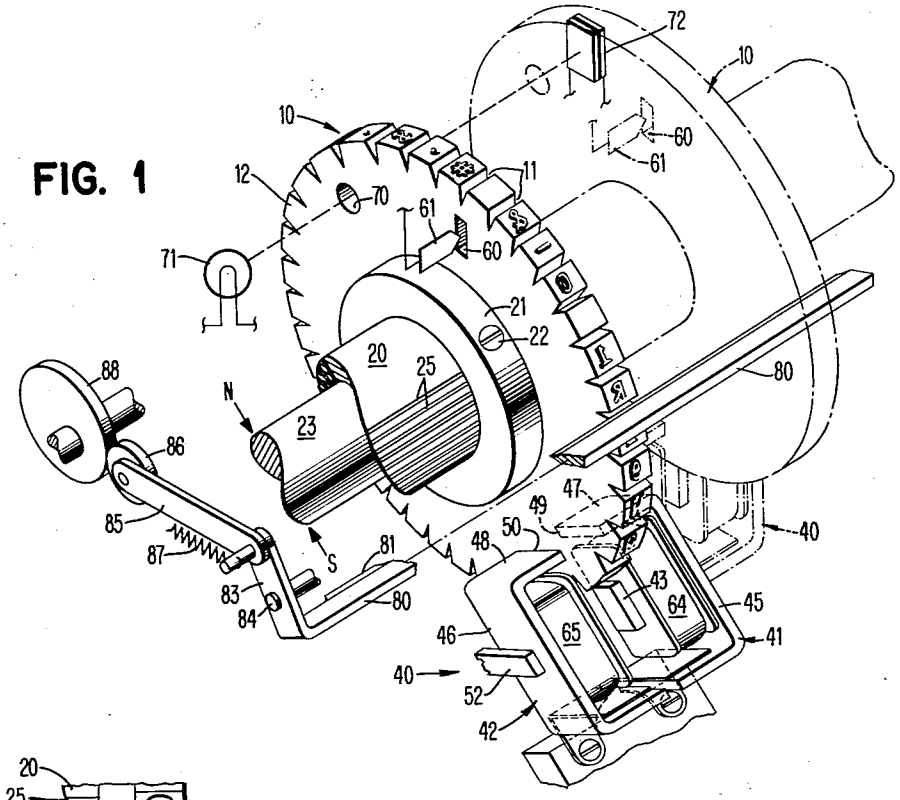
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DRIVING APPARATUS

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FIG. 1



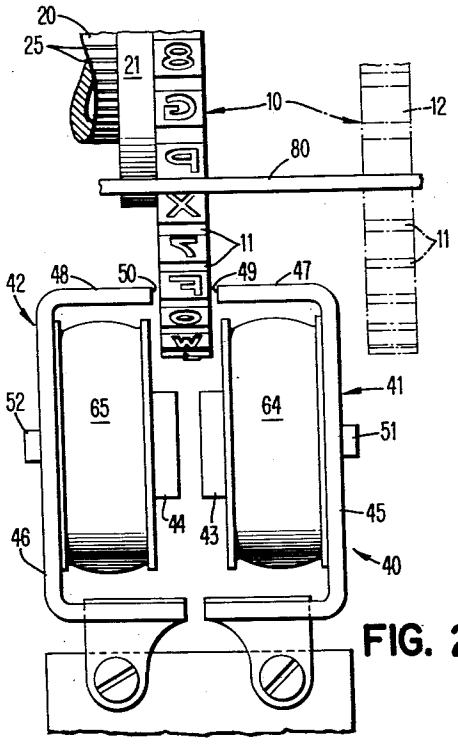


FIG. 2

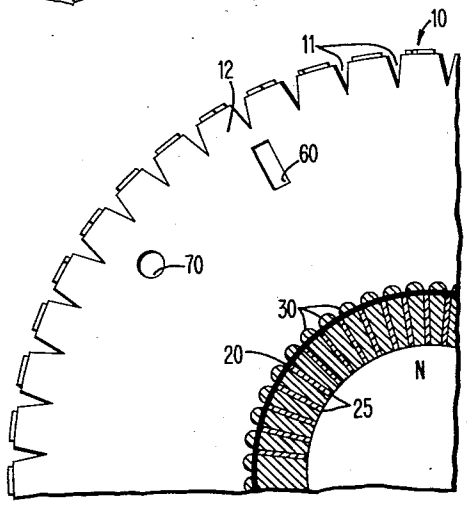


FIG. 3

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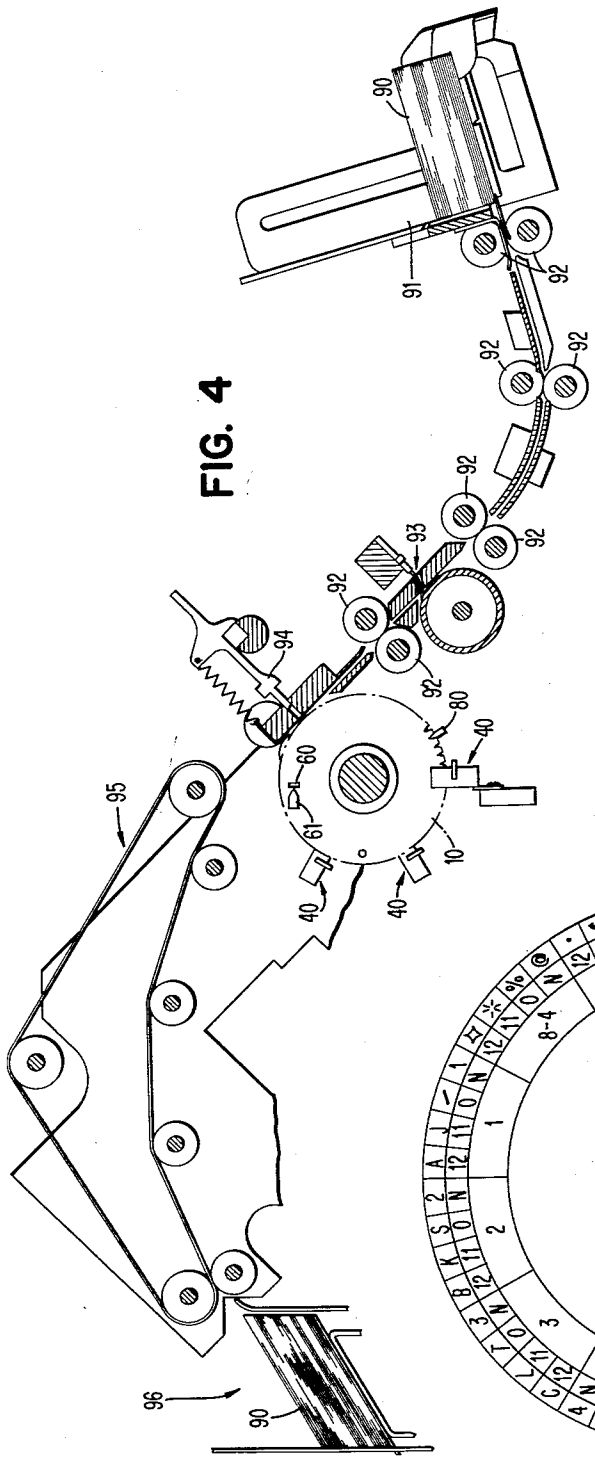


FIG. 4

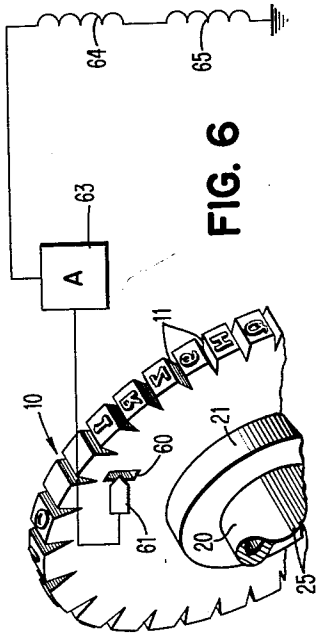


FIG. 6

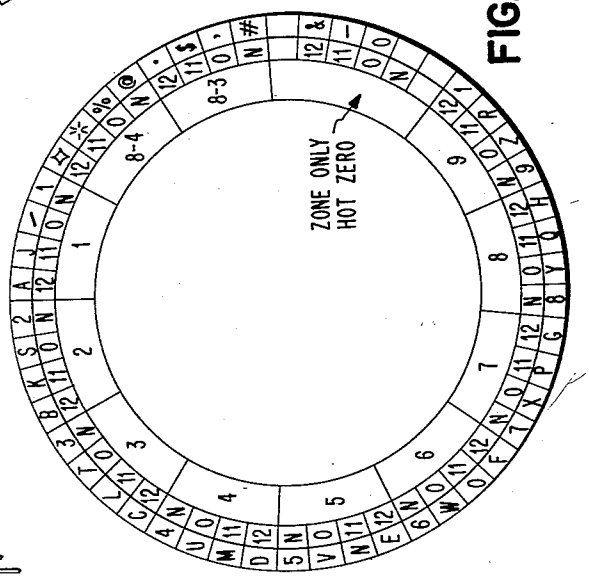


FIG. 5

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DRIVING APPARATUS

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7 Claims. (Cl. 101—93)

This invention relates to apparatus for driving a member and selectively arresting the same, particularly to apparatus for driving a print wheel and stopping the same so that a selected character or type face element on the print wheel is aligned in print position and, more particularly, to apparatus for driving a print wheel through a magnetic detenting type of coupling and selectively arresting the print wheel by an overriding magnetically operated pinch brake.

The magnetic detenting type of coupling enables the type characters formed to face outwardly from the periphery of the print wheel to be rotatively 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, depending upon whether or not the overriding magnetically operated pinch brake is operated. If the print wheel is arrested for a printing operation, then, after the printing operation, the print wheel is picked up by the drive shaft therefor in the proper relative angular relationship because of the magnetic detenting type of coupling. While the print wheel is arrested, the shaft for driving the same continues to rotate.

Because of the ability to selectively arrest the print wheel, the invention is particularly suited to be incorporated in record card controlled printing machines, such as an interpreter, and accounting machines. Of course, the impulse for energizing the overriding magnetically operated brake could come from any source.

Accordingly, a prime object of the invention is to provide an improved arrangement of apparatus for driving a member so that any selected segment thereof can be brought to rest in a predetermined position.

Another object of the invention is to provide an improved arrangement of apparatus which enables selective positioning of a print wheel.

A more specific object of the invention is to provide apparatus for selectively positioning a print wheel which is relatively of simple construction.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a perspective view showing one embodiment of the invention;

FIG. 2 is a front elevational view of the embodiment shown in FIG. 1;

FIG. 3 is a detail view partially in section of the magnetic detent type of coupling;

FIG. 4 is a schematic showing of the invention as incorporated in a record card controlled interpreter;

FIG. 5 is a schematic view illustrating the characters or type faces formed upon the periphery of the type wheel of the interpreter shown in FIG. 4; and,

FIG. 6 is a schematic circuit diagram showing the circuitry for energizing the coils of the magnetic pinch brake.

Referring to the drawings and particularly to FIG. 1, the invention is shown by way of example as a plurality of type wheels **10** journaled upon a shaft **20** of a magnetic detent type of coupling. The rotatable type wheels **10** are positioned adjacent to each other and are restrained from movement along the longitudinal axis of the shaft **20** by means of a collar **21**, or any other suitable device secured to the shaft **20** by any suitable fastening means such as set screw **22**.

The shaft **20**, as shown in FIGS. 1 and 3, is hollow and is secured about a cylindrical ceramic permanent magnet **23**. The shaft **20** driven by a suitable driving source, not shown, is made from non-magnetic material such as aluminum or a magnesium alloy. In the area journaling the type wheels **10**, the shaft **20** is provided with a plurality of arcuately spaced longitudinal slots **25**. The slots **25** are spaced from each other to correspond with the positions of the type elements upon the type wheel. The slots **25** are filled with magnetic material such as soft iron. Various other forms of construction can be utilized, for instance, the ceramic magnet **23** or any other permanent magnet could be provided with semicircular slots which are filled with non-magnetic bearing material.

The inner periphery of the type wheels **10**, FIG. 3, is provided with a plurality of arcuately spaced outwardly opening semicircular notches **30** filled with non-magnetic material, preferably bearing material such as bronze. The notches **30** correspond to the segments of the shaft **20** lying between the slots **25**. By this arrangement, when the shaft **20** is driven together with the cylindrical magnet **23**, the type wheels will be rotated therewith, because the magnetic lines of force developed by the central cylindrical magnet **23** permeate the iron filled in the slots **25** of the shaft **20** and cross into the type wheel, which is also of iron, or other magnetic material.

The individual type wheels **10** are adapted to be arrested by means of an associated selectively operable overriding pinch brake **40**, FIGS. 1 and 2, consisting of a pair of pivotally mounted magnets **41** and **42** having their cores **43** and **44** facing each other and adapted to be attracted toward each other. The magnets **41** and **42** are attached to brackets **45** and **46** having arms **47** and **48** adapted to have their end faces **49** and **50**, respectively, abut against the sides of the associated type wheel **10** when the magnets **41** and **42** are energized. The pivotally mounted magnets **41** and **42** are prevented from pivoting away from each other by fixed stops **51** and **52**. The clearances between the end faces **49** and **50** of the brackets **45** and **46** and the sides of the associated type wheels are exaggerated. The end faces **49** and **50** of the brackets **45** and **46** would normally lie in contact with the sides of the type wheel. Hence, when the magnets **41** and **42** are energized, the brackets **45** and **46** will immediately exert a grip upon the type wheel **10** to arrest the same. The spacing between the cores **43** and **44** of the magnets **41** and **42** is such that the end faces **49** and **50** of the brackets **45** and **46** will grip the sides of the type wheel **10** with a minimum spacing between the ends of the cores **43** and **44**. Of course, the magnets could be held stationary while just the armatures are permitted to pivot to grip the sides of the type wheel. Additionally, the spacing between type wheels may require a particular configuration for the armature. However, these modifications are ones capable of being made by any person skilled in the art.

The shaft **20** is constantly rotating; and, therefore, the type wheels **10** are also constantly being rotated unless arrested by the associated magnets **41** and **42**, when the same have been energized. The magnets **41** and **42** may be selectively energized from any suitable source. For instance, the type wheels **10** in this example are provided with a recessed slot **60**, as shown in FIG. 1, to be sensed by a suitably disposed magnetic head **61**. The slot **60** represents the home or restored position of the type wheel **10**. The magnetic head **61**, upon sensing the slot **60**, develops a signal which is amplified by an amplifier

63, FIG. 6, and transmitted to energize the coils 64 and 65 of the magnets 41 and 42 to arrest the type wheel 10 in home position.

In order to determine whether or not all of the type wheels 10 have been brought to or restored to the home position after the same have been selectively arrested for a printing operation by means of other electrical impulses transmitted to the magnets 41 and 42, such as by electrical impulses emanating in response to sensing a record card, the individual type wheels 10 are each provided with an aperture 70 positioned so that, when all of the type wheels 10 are aligned in the home position, lightwaves, generated by a lamp 71 positioned adjacent one end of the bank of type wheels, will pass through the apertures 70 and activate a photosensitive element 72 posiioned adjacent to the other end of the bank of type wheels. In the event all of the type wheels 10 are not aligned in the home position, a signal will not be generated and, therefore, the magnets 41 and 42 associated with each type wheel 10 will be de-energized, thereby permitting the type wheels 10 to rotate. The magnetic heads 61 then again sense the home marks 60 to develop a signal to energize the magnets 41 and 42 for arresting the type wheels 10. If the type wheels fail to align in the home position after a predetermined number of attempts to do so, an error light would come on and the machine would be stopped. After all the type wheels 10 have been aligned in the home position, a new cycle can take place to selectively arrest the individual type wheels so as to set up a new line of print.

When the individual type wheels 10 have been arrested so that the selected character thereon is in print position, a cyclically cam-operated alignment bar 80, FIG. 1, extending the length of the bank of type wheels 10 precisely aligns all of the type wheels so that all of the selected characters are in alignment for the printing operation. The alignment bar 80 is provided with a V-shaped portion 81 for engaging the inclined sides 11 of the teeth or projections 12 upon which the type characters are disposed. The type wheels 10 are always arrested by the magnets 41 and 42 so that the sides 11 of teeth 12 are engageable by the V-shaped portion 81 of the alignment bar 80. Therefore, upon actuation of the alignment bar 80, the type wheels 10, if not already precisely aligned so that the selected type characters are in the print position, are precisely aligned.

The alignment bar 80 is attached, or integral with, at each end to one end of an arm 83 pivotally mounted on a stationary shaft 84. The other end of the arm 83 is attached to one end of a link 85 rotatably carrying a cam follower 86 at its other end. The cam follower 86 is urged by a spring 87 to follow a rotatably mounted cam 88. The spring 87 normally holds the alignment bar 80 out of engagement with the type wheels. The cam 88 is rotated continuously by a suitable driving source and is contoured so that the alignment bar 80 is moved, just prior to print time, to precisely align the type wheels 10.

The invention is particularly suited to be incorporated in a record card interpreting machine. Generally, in a record card interpreting machine, perforations existing in coded form in a record card are sensed as the record card passes relative to a sensing mechanism. Upon sensing the perforations, electrical impulses are developed which are utilized to set up the printing mechanism. The printing mechanism is then caused to print upon the previously sensed record card the information represented by the perforations in the record card. In this manner, the record card may be visually read by a record card machine operator without having to decipher the information represented in coded form by the perforations.

FIG. 4 schematically illustrates a record card controlled interperter incorporating the present invention. The record cards 90 to be interpreted are contained in a conventional record card hopper 91. The record cards 90 are picked in seriatim by the conventional picker knife to be advanced to a first pair of cooperating feed rollers 92 of a series of spaced pairs of feed rollers 92 for conveying the record cards relative to a sensing station 93 and then bringing them to the print position between the type wheels 10 and print hammers 94. The record cards 90, after a printing operation, are conveyed by a belt and cooperating roller conveyor 95 to a card stacker 96.

The type wheels 10 rotate in synchronism with the record cards 90 which have twelve rows of index positions where each index position in each row is able to represent data according to a particular code such as represented upon the type wheel in FIG. 5. Hence, as a perforation is encountered in a particular row and column by the sensing mechanism at sensing station 93, an electrical impulse is transmitted to energize the magnets 41 and 42 to arrest the type wheel 10 for that particular column. For instance, assuming the record cards 90 are being fed "9" edge first, then, upon sensing a perforation in row nine for any particular column will cause the magnets 41 and 42 to arrest the type wheel 10 for the particular column so that type character nine is in print position. Further, assuming that the machine is capable of printing alphabetic and special characters such as asterisks, dollar signs, etc., then the print wheels, after being arrested upon the sensing mechanism encountering a perforation in the numeric rows nine through one, are permitted to rotate as the zone rows, zero, eleven and twelve, pass relative to the sensing mechanism 93. If a perforation is encountered as the zone rows pass relative to the sensing mechanism, the type wheel is again arrested so that the type characer represented by the combination of a numeric perforation and a zone perforation is in print position. If no zone perforation is encountered, a timed impulse is emitted to re-energize the magnets 41 and 42 to arrest the print wheel with the numeric character in print position. After the type wheels 10 are finally arrested, the alignment bar 80 is actuated by cam 88 to precisely align all of the type wheels. With the type wheels aligned, the print hammers 94 are operated to effect a line of printing. After the print hammers restore, the type wheels are permitted to rotate by de-energizing the magnets 41 and 42 to permit the type wheels to be restored to the home position. To enable high speed restoration of the type wheels, the shaft 20 is clutched to a higher speed drive, not shown. Hence, any desired 2-speed drive may be provided to drive the shaft 20 through a suitable clutch.

The magnetic heads 61 sense the home position slot 60, thereby developing a signal to energize the magnets 41 and 42 which, in response to the developed signal, act to arrest the type wheels 10. If the type wheels are all arrested in the home position, the photosensitive element 72 is activated by the lightwaves generated by the lamp 71 and passing through the apertures 70 in the type wheels 10. The photosensitive element 72, upon being activated, generates a signal to energize the coils of the magnets 41 and 42 associated with each type wheel to hold the same in the home position until a new cycle of operation is to take place.

It is thus seen that, within any one machine cycle, there is a period for sensing the perforations in the record cards and setting the type wheels in response to the information sensed, a period for printing by actuating the print hammers and a period for restoring the type wheels to the home position. The mechanism for advancing the record cards is controlled by a selectively operable clutch which is actuated only after the type wheels are restored and aligned in the home position.

From the foregoing, it is seen that an arrangement of apparatus is provided to drive a member so that any selected segment thereof can be brought to rest at a predetermined position. More specifically, it is seen that a drive is provided for a print wheel which has a definite

relationship relative to the shaft journaling the same. The shaft and print wheel are relatively coupled through a magnetic detent type of coupling. A selectively operable magnetic pinch brake arrests the print wheel so that a selected type character is in print position by overriding the magnetic detent coupling. After the print wheel is permitted to rotate again, the print wheel is picked up in a definite relative driving relationship by the magnetic detent coupling.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. Apparatus of the type described comprising: a continuously driven shaft, said shaft having at least one longitudinal section thereof consisting of a permanent magnetic core, a non-magnetic sleeve fixedly embracing said magnetic core, said sleeve having a plurality of arcuately spaced longitudinal slots, and a plurality of magnetizable members fixedly disposed within said slots; an annular disc of magnetic material journaled upon said sleeve, the inner periphery of said annular disc having a plurality of arcuately spaced notches, whereby a detent type of magnetic coupling is establishing between said driven shaft and said disc so that the same is caused to rotate with said driven shaft in a definite angular relationship relative thereto; and selectively operable magnetic means for arresting said disc by gripping the same.

2. Apparatus of the type described as in claim 1, wherein said notches in said disc are filled with non-magnetic bearing material.

3. Apparatus of the type described as in claim 2, wherein a plurality of arcuately spaced type faces are disposed upon the outer periphery of said disc.

4. Apparatus of the type described as in claim 3 wherein said selectively operable magnetic means comprises a first pivotally mounted electromagnet; an arm having a laterally projecting member carried by said first electromagnet, said laterally projecting member being adapted to come against one side of said disc upon pivoting of said first electromagnet; a second pivotally mounted electromagnet; and an arm having a laterally projecting member carried by said second electromagnet so as to come against the other side of said disc upon pivoting of said second electromagnet, said first and second electromagnets pivot toward each other upon being energized.

5. In a record card controlled machine, a constantly rotating drive shaft; a print wheel having a plurality of arcuately spaced type faces disposed upon the outer periphery; a magnetic detent type of coupling means coupling said print wheel with said drive shaft, whereby said type faces are progressively brought into print position; and a selectively operable overriding magnetic pinch brake for arresting said print wheel so that a selected type face is held in print position.

6. In a record card controlled machine as in claim 5 including an alignment bar adapted to precisely align said print wheel after the same has been arrested by said overriding magnetic pinch brake.

7. In a record card controlled machine as in claim 6, wherein said print wheel is provided with a sensible indicator indicative of a home position; and sensing means for sensing said indicator, said sensing means being operatively connected to said magnetic pinch brake whereby the same is operated to arrest said print wheel upon said sensing means sensing said indicator.

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