

[54] **TAPE CALCULATOR**

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[52] **U.S. Cl.** .....235/71 A

[51] **Int. Cl.** .....G06c 27/00

[58] **Field of Search** .....235/70, 71 R, 71 A, 86; 33/137, 138, 140

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*Primary Examiner*—Richard B. Wilkinson

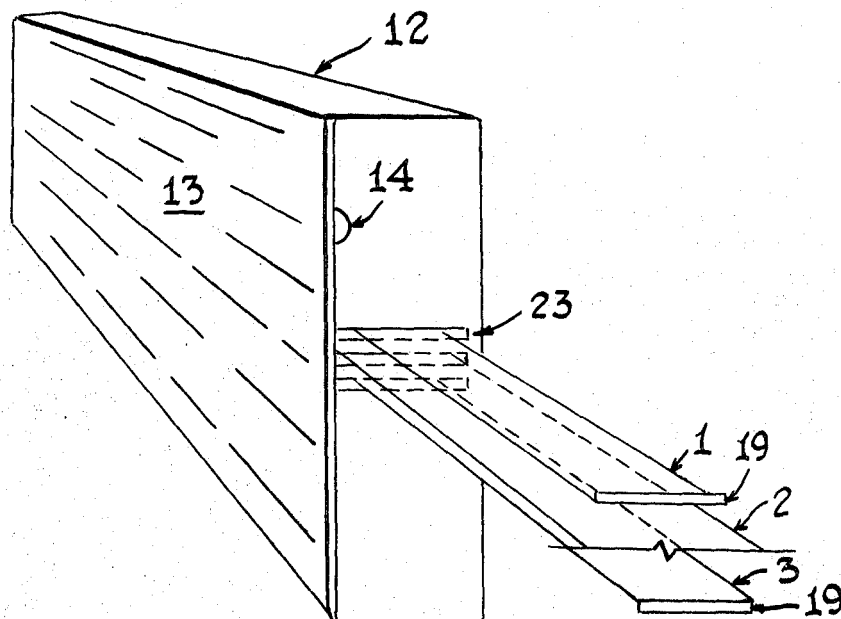
*Assistant Examiner*—Stanley A. Wal

*Attorney*—Roy E. Mattern, Jr.

[57] **ABSTRACT**

A tape calculator used for mathematical calculations and conversions having three tapes bearing preselected indicia. Each of the tapes is attached to a spring biased reel mounted in a case. The reels are arranged such that the tapes are withdrawn from the casing in three geometric planes, one above the other. A locking member is provided to maintain the tapes in preselected positions and a cleaning member on the casing reduces wear on the tapes and keeps the tape surface clean.

**1 Claim, 19 Drawing Figures**



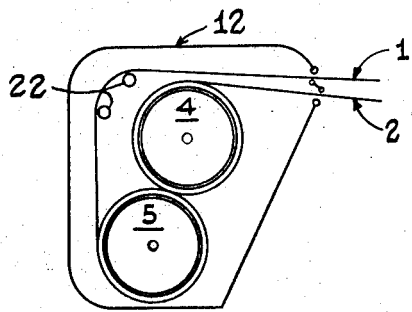


FIG. 1.

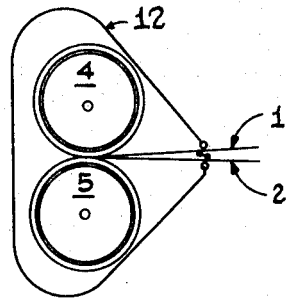


FIG. 2.

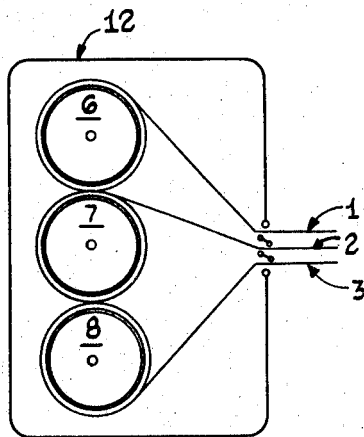


FIG. 3.

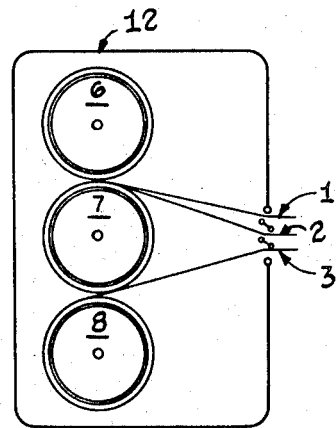


FIG. 4.

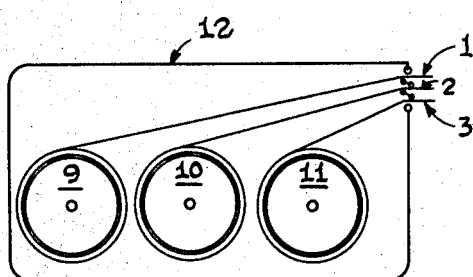


FIG. 5.

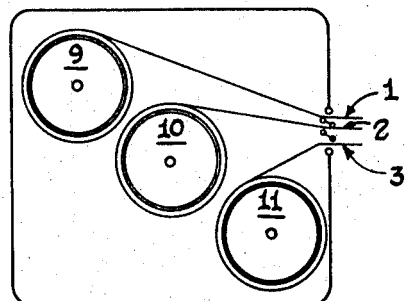


FIG. 6.

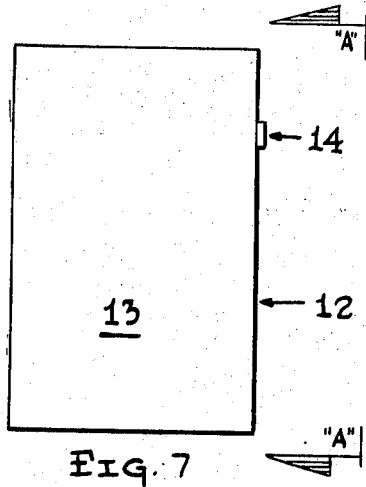


FIG. 7

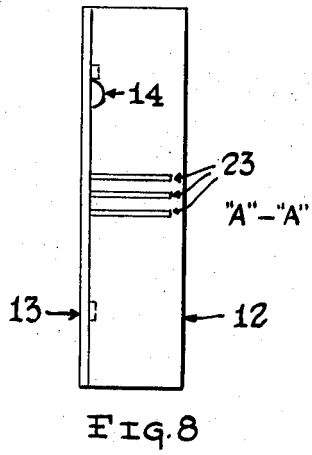


FIG. 8

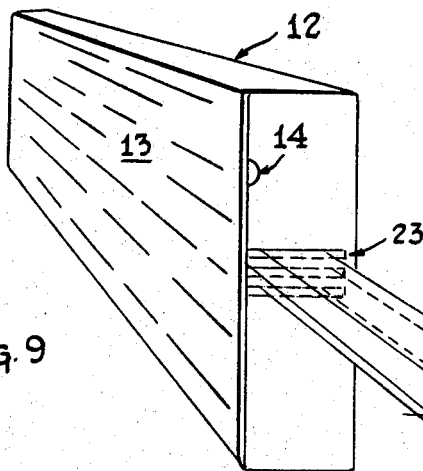


FIG. 9

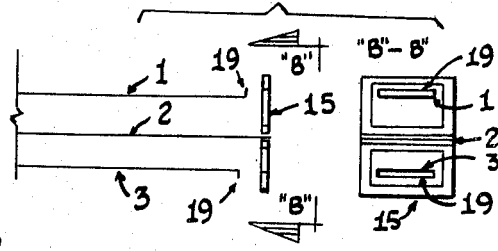


FIG. 10

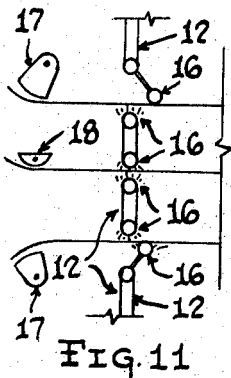


FIG. 11

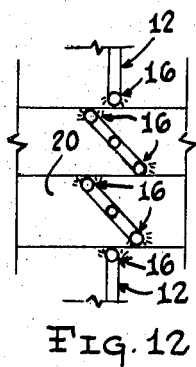


FIG. 12

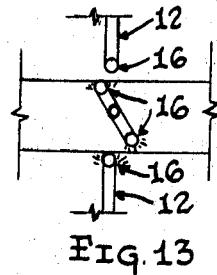
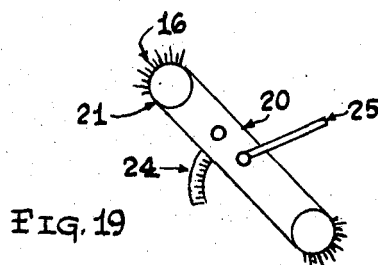
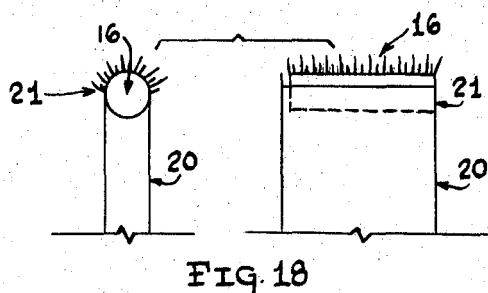
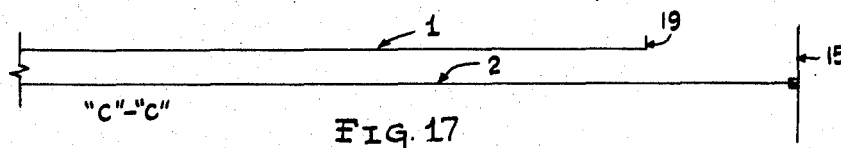
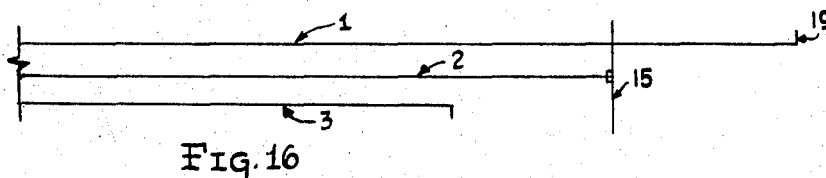
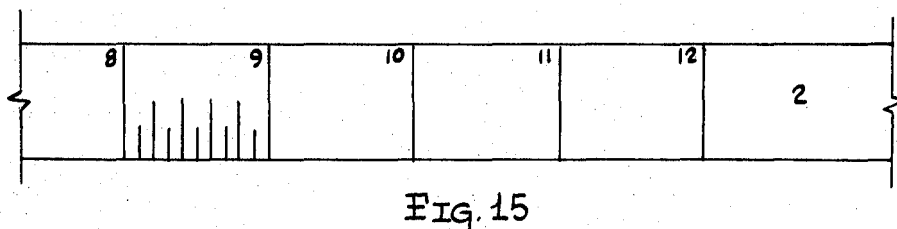
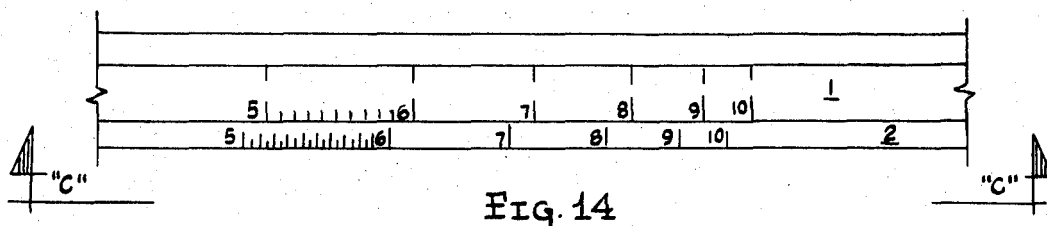


FIG. 13



## TAPE CALCULATOR

Prior art discloses many tape measuring devices and apparatuses that are used for measuring and calculating various arithmetic or mathematical problems. These known devices have a similar frame structure as the invention herein described and claimed. Generally, prior art devices have a frame enclosure member, a spring-biased reel having a tape attached thereto. The tape is generally is wound around the spring-biased reels and the end of the tape is confined in an outlet channel that may be withdrawn from the reel or retracted thereonto.

The invention disclosed in the instant application has a structural novelty in that two, three or more reels having tapes attached thereto; the tape cooperate and produce a calculating or measuring device heretofore not known. The structural embodiment of the invention contains an enclosure member, two, three or more reels having tapes attached thereto and an adjustable locking member for each said tape or the combination of tapes. The reels are spring-biased and thereby produce a tape apparatus which may be extended from the enclosure member in order to produce the calculation or measurement desired and subsequently reeled back or withdrawn into the enclosure member. The two or more tapes may be cooperating to produce an arithmetic, mathematic or measuring solution to any particular problem. The locking members may also have a cleaning member attached thereon thus provide a clean tape whether the tape is being withdrawn from or into the enclosure member.

The advantages of the novel device described in the instance application are that a stopping or locking member prevents the various tapes from moving while the calculation or measuring operation is being performed. The main object of the invention is to produce cooperating tapes which provide for mathematical, arithmetic calculations and/or a conversion table or measuring apparatus. Another object of the apparatus is provided by a cleaning member which cleans the tapes as they are being retracted into the enclosure member of the apparatus. A further object is provided by a multitude of tables whether they be logarithmic, arithmetic, mathematic, conversions tables, or volumetric or linear scales. Another object is that the apparatus is small has a nominal weight and may be carried by an artisan or workman who may wish to solve field problems or calculate a problem during field or any other type of non-office work.

The apparatus succeeds in providing for a structure that has not been provided in prior art devices. All prior art devices have failed to provide a cleaning apparatus and locking member whereby two or more tapes may be stopped or retained in a particular linear position. The apparatus described in the instant application provides for a simply operated calculator which is applicable for calculating in field, construction or other sites. This embodiment also may have a cleaning member and accomplishes a result not produced heretofore.

Other objects, features and advantages of the invention will be apparent from the following description when read with reference to the accompanying drawings. In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

FIG. 1 is an elevation view showing two spring-biased reels having two tapes respectively attached thereto:

FIG. 2 provides for two spring-biased tapes which may be withdrawn from the frame member in a horizontal manner;

FIG. 3 displays an elevation view of the apparatus having three spring-biased tapes taken off the side thereof;

FIG. 4 shows an elevation view of three spring-biased tapes taken off to a side and having alternative position for one of the spring-biased tapes as shown in FIG. 3;

FIG. 5 displays the spring-biased tapes placed in a horizontal configuration and taken off to one side thereof;

FIG. 6 shows an alternative position of tapes taken off in a horizontal direction;

FIG. 7 shows an enclosed frame member similar to that shown in FIG. 3 having a cover attached thereto;

FIG. 8 shows a profile view of FIG. 7 taken along lines A—A of FIG. 7;

FIG. 9 is perspective view showing the cover, the enclosed frame member and the tapes taken off in horizontal direction similar to that shown in FIG. 3;

FIG. 10 shows an elevation and profile view of the tapes as they are withdrawn from the enclosure member in a horizontal position;

FIG. 11 shows the positions of the cleaning members and the journals that hold the tapes in horizontal position when withdrawn away from or into the enclosure member;

FIG. 12 shows the positions of the locking rotators and cleaning members that are attached to the enclosure member and provide for a cleaning of the respective tapes projected therethrough;

FIG. 13 shows an alternative position for the locking rotators with respect to two tapes;

FIG. 14 is plan view of two tapes cooperating with each other;

FIG. 15 shows one tape which is used a measuring device;

FIG. 16 shows an elevation view of the tapes and the flanges that stop the tape from penetrating into the enclosure member;

FIG. 17 shows an elevation view taken along lines C—C in FIG. 14;

FIG. 18 shows the attachment of the cleaning members and the locking rotator;

FIG. 19 displays an exploded view of the locking rotator.

The structural detail of the various parts of the apparatus shown in the various figures is now discussed in detail. FIG. 1 shows the frame member 12 having side projections thereon and a back panel, and having reels 4 and 5 which have tapes 2 and 1 rotated circumferentially on those respective reels. Tape 1 is taken off of reel 5 and is kept away from reel 4 by means of sliders 22. The respective tapes 1 and 2 are taken off or withdrawn from frame member 12 in horizontal direction through the respective slots in the enclosure frame. The respective reels 4, 5, 6, 7, 8, 9, 10, and 11 are of the same nature as those in prior art. The various reels are not novel and are spring-biased and have a similar structure detail to those in prior art and are well known in the field of manufacturing tapes and other similar devices as herein described in the instant application. The reels may or may not have locking members attached in a central position, as is known in prior art, as is desired. The spring-biased mechanism is not

shown in the respective drawings or in figures forming part of the instant application and specification since any skilled workman in the art is familiar with such mechanisms, such as set forth in U.S. Pat. Nos. 937,863; 2,615,630; and 3,366,325.

FIG. 2 shows an alternative configuration of that of FIG. 1 having the respective reels 4 and 5 which rotate in an opposite directions and having tapes 1 and 2 taken off in a horizontal direction and are enclosed by the enclosure frame member 12.

FIGS. 3 and 4 display three spring-biased reels having tapes attached thereto. The tapes 1, 2 and 3 may be withdrawn out of or retracted into enclosure member 12. Reels 6, 7 and 8 are of a similar structural nature to prior art reels as has been discussed herein above and may be placed in a particular manner so as to ease the withdrawal from and into the enclosure member 12. Tapes 1, 2, and 3 which are retained on reels 6, 7, and 8 respectively are drawn away from member 12 in a horizontal direction. The frame member 12 is box-shaped configuration as is shown in FIGS. 7, 8, and 9 respectively.

FIGS. 5 and 6 display alternative positions of the respective reels 9, 10, and 11. The reels 9, 10, and 11 may be placed within the enclosure frame member 12 in various manners and positions, however, the tapes are still withdrawn in a horizontal direction away from the enclosure member 12; the positions of reels and respective tapes should take into account the frictional pressure involved if the reels are set in a position whereby the tapes are withdrawn at an angle greater than 45° to a direction the tape assumes outside of the enclosure member.

FIGS. 7 and 8 display elevation views of the enclosure member 12 with cover 13 which may be hinged and latched by means of latch 14. The latch 14 is provided for so as to permit entry into the enclosure member 12 to repair or subsequently replace any tape or reel which may be damaged or worn. Cover 13 generally in a closed position and latch 14 thus provides a permanent latching mechanism which is generally not in use during the operation of the apparatus described as the invention herein. In FIG. 8 slots 23 are provided for, so as to permit a withdrawal from or an entry into the frame member 12 of the tapes 1, 2, and 3 or more as the case may be.

FIG. 9 shows a perspective view of the frame member 12 having a cover 13 and latch 14 respectively. Slots 23 provide for the tapes 1, 2 and 3 and are sufficiently narrow to prohibit flange 19 from entry into frame member 12.

FIG. 10 represents an elevation view of tapes 1, 2 and 3 respectively and shows flanges 19 on tapes 1 and 3 and stop flange 15 on tape 2. A profile view taken along line B—B as shown in FIG. 10 and thus displays the manner in which tapes 1 and 2 may penetrate through stop flange 15 which may be integrally attached to tape 2.

FIGS. 11 and 12 show the various positions of the cleaners 16, journals 17 and 18, frame member 12 and locking rotator 20. In FIG. 11, the journals are shown respectively as journals 17 and 18. The journals provide for an entry into and away from the slots 23 as shown in FIGS. 8 and 9 and as discussed above and permit a bending of the tapes around journals 17 and 18. In FIG. 12 the journals 17 and 18 may or not may be

provided; in that case, however, locking rotators 20 are provided for and have a centrally pinned location and have a locking rotator as well as a cleaning member 16. In the particular configuration in FIG. 12, the locking rotators 20 may be locked into position after moving the tapes in a particular calculating position, thereby holding the tapes in a rigid form or position.

FIG. 13 displays a similar configuration as that shown in FIG. 12, except, in case of FIG. 13, only two tapes are provided for.

FIG. 14 displays two tapes which cooperate with one another and are shown in plan view. It should be noted, the various scales permit a logarithmic scale or various other mathematical or arithmetic tables or scales to be etched thereon. The means of cooperating one scale to another is provided for by the various slots 23 shown in other Figures; the locking rotators and cleaning members are also shown in other Figures.

FIG. 15 shows a plan view of measuring tape or another calculating device whereby only one tape is used.

FIGS. 16 and 17 provide for elevations views and display the various tapes as they may be used in particular manner. FIG. 17 shows an elevation view along lines C—C of FIG. 14 and display the end flange 19 and stop flange 15.

FIGS. 18 and 19 display the various applications of cleaners 16, cleaner holder 21 and locking rotator 20. FIG. 19 also shows a locker spring 24 and locker handle 25. The exploded views of FIGS. 18 and 19 shows the various manners by which the tapes are cleaned by cleaners 16 and the locking mechanism of locking rotator 20 which may be rotated around locker spring 24 having a central handle or locker handle 25.

Having discussed the various Figures in detail the operations of the device or apparatus will now be discussed. The various configurations set forth in FIGS. 1, 2, 3, 4, 5, and 6 display the various ways in which the spring biased reels, having tapes attached thereto, may be placed in the enclosing frame member. The Figures show that 2, 3 or more spring biased reels may be confined within the frame member and attached thereto. The tapes attached to the spring biased reels may have varying widths, this provides for a cooperating means whereby one tape may be used with another to calculate or to solve a particular a arithmetical or mathematical problem. One single tape may be used for a conversion table or a measuring tape. The use of the two tapes may be used for a conversion of one particular linear to another measurement; for instance, the conversion of inches in the foot measuring system to centimeters in the metric measuring system may be employed with the tapes as heretofore set forth. The use of 2, 3 or more tapes and reels provides for a large number of tables and scales so to produce a large number of tables that may be used on a particular job site, field site, construction site, or the like.

The tapes that are shown in FIGS. 1 to 6 inclusive are withdrawn or released into the frame member in a horizontal manner as mentioned above. The journals 17 and 18 provide for a bending of the tapes so as to present them through slot or slots 23 in horizontal position. The tapes may be presented or taken through configuration as shown FIGS. 11, 12, or 13. In either of the cases the cleaners 16 provide for a soft cleaning sur-

faces thereby preventing excessive wear and producing a cleaning surface. The cleaners 16 may be of a felt or soft plastic nature having fibers attached thereto to provide cleaning surfaces.

The frame member 12 may be of any material which will withstand long wear; plastic, aluminum or other like rust-proof material. The frame member may take many forms and stay within the envisaged scope of the invention. If three spring-biased reels are used it may easily be recognized that a large number of logarithmic, arithmetic, or mathematical scales may be used. The tapes in this case have cooperating scales etched on them as shown in FIG. 14 and the top surfaces of tapes 1 and 2 may cooperate using the respective scales etched thereon and the bottom surfaces of tapes 2 and 3 cooperate in the same manner using different scales that may be etched on those tapes 2 and 3.

While there has been disclosed in this specification forms in which the invention may be embodied, it is to be understood that these forms are shown for the purpose of illustration only, and that the invention is not limited to the specific disclosure, but may be modified and embodied in various other equivalent forms without departing from the spirit of the invention. In short, the invention includes all the modifications and embodiments coming within the scope of the claims ap-

ended to herein.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

- 1. A calculating device comprising:
  - a. a case having access means therein;
  - b. three spring biased reels rotatably mounted in said case;
  - c. tape means attached to each of said reels and bearing preselected numerical indicia thereon, said reels and tape means being arranged to be withdrawn through said access means in three separate geometrical planes, one above the other, with the middle tape being wider than the remaining tapes;
  - d. locking means provided within said case and operated from without said case to secure the respective tapes at preselected positions;
  - e. cleaning means mounted at said access means for preventing excessive wear and providing a cleaning surface for said tapes, whereby, upon withdrawal of said tapes to selected lengths, predetermined numerical results may be observed from the position of said tapes.

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