Feb. 14, 1933. A. THOMAS 1,897,084

INK RIBBON FEED MECHANISM

Filed June 25, 1931 3 Sheets-Sheet 1

Fig. 1

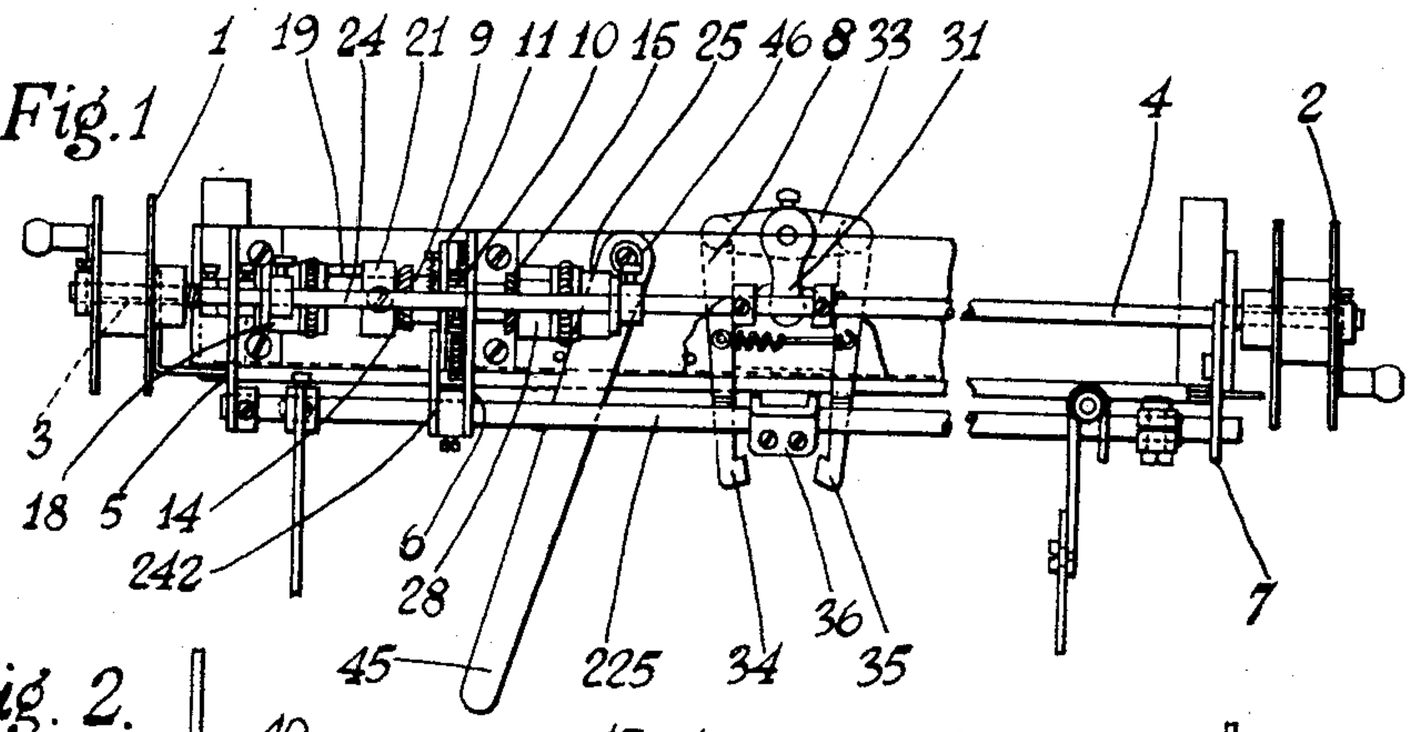


Fig. 2.

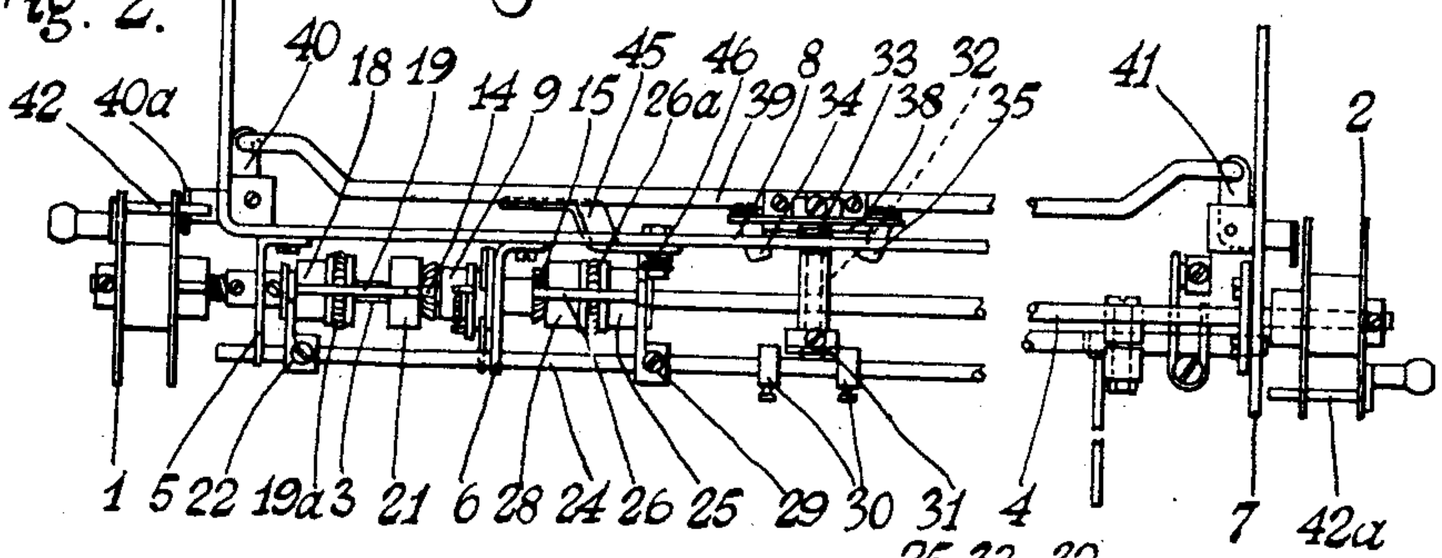
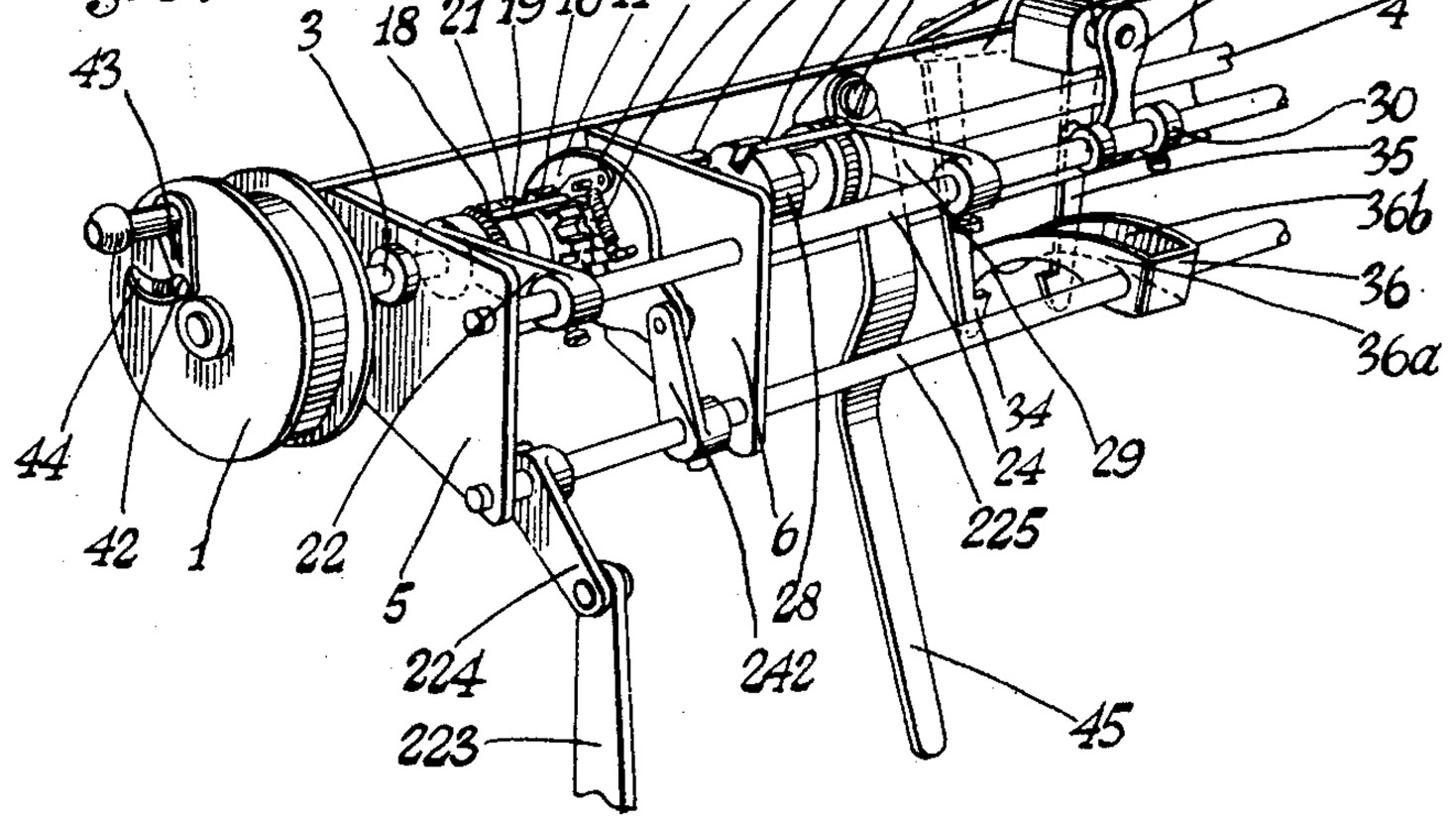


Fig. 3.



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INK RIBBON FEED MECHANISM

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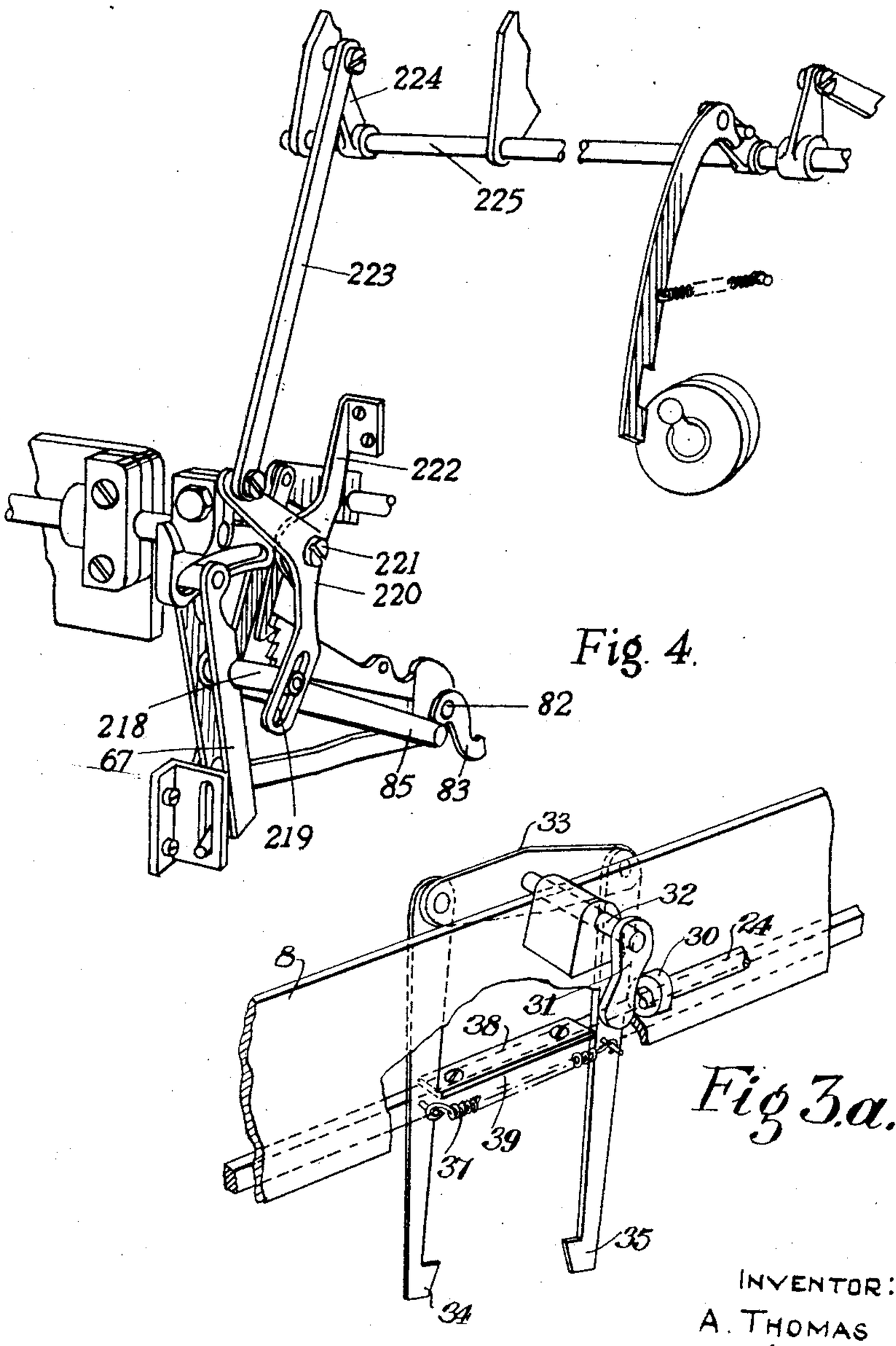

Fig. 4.

Fig 3.a.

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INK RIBBON FEED MECHANISM

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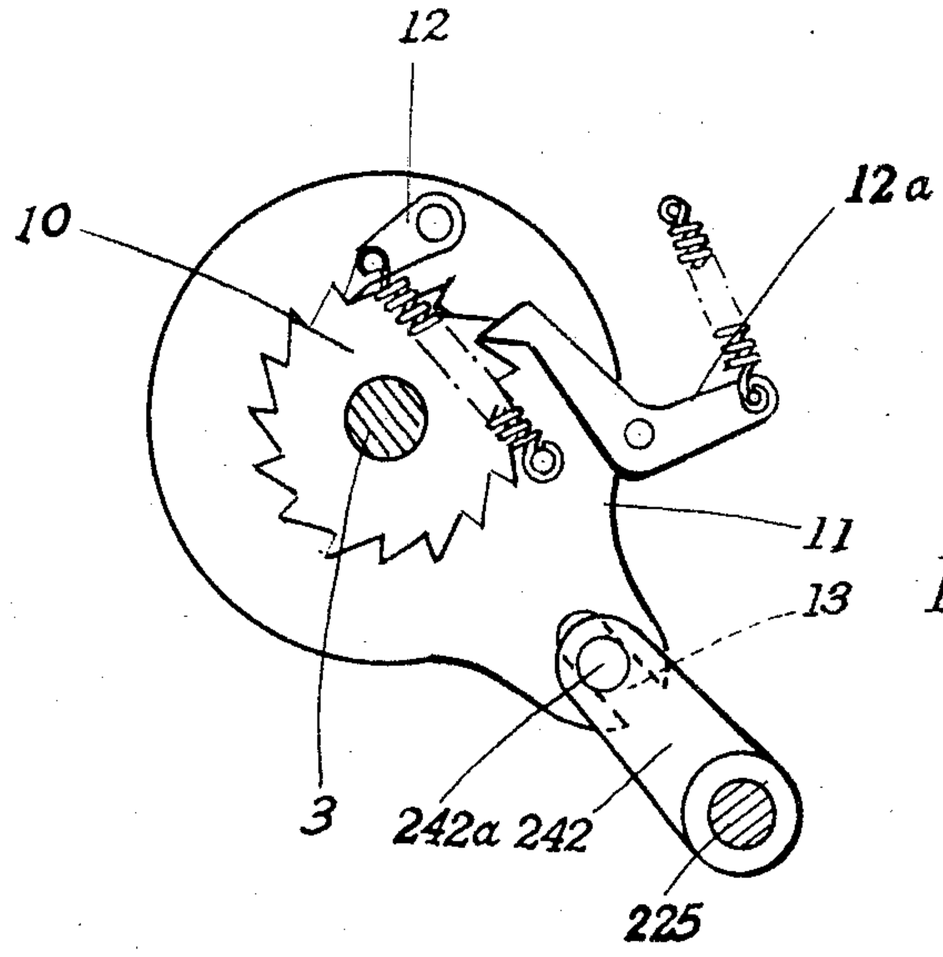
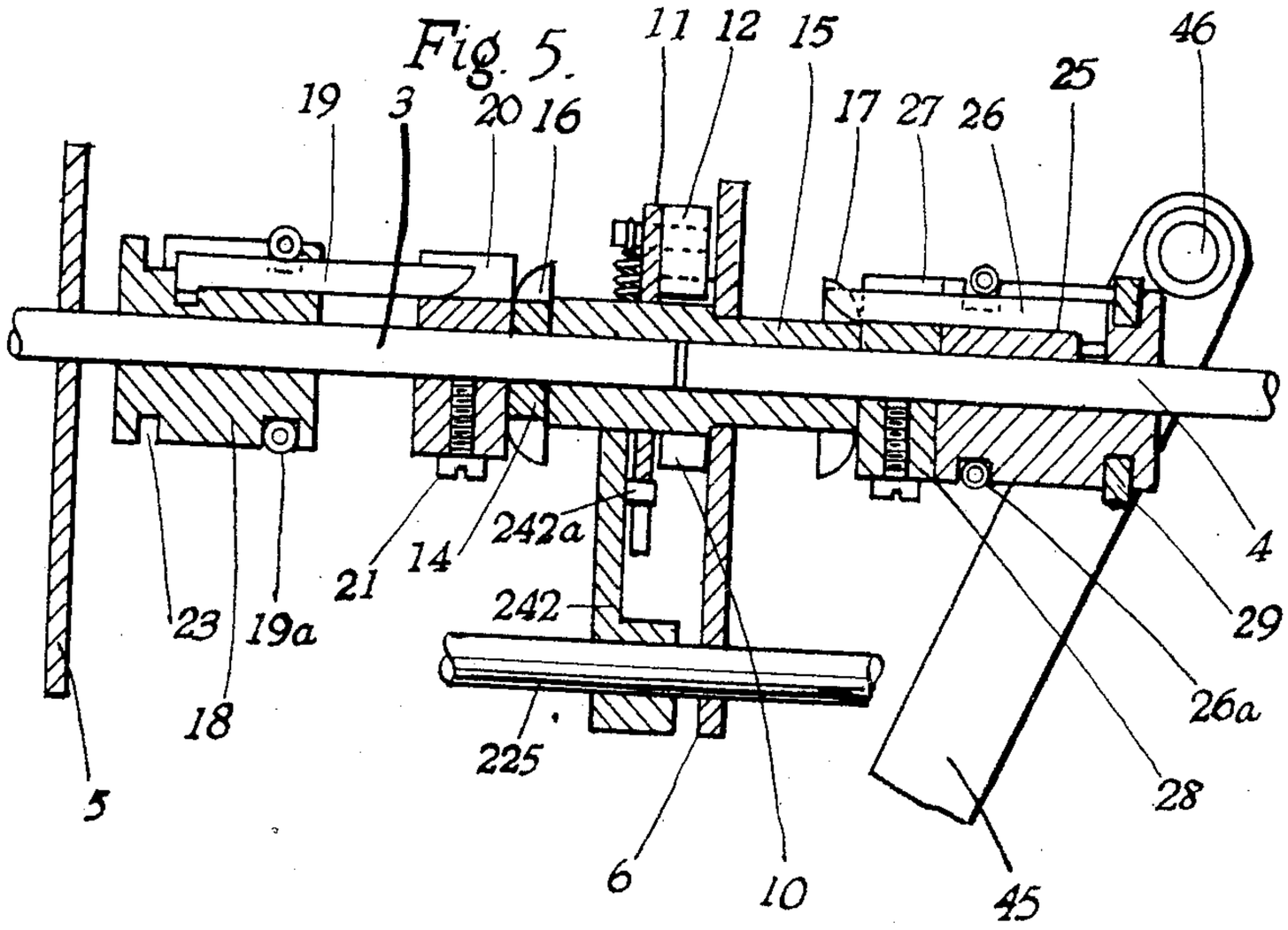


Fig. 6

Fig. 5.



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Patented Feb. 14, 1933 1,897,084

UNITED STATES PATENT OFFICE

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INK RIBBON FEED MECHANISM

Application filed June 25, 1931, Serial No. 546,714, and in Great Britain July 10, 1930.

This invention relates to ribbon feed mechanism for tabulating or like machines, and has for its object to provide an improved form of mechanism in which the reversal of the ribbon takes place when it is not being fed forward.

According to the present invention, the member which effects the reversal of the ribbon feed mechanism is operated while the ribbon feed pawl is being retracted, so that the reversal of the ribbon feed does not take place during an actual feed stroke of the pawl.

Preferably the mechanism comprises a reversing member, and a connection between said reversing member and the feed pawl actuating member such that said connection is only operative when the feed pawl is being retracted. For example, the mechanism may comprise a rocking member connected to the reversing mechanism and carrying two catch members, and means for moving one or other of said catch members into operative relation with an arm on the feed pawl operating shaft, this arm being so disposed that it only engages with, and moves a catch member when the feed pawl is being retracted, whereby the reversing mechanism is positively operated from the feed pawl operating shaft.

One construction according to the invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:

Fig. 1 illustrates the mechanism in elevation,

Fig. 2 illustrates the mechanism in plan,

Fig. 3 is a perspective view of the reversing mechanism.

Figure 3A illustrates to an enlarged scale a detail of the part of the mechanism illustrated in Figure 3.

Fig. 4 illustrates the connection between the operating member and the ribbon feed pawl.

Fig. 5 is an enlarged cross sectional elevation of the clutches for the ribbon feed mechanism, and

Fig. 6 illustrates the construction of the feed pawl and ratchet.

In the construction illustrated in the drawings, the ribbon feed mechanism comprises two spools 1 and 2 respectively secured to shafts 3 and 4.

Three brackets 5, 6 and 7 are provided forming part of a unit frame construction 8 and the bracket 6 forms a bearing for a sleeve 9 carrying a feed ratchet 10 (Figs. 1, 2 and 3). The sleeve 9 constitutes a bearing for the meeting ends of the two shafts 3 and 4. On the sleeve 9 adjacent the ratchet 10 is freely mounted a plate 11 carrying the feed pawl 12. The plate 11 is forked at 13 and this fork engages with a pin 242*a* on an arm 242 (Fig. 6) carried on a shaft 225 which is rocked by movement transmitted from an operating member, for example, the control member 83 described in the specification filed with copending U. S. patent application Ser. No. 546,712. A check pawl 12*a* is also provided for the ratchet 10.

The connection between the control member 83 and the shaft 225 is illustrated in Fig. 4 and comprises a stirrup member 67 to which the control member 83, which is pivoted at 82, is connected by means of a link 85. The stirrup member carries a laterally projecting pin 218 engaging in a slot 219 in a bell crank 220 pivoted at 221 to a bracket 222 fixed to the frame of the machine. The other end of this bell crank carries pivoted to it a link 223 pivoted to a short arm 224 secured to the shaft 225. Thus when the control member 83 is moved, the shaft 225 is rocked.

The arrangement of the pawl 12 on the plate 11 is such that when the shaft 225 turns in a clockwise direction, the pawl makes its feeding stroke.

The sleeve 9 carries at its end two collars 14 and 15 provided with dog teeth 17 and 16 respectively (Fig. 5). On the shaft 3 is

mounted a clutch member 18 which is free to slide on the shaft 3 and carries a clutch key 19 engaging in a slot 20 formed in a collar 21 secured to the shaft 3. The clutch member 18 can be moved along the shaft 3 by means of an arm 22 engaging with a groove 23 in the clutch member 18 and attached to a sliding reversing shaft 24. When the clutch member 18 is moved to the right in Fig. 5 the key 19 engages not only with the slot 20 in the collar 21, but also with one of the dog teeth 16 whereby the ratchet 10 is clutched to the collar 21 and consequently to the shaft 3. Hence as the ratchet is turned the spool 1 attached to the shaft 3 will be turned.

Adjacent the dog teeth 17 the shaft 4 carries a sliding clutch member 25 similar to the member 18 and having a clutch key 26 engaging in a groove 27 in a collar 28 secured to the shaft 4. The clutch member 25 is controlled by an arm 29 secured to the reversing shaft 24 in such a way that when the key 19 engages with the dog teeth 16, and key 26 is out of engagement with the dog teeth 17 and vice versa.

When the shaft 24 is moved longitudinally to the right in Fig. 2 the clutch key 19 is moved into engagement with one of the dog teeth 16 whereby the shaft 3 and spool 1 are clutched to the ratchet wheel 10 and are, therefore, driven by the pawl 12. On the other hand, the clutch key 26 is withdrawn from engagement with the dog teeth 17, so that the shaft 4 and spool 2 are disengaged from the ratchet wheel 10. The ribbon is, therefore, wound on to the spool 1 and off the spool 2.

If the shaft 24 is moved to the left in Fig. 2, the shaft 3 is disengaged from the ratchet wheel 10 and the shaft 4 is clutched thereto so that the ribbon is fed in the opposite direction. In order to effect this reversal or movement of the shaft 24, the said shaft carries two collars 30 between which lies a reversing arm 31 carried on a short spindle 32 to the other end of which is fixed a cross bar 33 carrying at each end depending pivoted hook members 34 and 35. Secured to the rocking shaft 225 is a forked member 36 having arms 36*a* and 36*b* adapted to engage respectively with the depending hook members 34 and 35.

The hook members are connected together by a spring 37 and their lateral position is controlled by a bracket 38 attached to a connecting rod 39 pivoted at one end to a bell crank 40 and at the other end to a bell crank 41, the two bell cranks being pivoted to the frame of the machine. A movement of either bell crank will move one of the hook members into engagement with one of the arms 36*a* and 36*b* and the other out of engagement. The ribbon is attached at one end to a pin 42 mounted on an arm 43 which is pivoted to the spool 1 and at the other end to a pin 42*a* similarly carried by the spool 2. The two pins project through slots 44 in the sides of the spools.

Assuming that the ribbon is wound on to the spool 1, the pin 42 will be locked near the center of the spool, and will, therefore, pass under a lug 40*a* on the bell crank as the spool revolves. When the ribbon becomes entirely unwound, it will pull the pin out to the end of the slot 44. The movement of the pin 42 thus caused by the ribbon will bring the pin outwards into a position where it will engage the lug 40*a* of the bell crank 40 and as the spool turns this bell crank will be turned about its pivot in a clockwise direction, thereby moving the connecting rod 39 to the right in Fig. 2. This movement of the connecting rod will move the hook members, so as to bring the hook member 34 into such a position that its hooked end is directly below the arm 36*a* of the shaft 225. This motion takes place on a feeding stroke of the ribbon, then at the return stroke of the pawl 12, the movement of the shaft 225 causes the finger 36*a* to pull the hook member 34 downwardly, thereby turning the cross bar 33 still further about its pivot, whereby the reversing arm 31 is turned in an anti-clockwise direction and moves the reversing shaft 24 to the right in Fig. 2, thereby causing the clutch key 19 to engage with the teeth 16 and the clutch key 26 to become disengaged from the teeth 17.

A manually operable handle 45 is pivoted to the frame at 46 and also to the arm 29 so that by movement of the handle 45 the shaft 24 may be reciprocated and the clutches engaged and disengaged.

It will be seen that the invention also comprises a reversing mechanism for a ribbon feed mechanism which is actuated from the ribbon through a relay, the ribbon itself being not subjected to the pull necessary to effect the reversal.

What I claim is:

1. Ink ribbon feed mechanism for tabulating machines comprising in combination a rocking member, two spools for the ribbon, a driving member reversing mechanism for connecting one or other spool to the driving member, an operative connection between said rocking member and said reversing mechanism, two catch members carried by said rocking member, a feed pawl operating shaft, an arm disposed on said feed pawl operating shaft, and means for moving one or other of the two said catch members into operative relation with the arm on the feed pawl operating shaft, the said arm being so disposed on the feed pawl operating shaft that it only moves one of the two said catch members when the feed pawl is being retracted, whereby the reversing

mechanism is positively operated from the feed pawl operating shaft.

2. Ink ribbon feed mechanism for tabulating machines comprising in combination a pivoted rocking member, two spools for the ribbon, a driving member, reversing mechanism for connecting one or other spool to the driving member, an operative connection between said rocking member and said reversing mechanism, two catch members on said rocking member, a feed pawl operating shaft, an arm on said shaft and means for moving one or other of said catch members into operative relation with said arm, which arm is so disposed on the shaft as to move a catch member only when the feed pawl is being retracted whereby the reversing mechanism is positively operated from the feed pawl operating shaft.

3. Ink ribbon feed mechanism for tabulating machines comprising in combination a pivoted rocking member, two spools for the ribbon, a driving member, a clutch member connected to each spool, a reversing shaft adapted to move said clutch members into and out of engagement with the driving member, a projection on said rocking member engaging with the reversing shaft, two catch members on said rocking member, a feed pawl operating shaft, an arm on said shaft, means for moving one or other of said catch members into operative relation with said arm, which arm is so disposed on the shaft as to move a catch member only when the feed pawl is being retracted, whereby when a catch member is moved by the arm, the rocking member is turned about its pivot and operates the reversing shaft to clutch one spool to the driving member and declutch the other spool therefrom.

4. Ink ribbon feed mechanism for tabulating machines comprising in combination two spools for the ribbon, two shafts to which said spools are respectively attached, a slotted collar attached to each shaft, a slidable collar mounted on each shaft, a driving member having slotted discs attached to it at each side, clutch keys carried by the slidable collars and adapted to engage with the slots in said slotted discs, a reversing shaft, operative connections between said reversing shaft and the slidable collars whereby when said shaft is moved in one direction axially one clutch key engages with its driving disc and the other clutch key is disengaged from its driving disc and vice versa, a pivoted rocking member, an operative connection between said rocking member and the reversing shaft, two catch members on said rocking member, a feed pawl operating shaft, an arm on said shaft, means for moving one or other of said catch members into operative relation with said arm, which arm is so disposed on the shaft as to move a catch member only when a catch member is moved by the arm, the rocking member is turned about its pivot and operates the reversing shaft to clutch one spool to the driving member, and declutch the other spool therefrom.

5. Ink ribbon feed mechanism for tabulating machines comprising in combination a rocking member, two spools for the ribbon, a driving member reversing mechanism for connecting one or other spool to the driving member, an operative connection between the rocking member and the reversing mechanism, two catch members carried by said rocking member, a feed pawl operating shaft, an arm on said shaft and means for transmitting the pull on the ribbon, when it becomes completely unwound, to the catch members to move one of said catch members into operative relation with the arm on the feed pawl operating shaft, whereby the reversing mechanism is positively operated from the feed pawl operating shaft.

6. Ink ribbon feed mechanism for tabulating machines comprising in combination two spools for the ribbon, two shafts to which said spools are respectively attached, a slotted collar attached to each shaft, a slidable collar mounted on each shaft, a driving member having slotted discs attached to it at each side, clutch keys carried by the slidable collars and adapted to engage with the slots in said slotted discs, a reversing shaft, operative connections between said reversing shaft and the slidable collars whereby when said shaft is moved in one direction axially, one clutch key engages with its driving disc and the other clutch key is disengaged from its driving disc and vice versa, a pivoted rocking member, an operative connection between said rocking member and the reversing shaft, two catch members on said rocking member, a feed pawl operating shaft, an arm on said shaft, means for transmitting the pull on the ribbon, when it becomes completely unwound, to the catch members to move one of said catch members into operative relation with the arm on the feed pawl operating shaft whereby the reversing mechanism is positively operated from the feed pawl operating shaft.

7. Ink ribbon feed mechanism for tabulating machines comprising in combination a rocking member, reversing mechanism for the ribbon, an operative connection between the rocking member and the reversing mechanism, two catch members carried by said rocking member, a feed pawl operating shaft, an arm on said shaft, two spools for the ribbon each having slots formed in its sides, a pin riding in the slots in each spool, to which pin the ends of the ribbon are respectively attached, and an operative connection between each pin and the catch members whereby when the ribbon becomes completely unwound, the respective pin is pulled out to

the end of its slot and thereby moves the catch members to bring one of the catch members into operative relation with the arm on the feed pawl operating shaft.

8. Ink ribbon feed mechanism according to claim 7, wherein the operative connections between the pins and the rocking member comprise bell cranks disposed adjacent each pin, a reciprocable shaft connected at its ends to said bell cranks, and an operative connection between said reciprocable shaft and the catch members whereby when a pin is moved by the ribbon, the respective bell crank is turned, and moves the reciprocable shaft which in turn, moves the catch members.

9. Ink ribbon feed mechanism for tabulating machines comprising in combination two spools for the ribbon, two shafts to which said spools are respectively attached, a slotted collar attached to each shaft, a slidable collar mounted on each shaft, a driving member having slotted discs attached to it at each side, clutch keys carried by the slidable collars and adapted to engage with the slots in said slotted discs, a reversing shaft, operative connections between said reversing shaft and the slidable collars whereby when said shaft is moved in one direction axially, one clutch key engages with its driving disc and the other clutch key is disengaged from its driving disc and vice versa, a pivoted rocking member, an operative connection between said rocking member and the reversing shaft, two catch members on said rocking member, a feed pawl operating shaft, an arm on said shaft, two spools for the ribbon each having slots formed in its sides, a pin riding in the slots in each spool, to which pin the ends of the ribbon are attached, bell cranks disposed adjacent each pin, a reciprocable shaft connected at its ends to said bell cranks, and an operative connection between said reciprocable shaft and the catch members, whereby when a pin is moved by the ribbon, the respective bell crank is turned and moves the reciprocable shaft which in turn, moves the catch members.

10. Ink ribbon feed mechanism for tabulating machines, comprising in combination, two spools for the ribbon, a driving member, a reversing member for connecting one or other spool to the driving member, an actuating member for moving said reversing member in one direction, a second actuating member for removing said reversing member in the opposite direction, a ribbon feed pawl, a swinging arm adapted to operate one of said actuating members during movement of the said arm in one direction, an operative connection between said arm and the feed pawl, whereby movement of the arm to operate an actuating member takes place during retraction of the feed pawl, and means for moving one or other actuating member into operative relation with the swinging arm.

11. Ink ribbon feed mechanism for tabulating machines, comprising two spools for the ribbon, a driving ratchet wheel, an operating pawl for said ratchet, clutches for connecting the spools to the ratchet, means for causing engagement of one clutch and simultaneous disengagement of the other clutch, and a detent pawl for the ratchet wheel, whereby the ribbon is maintained taut.

In testimony whereof I affix my signature.

ARTHUR THOMAS.