Oct. 12, 1948. J. A. SPENCER ET AL 2,451,365

RECORD TAPE ADVANCING DEVICE

Filed Oct. 22, 1943

3 Sheets-Sheet 1

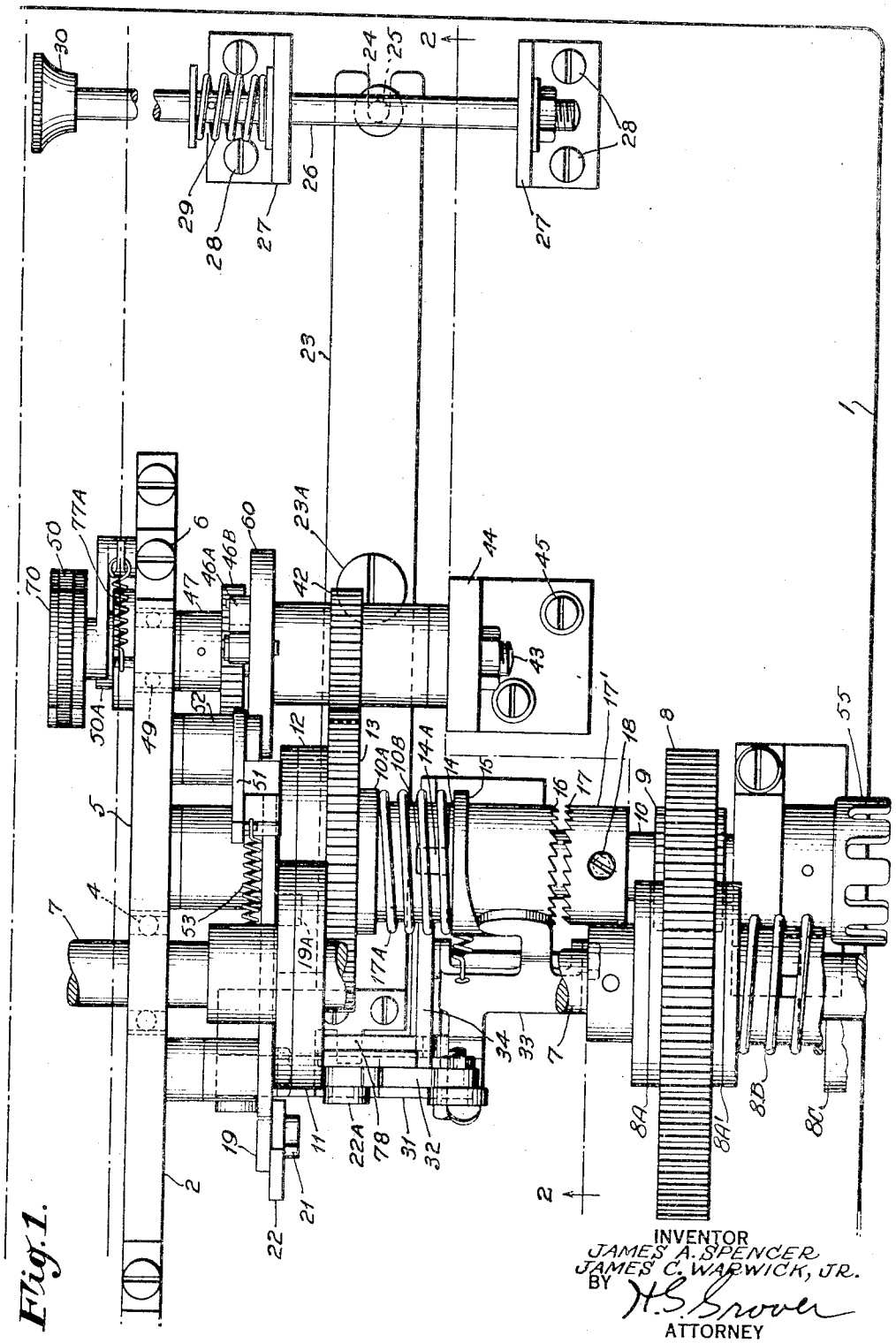


Fig. 1.

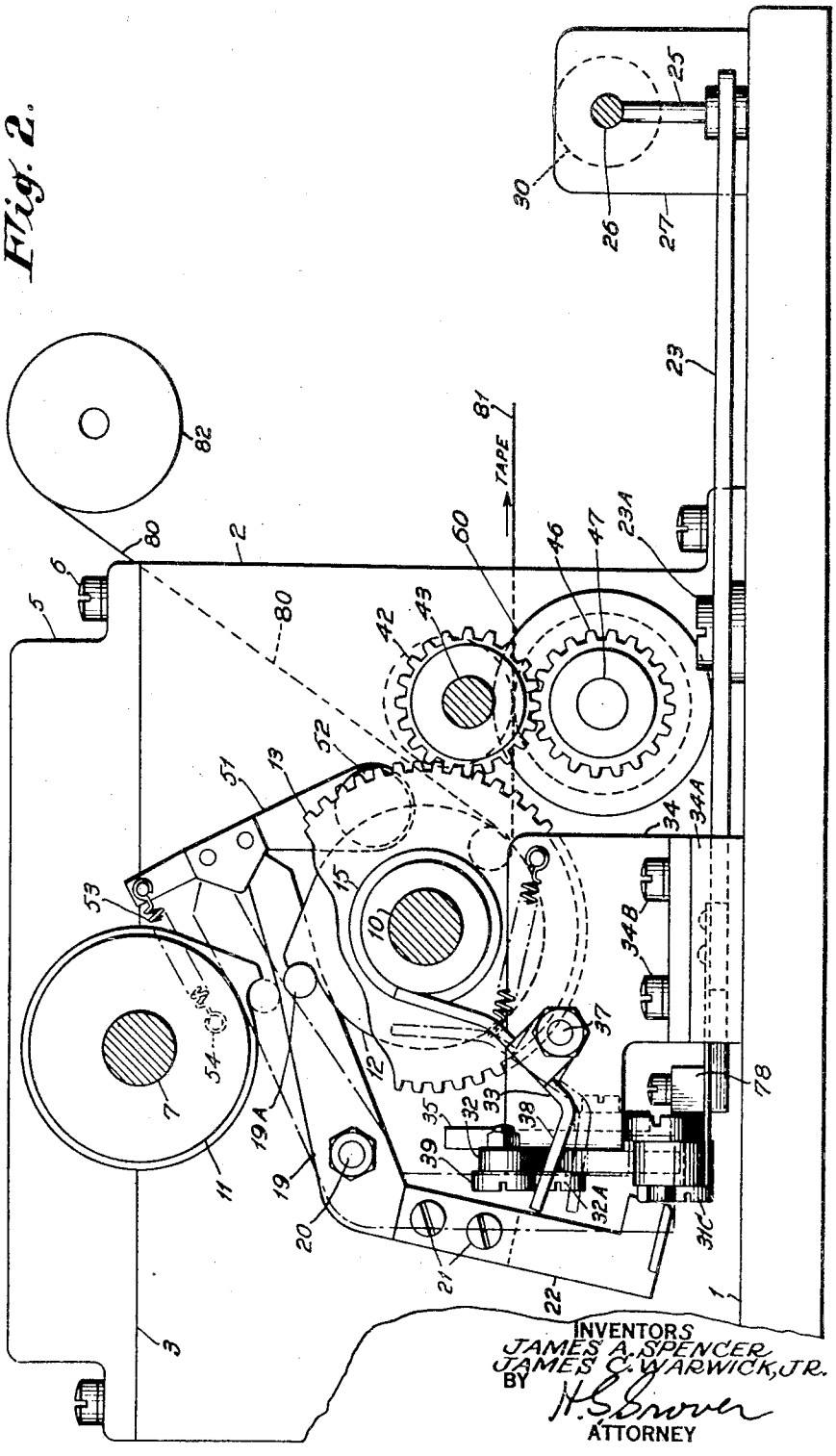
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Fig. 2.



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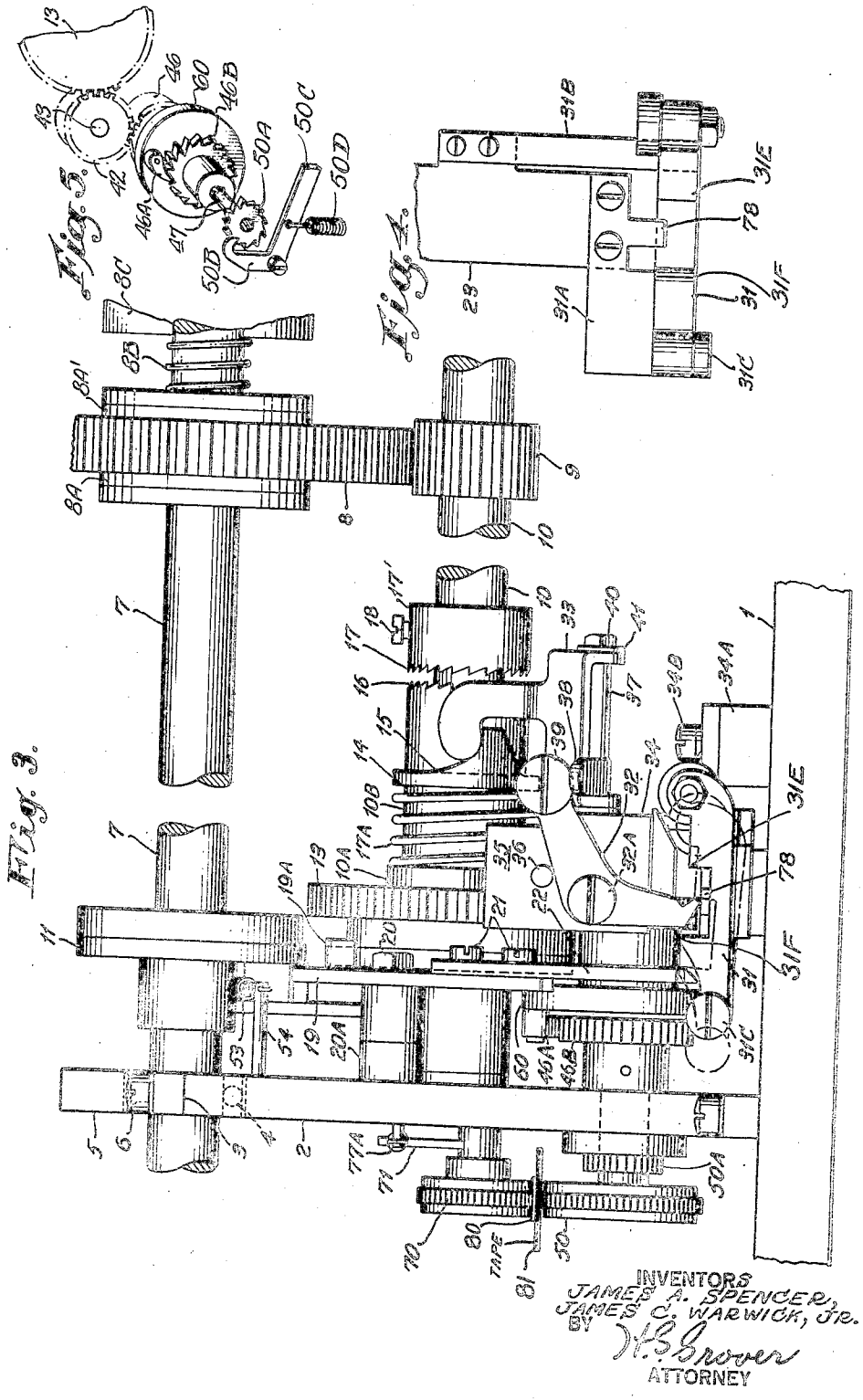


Fig. 3.

Fig. 5.

Fig. 4.

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2,451,365

RECORD TAPE ADVANCING DEVICE

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Application October 22, 1943, Serial No. 507,272

6 Claims. (Cl. 346—79)

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This invention relates to telegraphic tape printing mechanisms and more particularly to means for advancing the record tape.

An object of the invention is to provide a mechanism for ejecting from the tape printing recording machine a predetermined length of record tape in addition to the amount normally fed or spaced out through the action of the tape advancing mechanism for visual inspection of a record following a recording operation of the printing mechanism without opening or disturbing the tape printing mechanism.

A further object of the invention is to provide a mechanical interlocking arrangement of such design that but a single space-out operation following a recording cycle may be accomplished, and also to provide a means for automatically restoring the space-out mechanism to an operable condition during the next succeeding recording cycle.

The tape advance or space out mechanism of this invention is intended to operate in conjunction with the tape printer recording machine disclosed in Spencer U. S. Patent No. 2,431,651, granted November 25, 1947, and Reinhold, U. S. Patent No. 2,429,136, granted October 14, 1947, in which the motor shaft and main gear rotate continuously and the main recording shaft, having the recording characters located thereon, is driven through a friction clutch. This arrangement permits the main recording shaft to be held in a static condition except during a recording cycle.

This invention will best be understood by referring to the accompanying drawings in which:

Fig. 1 is a plan view of the mechanism of this invention;

Fig. 2 is an end sectional elevation of Fig. 1, the section being taken on line 2—2;

Fig. 3 is a partial side elevation of Fig. 1;

Fig. 4 is a detailed plan view of the trip lever; and

Fig 5 is a perspective view of the space-out tape feed wheel mechanism.

Referring now in detail to the drawings, the mechanism of this invention comprises a base 1 upon which is mounted an upright 2 which is split at the upper portion thereof at 3. A ballbearing 4 is retained at the central portion of the upright bearing plate 2 by means of an upper portion 5 of the upright 2. The upper portion 5 is secured to upright 2 by means of two bolts 6. A main recording shaft 7 is arranged to rotate on ballbearing 4. At the far end of shaft 7 there is located the recording disc (not shown) which

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is disclosed in Spencer U. S. Patent No. 2,431,651. The end of the main recording shaft 7, opposite the recording disc, has located thereon a large spur gear 8 which meshes with a pinion gear 9. Gear 9 drives a motor driven and clutch shaft 10. The intermittent rotation of the main recording shaft 7 is governed by a friction clutch consisting of discs 8A and 8A' and a spiral clutch spring 8B. This clutch arrangement exerts pressure against the sides of gear 8 and thus applies torque to the shaft 7. The clutch disc 8A and the spring 8B are actuated by an electromagnet (not shown) to rotate shaft 7 when a record is being recorded, and releases it at the end of the recording. A first cam 11 is located on and secured to the forward portion of shaft 7 intermediate ballbearing 4 and gear 8. Cam 11 positively holds shaft 7 stationary when no record is being made. A second cam 12 is fixed to floating sleeve 10A, which has an extending slotted portion 10B, and which is arranged to float freely on clutch shaft 10. Cam 12 positively holds a gear 13 stationary when a record is being made. The gear 13 is fastened to floating sleeve 10A. A second sleeve 14 also floats on shaft 10 and has tongue 14A which engages the slotted portion 10B on sleeve 10A. The end of sleeve 14 opposite the tongue 14A is provided with driven clutch ratchet teeth 16. Intermediate the tongue 14A and teeth 16 there is located a cam profile 15 which is secured to rotate with second sleeve 14.

The driving clutch teeth 17 are formed on a collar 17' which is secured to driven motor and clutch shaft 10 by means of bolt 18. A spring 17A urges clutch teeth 16 to engage with clutch driving teeth 17. As shown by Fig. 2, a cam follower 19 is pivoted on a stud 20 which is secured to upright 2 by stud 20A. Cam follower 19 has an engaging stud 19A which is located intermediate cams 11 and 12 for alternately engaging the peripheries of the cams. At the lower end of cam follower 19 there is fastened, by means of screws 21, a cam follower extension member or blocking lever 22.

On the base 1 there is pivoted at 23A a trip lever arm 23 which is slotted at 24 for engaging a stud 25. The stud 25 is fastened to a push button manually operated shaft 26, the shaft 26 being supported on base 1 by means of two angular shaped uprights 27. The uprights 27 are provided with screws 28 for fastening them in position to base 1. A helical compression spring 29 is provided to keep the manually operated shaft 26 in its forward position. A push button 30 is threaded on to the forward end of shaft 26.

As shown by Figs. 3 and 4, a slotted and an inclined cam surfaced trip lever 31 is pivoted to the extreme left hand end of the trip lever arm 23 by means of a pivot 31C on block 31A and is urged to normally rest in a horizontal position by flat spring 31B. The lever 31 has raised edges 31E and 31F located on each side of the slot. A trip bell crank 32 and clutch pawl 33 are supported above the slotted portion of trip lever 31 by means of an upright angular bent plate 34. A pivot screw 32A fastens the trip bell crank to upright plate 34. The upright plate 34 is secured to base 1 by means of a block 34A and screws 34B. An extension portion 35 on plate 34 supports trip bell crank 32 and also a stop screw 36. A support rod 37 extends out from upright plate 34 and has pivoted thereon the clutch pawl 33 which is arranged in position so that its extending arm 38 will engage the head of a bolt 39 secured to the upper end of bell crank 32. A nut 40 and washer 41 retains clutch pawl 33 in its pivoted position on the end of support rod 37.

A tooth clutch idler gear 42 meshes with gear 13 and is supported on a shaft 43 which is secured to an upright member 44, the upright 44 being fastened to base 1 by means of a plurality of screws 45. A gear 46 is secured to a tape feed shaft 47 for rotation therewith. An escapement disc 60 is fixed to the gear 46 and carries a push type pawl 46A which is arranged to drive a toothed escapement ratchet 46B fixed to the tape feed shaft 47, the arrangement being such that when shaft 47 is driven by the tape step-by-step feed mechanism partly shown by Fig. 5 the escapement pawl 46A rides over the teeth of escapement ratchet 46B. But when the tape advance mechanism herein described is permitted to operate, shaft 47 is driven by means of the engagement between escapement pawl 46A and the teeth of the escapement ratchet 46B. Tape feed shaft 47 is secured for rotation on upright bearing plate 2 by means of a bearing 49. The extreme end of shaft 47 is provided with the tape feed wheel 50, a ratchet 50A and a pawl 50B. The pawl 50B is of the hook or pull type and is actuated by a step-by-step tape feed lever 50C and a spring 50D. A tension wheel 70 rides over the top of the tape. An arm 71 supports wheel 70 in position on member 2. Tension for the tape feed is applied to the wheel 70 by means of spring 71A.

A detent 51 is pivoted, as shown in Fig. 2, by means of a pivot support stud 52 on bearing plate 2 and is positioned so as to cooperate with cams 11 and 12 and cam follower 19. A spring 53 keeps detent 51 in proper engagement and has its extreme end fastened to bearing plate 2 by means of stud 54.

An inked ribbon 80 passes over the paper tape 81 and is wound upon two spools 82, only one of which is shown in Fig. 2. The motor driven and clutch shaft 10 is provided with a flexible coupling member 55 which engages a similar coupling member which connects to an electric motor (not shown) for driving this mechanism. A block 78 serves as a limit for the upward travel of trip lever 31.

In the operation of this device, if, for example, one considers a normal record tape recording operation to be completed, the tooth clutch 16 is held disengaged by means of pawl 33 resting against the bulged portion of the cam profile 15 and at this time the main tape recording shaft 7 is at rest because of clutch 8A being released. The stud 19A occupies a position in the notch or slot of the lower cam 12, as shown by the full lines in Fig. 2. The blocking lever 22 is moved out of the path of the inclined surface 31F of the trip lever 31.

Whenever it is desired to inspect a record which has been previously recorded, push button 30 is manually operated, which in turn (through the action of stud 25 and rod 26 moving toward the upright 27) rotates lever 23 around its pivot 23A, thus causing trip lever 31 to rotate about a pivot 31C and the high point 31E of the trip lever 31 to engage the lower end of trip bell crank 32. This action momentarily depresses the arm 38 of pawl 33 which disengages the cam profile 15, and in so doing releases the driven clutch member 16. The spring 17A then urges the ratchet clutch teeth 16 to engage the other half of the ratchet clutch teeth 17. The shape of the cam profile 15 is such that clutch pawl 33 engages the cam periphery again after the record has been inspected and automatically disengages the clutch teeth 16 again upon the completion of one complete turn of sleeve 10A on clutch shaft 10. As the gear 13 rotates by the engagement of teeth 16 and 17, gears 42 and 46 rotate with shaft 10. The driving member of escapement disc 60 is fixed to gear 46 and its associate ratchet to shaft 47, so that when gear 46 rotates, the tape feed shaft 47 and its associate feed-wheel 50 rotate with it and thus space out or, in other words, unwind a predetermined amount of recorded tape. This will be of sufficient length to inspect the previous printed record.

During the above mentioned spaced out operation of the mechanism of this invention, as shown by the broken lines in Fig. 2, the cam follower 19 is forced by cam 12 into the notch of cam 11 and is held in this upward position by detent 51. This change in the position of cam follower 19 moves the blocking lever 22 immediately over the inclined cam surface of trip lever 31, so that when trip lever 31 is moved to the left by operating push button 30 (as shown by the broken lines in Fig. 3), its right-hand end is forced down toward base 1 as the inclined surface 31F rides under the end of blocking lever 22, preventing the engagement of trip lever 31 with the trip bell crank 32.

The interlocking arrangement is such that so long as blocking lever 22 remains in the aforestated or spaced out position, clutch pawl 33 cannot be disengaged from its associate clutch member by operating push button 30, a second time. In this spaced out position cam follower stud 19A remains locked in the notch or slot of cam 11 (shown by the broken lines) until after this cam, which is fixed to the main recording shaft 7, makes one revolution and, in so doing, moves cam follower stud 19A into the notch of cam 12, thus conditioning the recording device to operate as before. With the interlocking mechanism cooperating with shafts 7 and 10, only one continuous length of about four inches of tape may be fed or spaced out between any two recording cycles. This is accomplished principally by means of lever 19 which, when moved out of engagement with cam 11 during a recording cycle, swings its extension 22 out of the path of the toothed clutch releasing mechanism. This condition remains until it is desired to again run out a continuous length of tape. Then the toothed clutch releasing mechanism is again operated by push button 30. The second or lower cam 12 is permitted thus to make one revolution and in doing so returns lever 19 to its former engagement with the first cam 11 and extension 22 into the path of clutch

releasing mechanism. This condition makes the clutch or space out releasing mechanism inoperative until after another recording cycle has been completed.

The space out mechanism including disc 60, ratchet 46B and pawl 46A, is so arranged that it cooperates with shafts 10, 43 and 47 as follows: During a normal recording cycle the toothed clutch 16 is disengaged and the tape is advanced step-by-step by means of the second ratchet 50A and pawl 50B, shown by Fig. 5 as being located at the end of shaft 47. Shaft 47 turns but the first escapement pawl 46A rides over the sloped backs of the escapement ratchet teeth 46B. Thus no motion is imparted to gears 46, 42 and 13. On the other hand when rod 26 is pushed in for spacing out the tape, the toothed clutch 17 is engaged. This action causes gears 13, 42 and 46 to be coupled with shaft 10. The shaft 10 then drives the escapement pawl 46A against the front of an escapement ratchet tooth 46B, thus imparting continuous rotation to shaft 47.

While we have indicated and described a mechanism for carrying our invention into effect, it will be apparent to one skilled in the art that our invention is by no means limited to the particular devices shown and described, but that many modifications may be made without departing from the scope of our invention.

What we claim is:

1. A printing tape space-out mechanism for tape printers comprising a tape feed wheel, a driven rotatable shaft, a recording shaft coupled to said driven rotatable shaft, a tape feed shaft secured to said tape feed wheel, clutch means coupled to said tape feed shaft to intermittently couple it with said driven rotatable shaft to space out a predetermined length of tape, and means including a cam on said clutch means and a clutch pawl adapted to engage said clutch means for uncoupling said recording shaft from said driven rotatable shaft when the clutch means on said tape feed shaft causes it to be coupled to said driven rotatable shaft.

2. A printing tape space-out mechanism for tape printers comprising a tape feed wheel, a driven rotatable shaft, a recording shaft coupled to said driven rotatable shaft, a first cam secured to rotate with said recording shaft, a second cam coupled to intermittently rotate with said driven rotatable shaft, a cam follower positioned between said cams to alternately engage the peripheries thereof, means to alternately retain said cams in a static condition, a tape feed shaft secured to said tape feed wheel, clutch means to intermittently couple said tape feed shaft with said driven rotatable shaft to space out a predetermined length of tape, and means including a cam on said clutch means and a clutch pawl adapted to engage said clutch means for uncoupling said recording shaft from said driven rotatable shaft when the clutch means for intermittently coupling said tape feed shaft causes it to be coupled to said driven rotatable shaft.

3. A telegraphic tape advance mechanism comprising a tape feed member, a driven rotatable shaft, a recording shaft coupled to said driven rotatable shaft, a clutch member surrounding said driven rotatable shaft, manual means for disengaging said clutch member, a tape feed shaft secured for rotation with said tape feed member, clutch means coupled to said tape feed shaft to intermittently couple it with the clutch member on said driven rotatable shaft to space out a predetermined length of tape, and means

including a cam on said clutch means and a clutch pawl adapted to engage said clutch means for uncoupling said recording shaft from said driven rotatable shaft when the clutch means on said tape feed shaft causes it to be coupled to said driven rotatable shaft.

4. A tape advance device comprising a tape recording mechanism including a tape step-by-step advance mechanism coupled to said tape recording mechanism to advance said tape as said recording mechanism is actuated to mark a record thereon, means to disengage said step-by-step tape advance mechanism after said record is marked, a device to advance said tape a predetermined amount after said tape has been marked with a record thereon, and means to prevent the movement of said step-by-step mechanism when said tape is advanced a said predetermined amount to observe said marked record.

5. A tape advance mechanism comprising a plurality of rotatable shafts, one of said shafts serving as a driven rotatable shaft, another one of said shafts serving as a recording shaft which is coupled for intermittent rotation with said driven rotatable shaft, means to rotate said shafts, a system of gears surrounding said first mentioned driven rotatable shaft for intermittent rotation therewith, a first cam secured to rotate with said recording shaft, a second cam secured to one of the gears of said gear system to intermittently rotate with said driven rotatable shaft, a cam follower positioned between said cams to alternately engage the peripheries thereof, means to alternately retain said cams in a static condition, a profile cam secured to one of said gear members, a clutch associated with said profile cam, a bell crank for operating said clutch, means for manually operating said bell crank for disengaging said clutch from rotation with said driven rotatable shaft, and an escapement mechanism including a pawl and ratchet for disengaging said recording shaft when said tape is advanced.

6. A tape advance mechanism comprising a plurality of rotatable shafts, one of said shafts serving as a driven rotatable shaft, another one of said shafts serving as a recording shaft which is coupled for intermittent rotation with said driven rotatable shaft, means to rotate said shafts, a system of gears surrounding said first mentioned driven rotatable shaft for intermittent rotation therewith, a first cam secured to rotate with said recording shaft, a second cam secured to one of the gears of said gear system to intermittently rotate with said driven rotatable shaft, a cam follower positioned between said cams to alternately engage the peripheries thereof, means to alternately retain said cams in a static condition, a profile cam secured to one of said gear members, a clutch associated with said profile cam, a bell crank for operating said clutch, means for manually operating said bell crank for disengaging said clutch from rotation with said driven rotatable shaft, a detent for engaging said cam follower, and an escapement mechanism including a pawl and ratchet for disengaging said recording shaft when said tape is advanced.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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