

[54] IMPRINT WHEEL ASSEMBLY	1,644,144	10/1927	Osborne et al.	101/110
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	3,646,885	3/1972	Kolody.....	101/328
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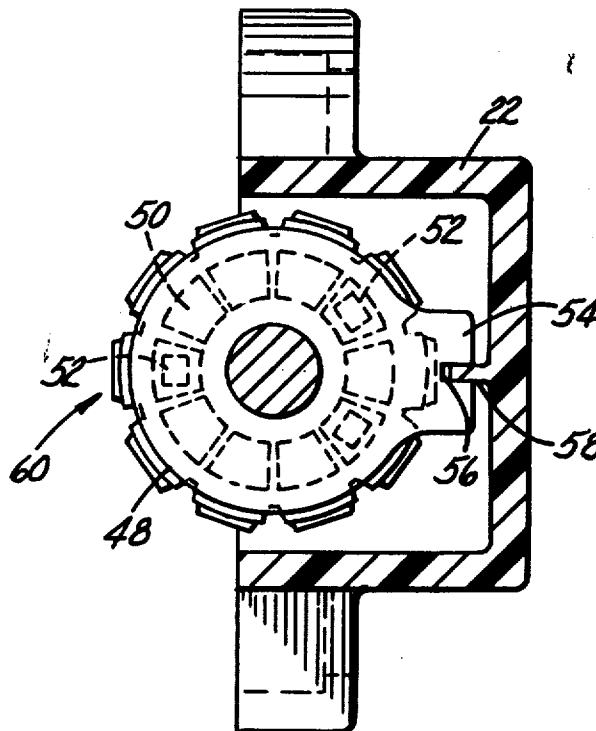
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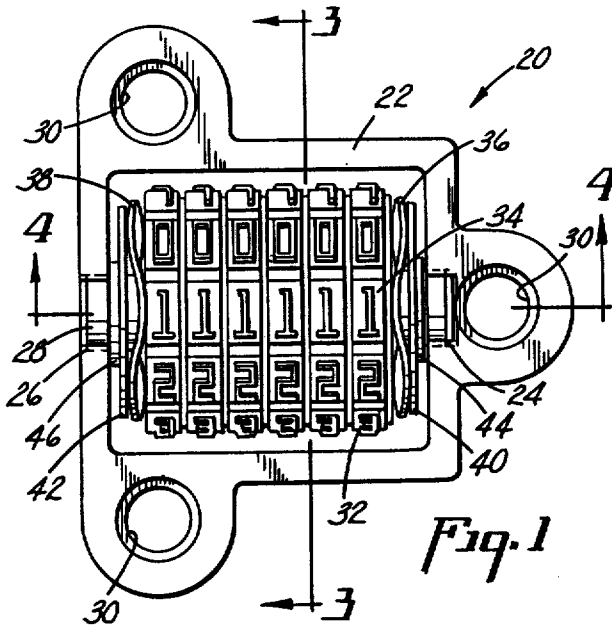
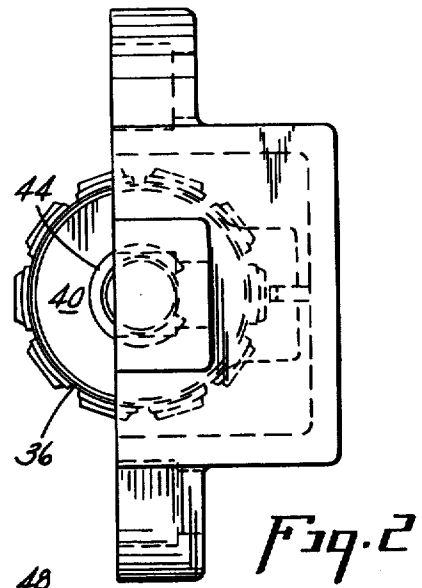
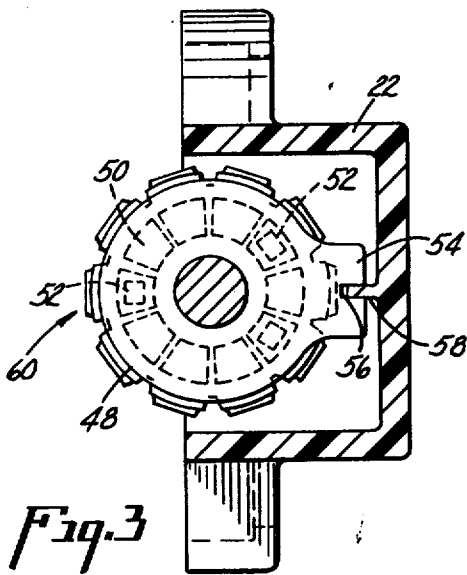
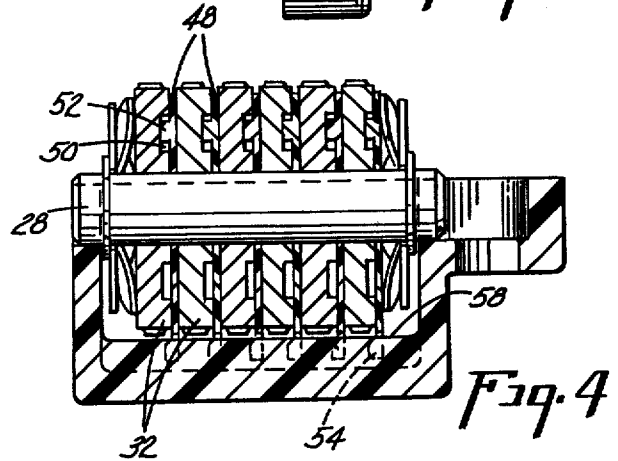
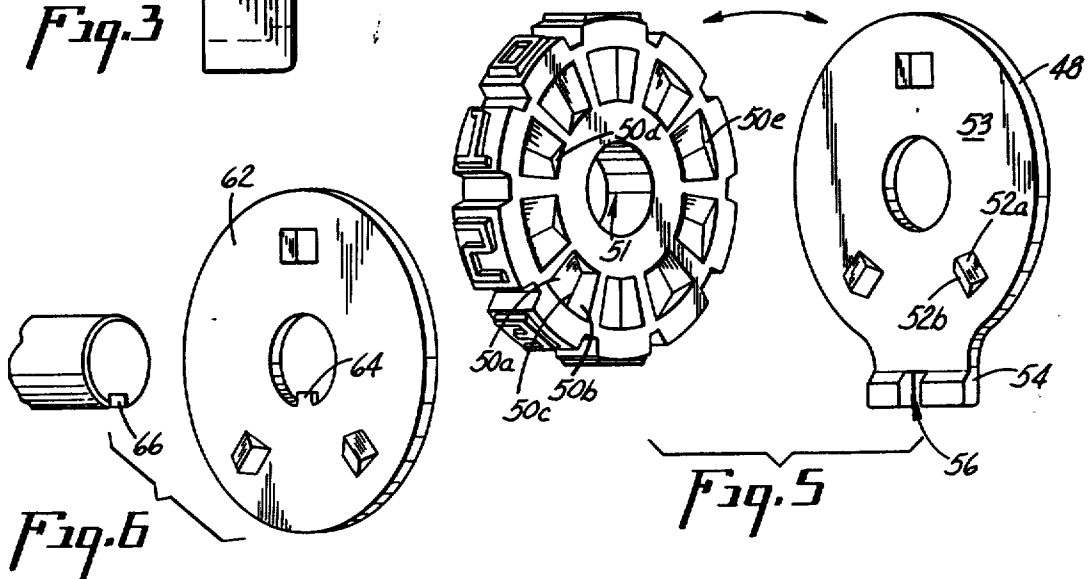
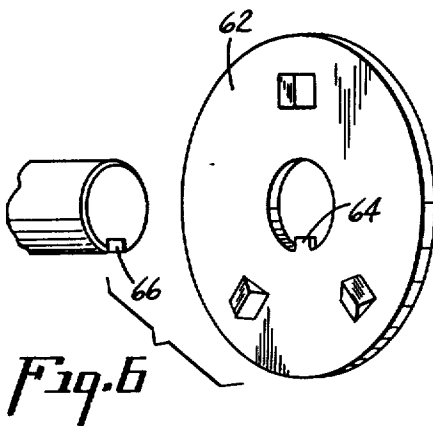
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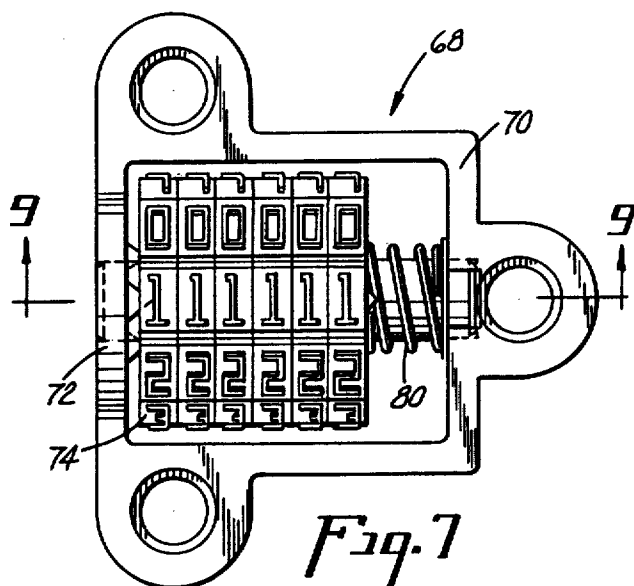
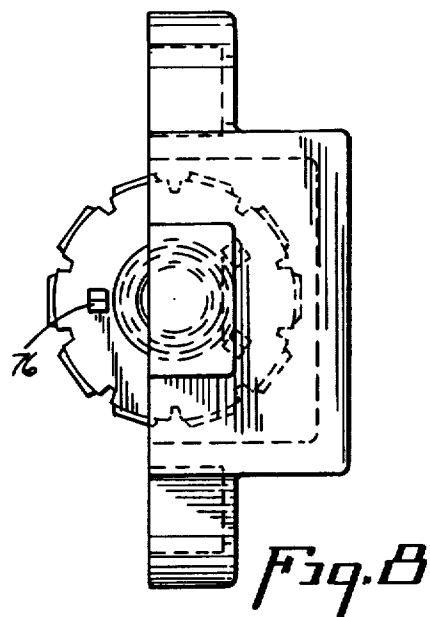
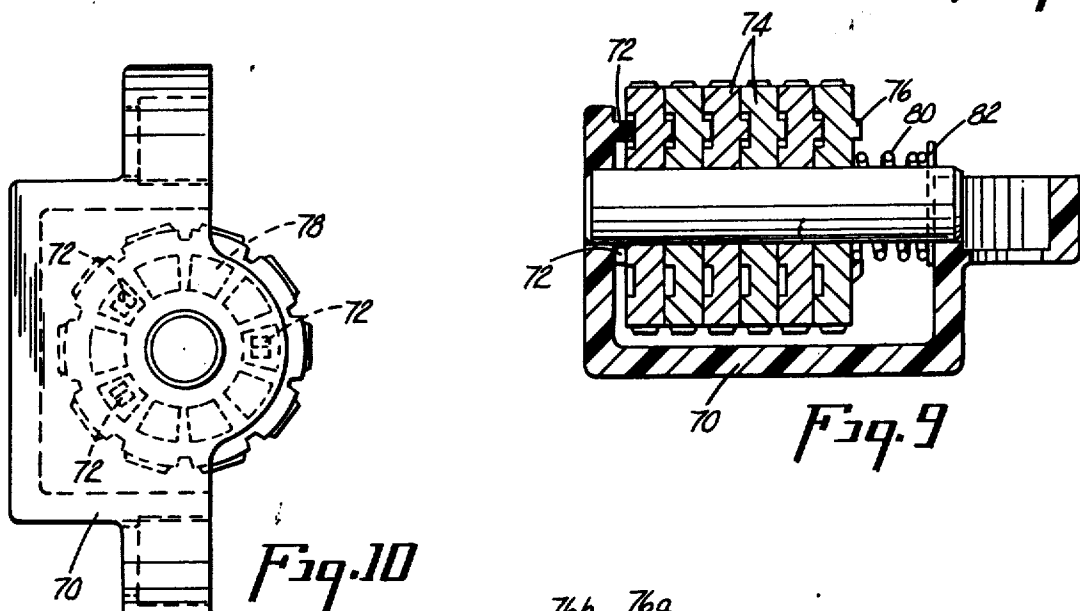
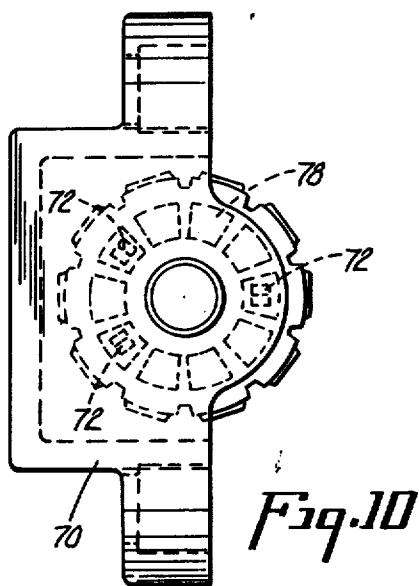
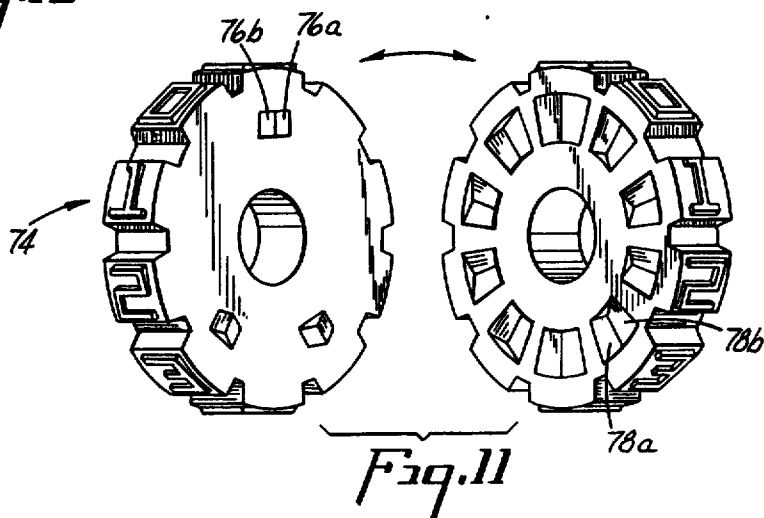
[57] ABSTRACT

An imprint wheel assembly is provided including a plurality of imprint wheels, means biasing the wheels axially toward each other, and detent means associated with each wheel for axially detenting such in a selected index position for imprinting of a selected date or other information.

6 Claims, 11 Drawing Figures







IMPRINT WHEEL ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention is generally related to print wheels, and more particularly, to a selectively settable imprint wheel assembly which is mountable upon the frame of an imprint machine, such as a data recorder.

Various imprint wheel assemblies have been provided in the past which generally included a support frame having a shaft on which individual imprint wheels were rotatably mounted in side-by-side relation. An appropriate detenting means was mounted either within the support shaft or outwardly thereof and, typically, acted upon a cerated periphery on each imprint wheel to retain such in position. As the wheels were set by a stylus, or other appropriate means, they were indexed from one position to the next under the influence of the detenting means. This type of detenting applies relatively mild retaining forces to the imprint wheels in order to hold them in position during the imprint operation. Such detenting means may be referred to as "non-locking" or "yieldable" as such does not positively lock the wheel in place.

Conventional imprint wheel assemblies have, for the most part, required a considerable number of parts, particularly for detenting, which increased the production costs. The large number of parts also rendered such assemblies susceptible to mechanical wear and failure, leading to periodic maintenance or replacement. The complexity of many conventional detent mechanisms often resulted in inaccurate detenting, such that the wheels were not indexed to a level position necessary for clear imprinting.

It is an object of the present invention to provide a novel imprint wheel assembly which is comprised of a minimum number of parts, is durable, reliable, and relatively inexpensive to manufacture and maintain.

Another object of the present invention is to provide a unique imprint wheel assembly including means which axially detents each of the wheels to hold such in proper position necessary for clear imprinting.

It is a further object of the present invention to provide a versatile imprint wheel assembly including a compact detent means associated with each imprint wheel to provide axial detenting, yet allowing the wheels to be mounted closely together.

Still another object of the present invention is to provide a novel yieldable detent mechanism for imprint wheels, or the like, which utilizes slight axial displacement of each wheel against an axial biasing spring during manual rotation, the spring being effective to axially return the wheel for accurate detenting at the selected position.

SUMMARY OF THE INVENTION

The imprint wheel assembly of the present invention is provided with a plurality of wheels mounted adjacent each other for rotation about a common support shaft. One embodiment of the invention includes disc-like detent members each axially adjacent to an imprint wheel. One side of each wheel is provided with a plurality of detent surfaces, preferably grooves, which cooperate with corresponding surfaces on the adjacent detent member. Engagement of the detent surfaces is encouraged by a biasing spring, such as a wave washer, which axially biases the opposite detent surfaces toward each other.

Preferably, each detent is defined by a pair of planar surfaces, oppositely sloped and at an angle to the axis of rotation. This provides a type of axial tooth and groove connection between each wheel and detent member. The imprint wheels are set individually with a stylus, or the like, with the detent means yielding to the force of the stylus to allow rotation. The planar detent surfaces slide over each other in a wiping type engagement during adjustment. When the detent teeth are brought into general alignment with the next set of detent surfaces, the spring axially displaces the wheel toward the detent member. The oppositely sloped surfaces defining each groove provide centering of the teeth, whereby the wheel is accurately detented at a level position to assure a clear imprinting. During the setting operation, the detent members are held against rotation by keying or otherwise fastening such to the support shaft or housing.

A second form of the invention is hereinafter described which is similar in detent operation to the above-mentioned embodiment, but does not require a separate detent member for each imprint wheel. Detenting is effected by cooperating detent surfaces formed on the opposite sides of the adjacent wheels. Proper indexing is assured by providing the housing with a set of stationary detent teeth which coact with one of the end wheels. The wheels are axially biased toward each other during adjustment. When setting each wheel, the operator manually holds the previously set adjacent wheel to prevent its movement.

It will be appreciated that the imprint wheel assembly of the invention is comprised of a minimum number of parts and, as such, is relatively inexpensive to manufacture and maintain. The overall construction also leads itself to convenient disassembly for changing or replacement of the wheels or other components in the event such should be necessary.

DESCRIPTION OF THE DRAWINGS

These and other features and advantages of the present invention will become apparent to those skilled in the art upon an understanding of the embodiment shown in the drawings wherein:

FIG. 1 is a top plan view of a first embodiment of the imprint wheel assembly according to the present invention.

FIG. 2 is an end elevation of the assembly shown in FIG. 1 looking from the right end.

FIG. 3 is a sectional view taken along section 3—3 of FIG. 1.

FIG. 4 is a sectional view taken along section 4—4 of FIG. 1.

FIG. 5 is an exploded perspective view of an imprint wheel and associated detent member, looking in opposite directions.

FIG. 6 is an exploded perspective view of a second form of detent member and associated shaft, looking in opposite directions.

FIG. 7 is a top plan view of a second embodiment of the imprint wheel assembly of the present invention.

FIG. 8 is an end elevation of the assembly shown in FIG. 7, looking from the right end.

FIG. 9 is a sectional view taken along section 9—9 of FIG. 7.

FIG. 10 is an end elevation of the assembly shown in FIG. 7, looking from the left end.

FIG. 11 is a perspective view of a pair of adjacent imprint wheels looking from opposite directions.

DESCRIPTION OF THE EMBODIMENT

Referring now, more particularly, to FIGS. 1-4, a first embodiment of the imprint wheel assembly of the present invention is illustrated and is generally indicated by the numeral 20. The assembly includes a housing or frame 22, preferably of plastic or other synthetic material, which supports a shaft 28 on bearing surfaces 24 and 26. Housing 22 is provided with appropriate mounting holes, as indicated at 30, for mounting the wheel assembly to a data recorder or other structure.

The assembly is provided with a plurality of imprint wheels 32 rotatably mounted to support shaft 28 and axially disposed of each other. Each imprint wheel is provided with a series of circumferentially spaced type faces 34, each bearing an embossed alphanumeric character, such as the numbers illustrated in FIG. 1. Imprint wheels 32 are biased axially toward each other under the influence of a pair of wave washer springs 36 and 38 mounted near opposite ends of shaft 28. A pair of retaining washers 40 and 42 bear against C clips 44 and 46, fastened to grooves in shaft 28. This holds wave washers 36 and 38 snugly in place to maintain mild axial biasing forces against the imprint wheels. Of course, it is not intended that the structure be limited to the use of wave washers. If desired, other appropriate spring means, such as coil compression springs, may be utilized.

It will be appreciated that support shaft 28 is preferably snap fitted to housing 22 by way of a pair of openings in the housing overlying bearing surfaces 24 and 26. These openings are slightly narrower than the diameter of support shaft 28. The housing material is somewhat resilient such that shaft 28 may be forced through the openings and snapped into place. During assembly, the imprint wheel and other components are first mounted to shaft 28, which is then pressed into the housing.

In devices of this type, it is customary to provide a detenting mechanism acting on the imprint wheels to provide indexing which determines the various wheel imprint positions. The detenting mechanism provides a type of snap action when the wheels are manually rotated with the aid of a stylus to set such at the desired positions. With particular reference to FIGS. 3 and 4, the detenting mechanism associated with the present invention may be seen to include a plurality of disc-like detent members 48, each freely mounted about shaft 28. Preferably, each detent member is made of a low-friction synthetic material, such as Teflon or Delrin (trademarks of DuPont de Nemours and Co.). Each detent member is relatively thin and is disposed in axial engagement with an imprint wheel, as best illustrated in FIG. 4. One axial side surface of each imprint wheel is provided with a plurality of circumferentially spaced detent grooves 50 which cooperate with detent teeth 52 of the adjacent detent member. The detent teeth and grooves are shaped to provide a centering effect for proper indexing under the influence of axial springs 36 and 38.

Each detent member is provided with a radially extending tab portion 54 which is slotted at 56 to define a keyway which cooperates with an internal tab or key 58 integral with housing 22, as best illustrated in FIG. 3. This prevents rotation of the detent members. Detent teeth 52 are positioned to provide positioning of the wheels such that one embossed surface of each wheel

will be in proper alignment for imprint, such as that indicated at 60 in FIG. 3.

It will be appreciated that when any of the imprint wheels is rotated to a new setting, the wheel and associated detent member move axially apart from each other momentarily until the teeth come in contact with the next set of detent grooves.

This axial displacement is accommodated by either one or both of springs 36 and 38 and may cause momentary axial displacement of the other wheels and detent members in the structure, depending upon the resultant axial forces. Since the detent members are keyed along an axis parallel to the axis of support shaft 28, they are free to float axially in order to accommodate axial wheel displacement during setup. When all of the imprint wheels have been set to their desired positions, they assume their original axial positions. This assures that all imprint wheels are in the same axial position for each setting.

Referring to FIG. 5, the specific structure of each imprint wheel and detent member may be seen in more detail. Preferably, each detent member is provided with three detent teeth 52 which are spaced around a circular path corresponding to that defined by the detent grooves 50 of the imprint wheels. This provides three contact points between each detent member and the associated wheel. The three teeth define a plane and maintain the parallel relationship between wheels and detent members to prevent any tilting which might cause binding with the support shaft during setup. Of course, if desirable, a greater or lesser number of detent teeth may be utilized if feasible. It should also be noted that the detent teeth may be formed on the imprint wheels, with the grooves being formed in the detent members. It will be appreciated, however, that since the imprint wheels are as wide as the embossed characters, they can easily accommodate the axial grooves. It would probably be necessary to widen the detent member somewhat if they were to accommodate the grooves, resulting in a less compact structure.

Preferably, each of the detent grooves is defined, in part, by a pair of oppositely inclined surfaces 50a and 50b which are substantially planar and intersect along a radial line 50c. Each groove is bounded by a pair of curved side walls 50d and 50e which are concentric with the support shaft opening 51. In the preferred embodiment, planar surfaces 50a and 50b are at approximately 90° to each other. Detent teeth 52 protrude axially from a substantially planar side surface 53 of each detent member. Preferably, each tooth is defined, in part, by a pair of oppositely inclined planar surfaces 52a and 52b which come into general wiping or sliding engagement with surfaces 50a and 50b of the corresponding detent grooves during wheel rotation. It has been found that if the angle between surface 52a and 52b is slightly less than that between groove surface 50a and 50b accurate indexing is assured. This aids in bringing each tooth to a dead center position in the corresponding detent groove. By setting the tooth angle approximately 10° less than the groove angle (i.e. 80°) satisfactory results have been achieved.

With reference to FIG. 6, it will be appreciated that the detent members may be held against rotation by alternately providing internal keying. Detent member 62 is provided with an internal key 64 which cooperates with a keyway 66 formed in the support shaft. The support shaft is keyed, or otherwise fastened, to the housing (not illustrated) to prevent rotation. This, in

5

effect, prevents the detent members from turning when the wheels are being set. It will also be appreciated that this arrangement provides a more compact wheel assembly than that illustrated in FIGS. 1-5, as tabs do not protrude radially from the detent members.

Referring now to FIGS. 7-10, a second embodiment of the imprint wheel assembly of the present invention is illustrated and is generally indicated by the numeral 68. This embodiment is similar to the first embodiment illustrated in FIGS. 1-6, but differs in that it provides axial detenting without utilizing stationary detent members mounted between the imprint wheels. Thus, a more axially compact structure may be provided and additional cost savings may be realized by the elimination of several parts. The assembly is provided with a housing or frame 70 which is provided with a group of stationary detent teeth 72 which cooperate with detent grooves formed in the left end imprint wheel 74. This provides a stationary reference point to assure proper indexing. One side of each imprint wheel is provided with three detent teeth 76, while the opposite side is provided with a group of detent grooves 78. The detent teeth of each wheel cooperate with the grooves in the adjacent wheel, as best illustrated in FIG. 9. The imprint wheels are axially biased into engagement by way of a coil compression spring 80 positioned between a stationary seat 82 and the imprint wheel. The imprint wheels are rotatably mounted about a support shaft 84 appropriately mounted in housing 70. It will be appreciated that the detent arrangement of the second embodiment is serial in nature such that the index position of each imprint wheel is dependent upon that of the adjacent wheel. All indexing is referenced to the stationary detent teeth 72 which, preferably, are integral with housing 70.

The procedure for setting the imprint wheels of the second embodiment differs somewhat from that of the first embodiment in that it is necessary to hold the previously set wheels against further rotation. This may be easily achieved by following a procedure of setting the wheels from left to right as the assembly is illustrated in FIGS. 7 and 9. The wheel immediately to the left of the wheel being set is held stationary by a second stylus to prevent resetting of any of the previously set wheels. During setting, axial displacement of the wheels is absorbed by coil compression spring 80, which also serves to axially return the wheels and properly index such under the influence of the detent surfaces.

FIG. 11 illustrates in perspective the configurations of the opposite side surfaces of the imprint wheels of the second embodiment. Preferably, the detent teeth 76 are defined by oppositely inclined planar surfaces 76a and 76b, similar to those of detent members 48 of the first embodiment. Detent grooves 78 are defined, in part, by oppositely inclined planar surfaces 78a and 78b, similar to those associated with the detent grooves of the first embodiment. By utilizing three or more detent teeth, smooth axial displacement of each wheel is achieved without binding during setting.

From the foregoing description it will be appreciated that both embodiments of the present invention are relatively inexpensive to manufacture and maintain. Both wheel assemblies provide highly reliable and ac-

6

curate detenting with relatively few parts, compared with conventional assemblies. Of course, it is not intended that the present invention be limited to the particular shape, number or exact configuration of the teeth or detent grooves illustrated in the drawings.

While preferred embodiments of the invention have been described and illustrated, it is to be understood that these are capable of variation and modification. Accordingly, the aim of the appended claims is to cover all such variations and modifications as they fall within the true spirit of the invention.

What is claimed is:

1. An imprint wheel assembly for use with a data recorder, said assembly comprising:

a frame;

a shaft mounted to said frame;

a plurality of imprint wheels each rotatably mounted to said shaft for selective rotation about the axis of said shaft to selected positions, said imprint wheels being axially disposed of each other and axially movable relative to said shaft;

means yieldably biasing said wheels axially toward each other; and

detent means associated with each of said wheels for axially detenting said wheels to maintain such in selected positions under the influence of said axial biasing means;

said detent means comprising a plurality of detent members each axially disposed adjacent a corresponding one of said plurality of wheels and normally retentively engaging said one wheel, each detent member separating the axially adjacent wheels from each other and including means for preventing rotation of the detent member about said shaft and allowing axial movement relative to said shaft against the influence of said biasing means, each said wheel and each adjacent said detent member including cooperating surfaces sloped at an angle to said axis and in sliding engagement while the associated wheel is rotated to a said selected position.

2. The assembly set forth in claim 1 wherein each of said detent members is comprised of a disc-like member mounted in engagement with one of said wheels.

3. The assembly set forth in claim 1 wherein each said detent member is of generally disc-like configuration with a pair of opposite sides, one of said sides being substantially planar and the opposite of said sides including a said sloped detent surface.

4. The assembly set forth in claim 3 wherein said sloped detent surfaces define a plurality of wheel positions equal to the number of selected positions for each imprint wheel.

5. The assembly set forth in claim 1 wherein said rotation preventing means slideably engages said frame for allowing axial movement of the associated detent member relative to said frame.

6. The assembly set forth in claim 1 wherein said shaft includes a keyway, said rotation preventing means slideably engaging said keyway for allowing axial movement of the associated detent member relative to said shaft.

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