Sept. 12, 1961 L. J. LAPOINTE 2,999,625

TAPE TRANSPORT APPARATUS

Filed June 23, 1958

Fig_1

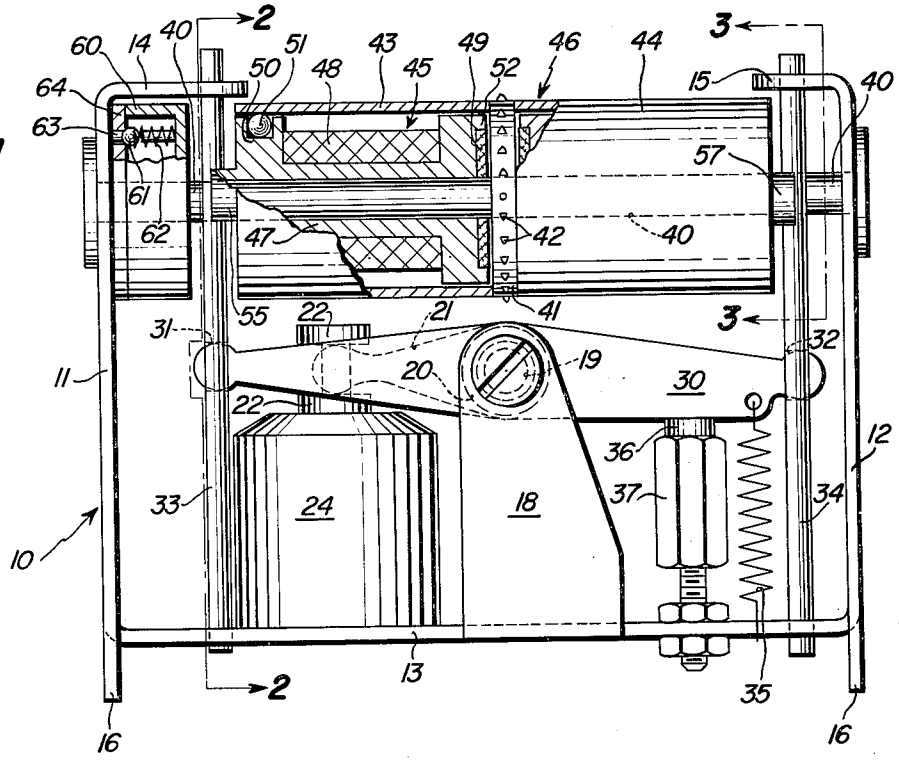
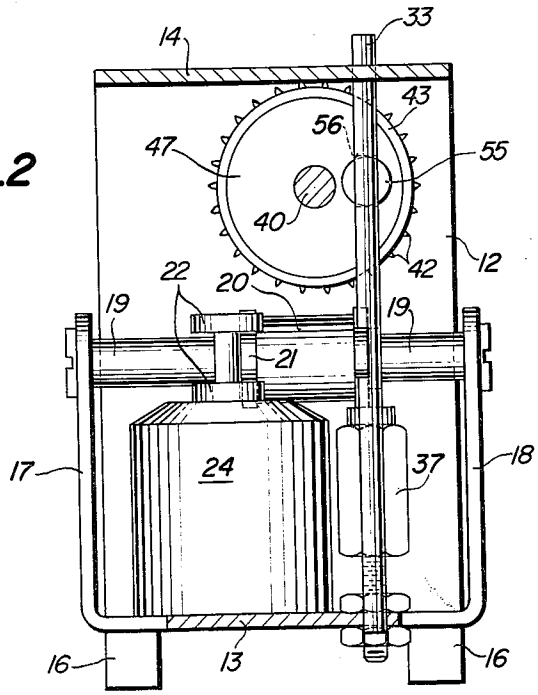


Fig_2



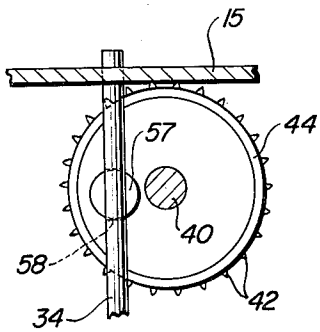


Fig_3

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2,999,625

Patented Sept. 12, 1961

2,999,625

TAPE TRANSPORT APPARATUS

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Filed June 23, 1958, Ser. No. 743,805

8 Claims. (Cl. 226—51)

This invention relates to a record transport device and more particularly relates to a novel power operated apparatus for intermittently feeding a punched record tape.

The many types of tape feed units presently used in data processing equipment are relatively complex and expensive which makes the initial and maintenance costs thereof relatively high.

One object of the instant invention is to provide a novel type of record transport device which is extremely simple and compact.

Another object of the invention is to provide an improved tape feed drive mechanism which is very inexpensive to manufacture and which is capable of intermittently feeding a punched tape in either of two directions and at either of two speeds.

Another object of the invention is to provide a novel tape transport device which is power driven by means of one solenoid and which is operated in either of two directions and at either of two speeds by the selective actuation of two electromagnetic clutches.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIGURE 1 is a front elevational view taken in partial section.

FIGURE 2 is a vertical sectional view taken along line 2—2 of FIGURE 1.

FIGURE 3 is a fragmentary sectional view taken along line 3—3 of FIGURE 1.

The instant device is housed within a rectangular type frame 10 having two upstanding end portions 11, 12 interconnected by the bottom horizontal portion 13. Frame 10 is provided at the top with bent-over ears 14 and 15 and at the bottom with four bent off legs 16. Frame 10 is also provided with a pair of upstanding side portions 17 and 18 which rotatably support the shaft 19. Rotatably mounted on shaft 19 is a bushing 20 having a relatively short radially disposed arm 21 rotatably secured to the inner end thereof. The outer end of arm 21 is positioned between the mutual facing shoulders of the upper and lower flanged portions 22 of the armature of a solenoid 24; the latter being suitably secured to the bottom of the frame 10. To the outer end of bushing 20 there is rotatably secured a beam 30. The outer ends of said beam are slidably engaged with the walls of the laterally disposed notches 31, 32 respectively formed in the rods or clutch operating members 33, 34, said rods being axially slidably mounted in suitable aligned apertures respectively formed in the bottom 13 and in the bent-off ears 14 and 15 of said frame 10. Beam 30, together with the bushing 20 and the associated lever 21, are rotatably biased in a clockwise direction by means of a spring 35. The clockwise limit of travel of beam 30 is determined by the position of the upper end 36 of a stop member 37 which is adjustably fixed to the bottom of said frame 10.

A main shaft 40 is rotatably mounted adjacent the upper ends of said frame end portions 11 and 12. A centrally disposed disk 41 is rotatably secured to shaft 40 and is provided with a plurality of peripherally spaced teeth 42 which are adapted to engage the feed holes of the record card or tape. Coaxially fixed to disk 41 is a pair of tubular drum members 43 and 44. Any suitable clutches may be provided for selectively driving the drum members 43, 44: here conventional electromagnetic type clutches 45 and 46 are rotatably mounted on the main shaft 40 and are respectively disposed within said drum members 43, 44. In that each of said clutches are constructed and operated in the same manner discussion of one such clutch (45) will suffice here. The central portion of the clutch spool or member 47 is surrounded by the usual windings 48 which the right or inner end of said spool is counterbored so as to receive a friction disk member 49 made of leather, cork or other suitable material. The left or outer end of spool 47 is provided with a peripheral groove 50 in which is disposed a plurality of anti-friction ball bearings 51 which engage and roll on the inner surface of said drum member 43. The outer end of clutch spool 47 is also provided with a projection 55 which extends into the notch 56 formed on the adjacent side of the rod 33. The spool for the clutch 46 is provided with a similar projection 57 which extends into the notch 58 formed in the adjacent side of rod 34. When the clutch windings 48 are energized a magnetic flux loop will be established through the right end 52 of spool 47, the air gap between disk 41 and the spool end 52, the disk 41, drum member 43, balls 51 and finally back through the body portion of spool 47. The establishment of this flux loop will cause the spool 47 to be axially biased to the right, as seen in FIGURE 1, so that the said disk member 49 is pressed into frictional clutching engagement with the left face of the central disk 41.

In the operation of the instant device, the solenoid 24 is first energized and the beam 30 is thereby rotated in a counter clockwise direction, FIGURE 1, thus respectively lowering and elevating the rods 33 and 34. This action will cause the spools of the clutches 45 and 46 to rotate in opposite directions and, depending on which of said clutches is energized, a corresponding rotation of the disk 41 and the associated drum members 43, 44 will result. The extent of rotative movement of the beam 30 during its said counter clockwise motion is just sufficient to rotate drum members 43, 44 through a peripheral distance which is substantially equal to the pitch of the disk teeth 42. When the solenoid 24 is deenergized, spring 35 will restore the beam 30 to its normal clockwise position determined by the adjustable stop 37. Normally neither clutch 45 or 46 is engaged during the return stroke of beam 30, however, if desired, the clutch that has just been energized may be deenergized and the other clutch simultaneously energized. In this way an additional rotational step of the drum members 43, 44 may be obtained for each cyclic operation of the beam 30 thus doubling the intermittent rotation of said drum members. If the above noted sequence of operation of the clutches is reversed then the said drum members and the record tape will be intermittently driven in the opposite direction.

In order to yieldably retain the shaft **40** and said drum members in a given rotative indexed position, a cylindrical housing **60** is rotatably secured to the left end, FIGURE 1, of said shaft **40** and operatively supports at least one detent ball **61** which is yieldably biased by a spring **62** into successive engagement with a plurality of holes, such as at **63**, formed in the plate **64** secured to the end portion **11** of the frame **10**; said holes being disposed on a circular line of centers.

The instant device is very compact, inexpensive and efficient; one prototype model having been made which occupies no more than ten cubic inches and which has been successfully operated at seventy-five cycles per second for extended periods of time. If desired a second solenoid may be used in place of spring **35**.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration only and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

The invention claimed is:

1. A record transport device; comprising a frame, a record supporting feed drum means rotatably mounted on said frame, a pair of rotatably mounted clutch spools which are individually operated one at a time and which in their engaged conditions are respectively rotatably connected to said drum means and which in their disengaged conditions are respectively rotatably disconnected from said drum means, means for rotating one of said spools in one direction, means for rotating the other of said spools in the opposite direction, and a single power means mounted on said frame for simultaneously operating the two spool rotating means in opposite directions so that said drum means may be driven in either rotative direction depending on which one of said clutch spools is in its engaged condition.

2. A record transport device; comprising a frame, a record supporting drum means rotatably mounted on said frame, a pair of clutch members rotatably supported in said frame, said clutch members being individually operated one at a time and when in their engaged conditions being respectively rotatably connected to said drum means and when in their disengaged conditions being respectively rotatably disconnected from said drum means, a pair of operating members respectively operatively connected to said pair of clutch members for respectively rotating the latter, means for actuating one of said operating members in one direction while simultaneously actuating the other of said operating members in the opposite direction, and power means for driving the said actuating means in opposite directions so that said drum means may be driven in either rotative direction depending on which one of said clutch members is in its engaged condition.

3. A record transport device; comprising a frame, a beam pivotally mounted on said frame, power means for pivotally oscillating said beam, a record supporting drum means rotatably mounted in said frame, a pair of rotatably supported clutch spools disposed adjacent said drum means, said clutch spools being individually operated one at a time and when in their engaged conditions being respectively rotatably connected to said drum means and when in their disengaged conditions being respectively rotatably disconnected from said drum means, and means connected between each of the opposite ends of said beam and said clutch spools respectively whereby operation of said power means serves to rotate one clutch spool in one direction and to simultaneously rotate the other clutch spool in the opposite direction so that said record drum means may be driven in one rotative direction or the other depending on which one of said clutch spools is in its engaged condition.

4. A record transport device; comprising a frame, a record supporting drum means rotatably mounted on said frame, a pair of clutch spools rotatably mounted adjacent said drum means, said spools being individually operated one at a time and when in their engaged conditions being respectively rotatably connected to said drum means and when in their disengaged conditions being respectively rotatably disconnected from said drum means, a solenoid mounted on said frame, and means actuated by said solenoid for rotating one of said clutch spools in one direction while simultaneously rotating the other of said clutch spools in the opposite direction whereby said drum means may be driven in one rotative direction or the other depending on which one of said clutch spools is in its engaged condition.

5. A tape transport device; comprising a frame, a tape supporting drum means rotatably mounted in said frame, a pair of electromagnetically actuated clutch spools rotatably mounted adjacent said drum means, said spools being individually operated one at a time and when in their engaged conditions being respectively rotatably connected to said drum means and when in their disengaged conditions being respectively rotatably disconnected from said drum means, a pair of rods slidably mounted in said frame and being respectively operatively connected to said clutch spools so as to rotatably operate the latter, a beam pivotally mounted on said frame and having outer ends which are respectively operatively connected to said rods, and power means for pivotally actuating said beam so that one of said clutch spools is rotated in one direction while the other of said spools is simultaneously rotated in the opposite direction whereby said drum means may be driven in one rotative direction or the other depending on which one of said clutch spools is in its engaged condition.

6. A record transport device; comprising a frame, a shaft supported on said frame, record drum means mounted on said shaft, a pair of clutch members mounted on said shaft, said clutch members being individually operated one at a time and when in their engaged conditions being respectively rotatably connected to said drum means and when in their disengaged conditions being respectively rotatably disconnected from said drum means, a pair of clutch operating members movably mounted in said frame and respectively operatively connected to said clutch members so as to rotate the latter, and means for simultaneously actuating said clutch operating members in opposite directions so that said drum means may be driven in either rotative direction depending on which one of said clutch members is in its engaged condition.

7. A record transport device; comprising a frame, a shaft rotatably mounted on said frame, record drum means secured to said shaft, a pair of clutch spools rotatably mounted on said shaft, said clutch spools being individually operated one at a time and when in their engaged conditions being respectively rotatably connected to said drum means and when in their disengaged conditions being respectively rotatably disconnected from said drum means, a pair of operating rods slidably mounted in said frame and being respectively operatively connected to said clutch spools so as to be capable of rotatably displacing the latter, a beam pivotally mounted on said frame, the free outer ends of said beam being respectively operatively connected to said rods, and power means for pivotally actuating said beam so that one of said clutch spools is rotated in one direction while the other of said clutch spools is simultaneously rotated in the opposite direction whereby said record drum means may be driven in one rotative direction or the other depending on which one of said clutch spools is in its engaged condition.

8. A transport mechanism for intermittently feeding a record tape; comprising a frame, a driven member rotatably mounted on said frame and being adapted to control the movement of the record tape to be intermittently indexed through predetermined incremental longitudinal steps, a clutch driving member rotatably mounted in said frame, said driving member being disposed in substan-

tially coaxial relation with respect to said driven member and being axially movable into and out of driving engagement with said driven member, drive means for rotatably oscillating said clutch driving member between two predetermined limits of rotation, the extent of rotational movement of said driving member in one direction being just sufficient to be capable of indexing the driven member through a predetermined incremental step, and control means adapted to be operated in timed relation to the oscillatory motion of said driving member for axially moving said clutch driving member so as to be in driving engagement with said driven member when said driving member is moving in one of its rotational directions and for permitting a movement of said clutch driving member

in the opposite axial direction so as to be out of driving engagement with said driven member when said driving member is moving in its other rotational direction.

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