

Dec. 2, 1941.

W. J. PASINSKI

2,264,855

CASH REGISTER

Original Filed June 10, 1937

2 Sheets-Sheet 1

Fig. 2.

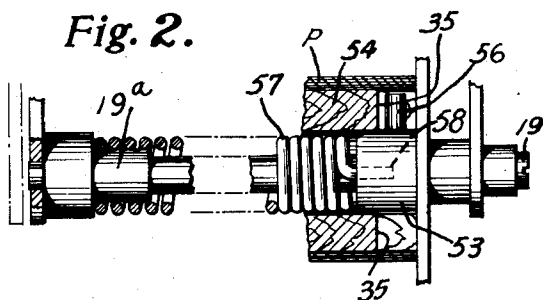
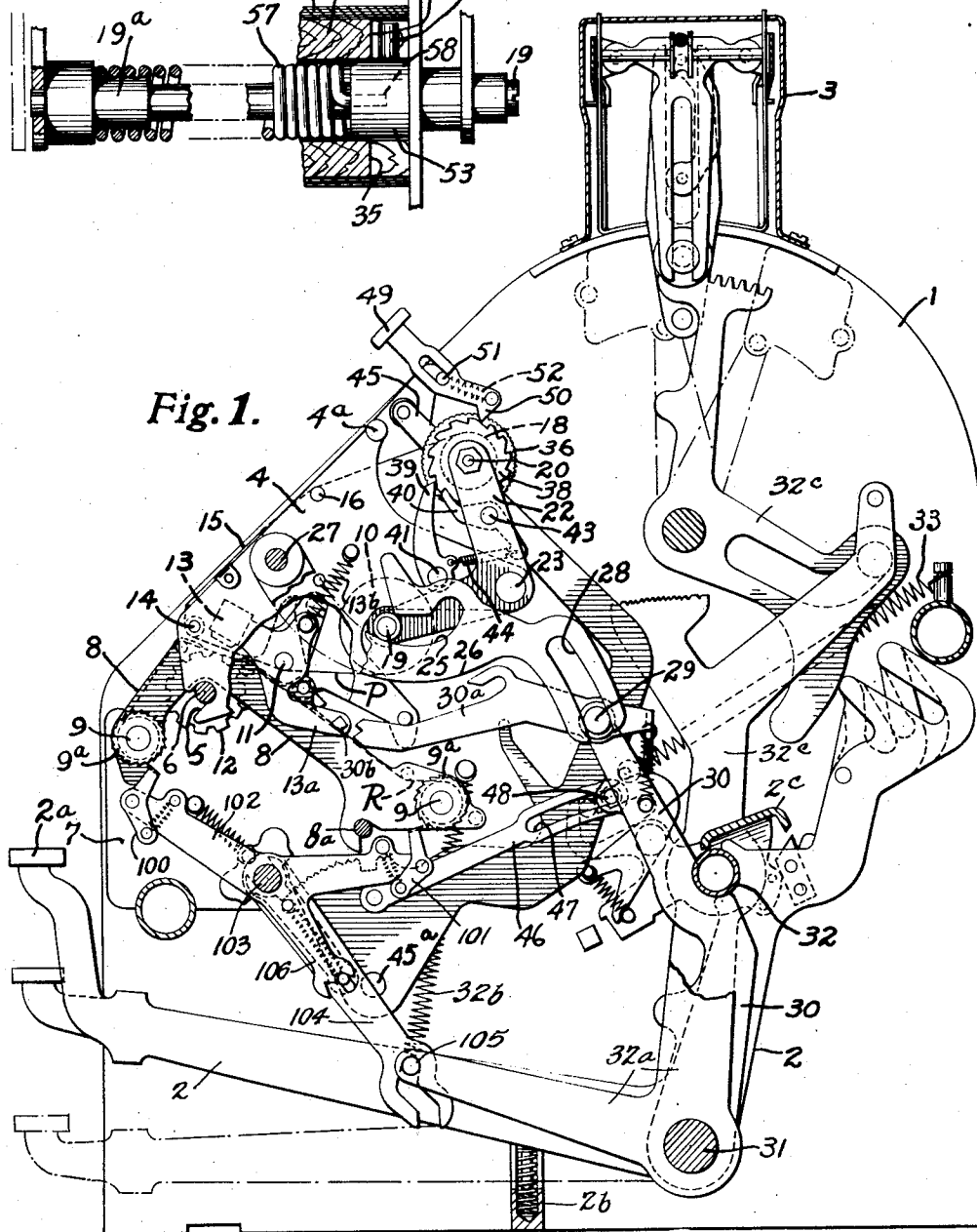


Fig. 1.



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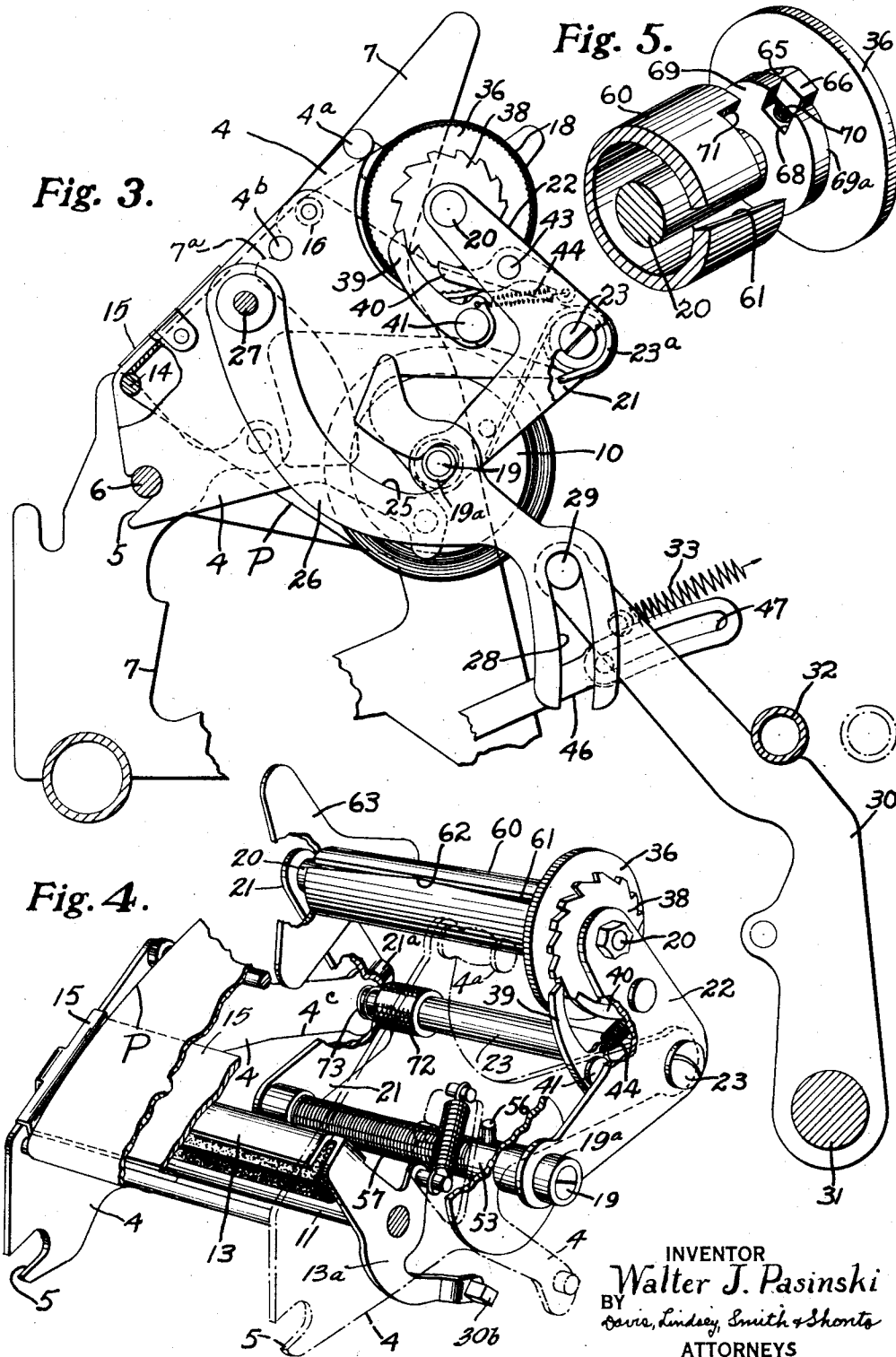
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,264,855

CASH REGISTER

Walter J. Pasinski, Howell, Mich., assignor to
Burroughs Adding Machine Company

Application June 10, 1937, Serial No. 147,430

Renewed October 26, 1939

19 Claims. (Cl. 197—133)

This invention relates to cash registers, and more particularly to an improved paper equipment or mechanism for supplying, feeding, storing and controlling a record strip of paper.

The paper equipment is of the type in which the paper is moved from a visible to a printing position and returned to visible position during each machine operation. The machine has a paper support or table located at some distance from the printing mechanism. A paper strip passes from a supply roll past the printing mechanism and over the paper table to a storage roll. Normally, the last printed entry is in visible position on the table, or through a sight opening. During each machine operation, the paper strip is moved so as to bring it to proper position relative to the printing line of the printing mechanism to enable the next entry to be properly spaced from the last. A line-spacing operation occurs automatically and, after printing occurs, the strip is returned to a visible position so that the currently printed entry is visible.

One of the difficulties encountered with mechanisms of this kind has been that so many parts have to be moved that the key depression is hard. Another difficulty is that the mechanisms are quite complicated and expensive and quite likely to get out of order. It is one of the objects of the present invention to provide a mechanism of the above-mentioned type which is extremely simple, and one in which the combination and arrangement of parts is such that only a minimum number of parts need be moved, with the result that the mechanism may be operated by a very easy key depression.

Another difficulty is that the mechanisms of prior machines have been located within the interior thereof, and, with the complicated mechanisms for shifting the paper that have heretofore been employed, the paper handling section of the machine is so tied in with the rest of it as to make it very difficult to service and repair. Another of the objects of the present invention is to overcome this difficulty by providing a combination and arrangements of parts that enables a paper handling section of the type in question to be detached as a unit for service and repair.

Another difficulty is that, where the paper rolls are located within the machine and surrounded by complicated mechanism, it is often fairly difficult to remove and replace the rolls. Another of the objects of the present invention is to provide an improved means for enabling the paper rolls to be very easily changed while in a readily accessible position.

The operator of mechanisms of this type also frequently desires to look at an entry that has already been made but wound upon the paper storage roll. Heretofore, it has been very difficult, if not impossible, for him to look at such entries. Another object of the present invention is to provide a mechanism whereby the operator can very quickly and easily look at any entry desired, after which he can very quickly rewind the paper strip so that operations may proceed in the normal manner.

Still another object is to provide a very easy and efficient means for attaching the end of a paper strip to the storage roll, which means also acts to align the paper to insure that it will slide properly on the parts over which it is moved when it is shifted from visible to printing position and returned.

Other and further objects of the invention will become apparent hereinafter by reference to the annexed specification and drawings.

In the drawings:

Figure 1 is a right side sectional elevation of a cash register showing the paper mechanism applied thereto;

Fig. 2 is an enlarged fragmentary detail section of the paper supply roll mechanism;

Fig. 3 is an enlarged view of the essential elements of the paper mechanism in printing position;

Fig. 4 is a detail perspective view of the paper roll supporting devices with certain parts cut away;

Fig. 5 is a detail perspective of the release for the paper storage roll drive.

The invention is illustrated in connection with a Burroughs key operated cash register such as disclosed in Pasinski No. 2,070,059, February 9, 1937. And the printing mechanism with which the invention is illustrated is that of Patent No. 2,249,224, issued to me on July 15, 1941. It is to be understood, of course, that the invention can be used with other types of cash registers or calculating machines.

General construction of machine

The mechanism of the Burroughs cash register is housed in a casing 1 shown in Fig. 1, which casing has an inclined front face shown in more detail in said Patent No. 2,070,059. The various mechanisms of the machine are operated by depressible amount keys 2* on the ends of key levers 2. The key levers 2 are in the form of bell crank levers fixed to a shaft 31 journaled in the side plates of the machine, said bell cranks

being urged clockwise as viewed in Fig. 1 by springs 2^b against limit stops not shown. The rear upwardly extending arms of the bell crank levers 2 cooperate with a key coupler 2^c as described in said Pasinski patent. The rear ends of levers 2 are also positioned to engage a universal operating shaft or bail 32 carried by bell crank levers 32^a of which there is one at each side of the machine (Fig. 1). The bell cranks 32^a are fixed to shaft 31 and urged clockwise (Fig. 1) by springs 32^b. The bell cranks 32^a also act as full stroke sectors and they act through connections 32^c (Fig. 1) to operate the indicating mechanism 3 all as described in said Pasinski Patent 2,070,059.

The arrangement is such that, when an amount key is depressed, its lever 2 will engage shaft 32 and rock it forward. As shaft 32 moves forward, it engages and rocks a pair of levers 30 pivoted on the shaft 31, and supporting a bail 29, said levers being used to operate different mechanisms of the machine as will be presently described. Said levers 30 are returned to normal, when released, by a spring 33. For purposes of convenience in the present description the shaft 32, the lever 30 and associated parts will be called the general operating mechanism.

The printing mechanism includes a set of rotatable type wheels 12 which are differentially positioned under the control of the amount keys as described in detail in said copending application Serial No. 147,429.

Positioned over the type wheels 12 is a stretch of ink ribbon R carried by two ribbon reels 9 having feed ratchet wheels 9^a attached to them.

Positioned above the ink ribbon and type wheels is a platen 13 (Fig. 4) carried by a hammer member 13^a pivoted on a shaft 11 carried by the paper section as presently will be explained. At an appropriate time during operation of the machine, the hammer-platen 13—13^a is fired to cause the platen to strike the paper which causes said paper to engage the ink ribbon and the ribbon to engage the characters of the type wheels then in line under said platen. The line where the platen strikes the type wheels and makes the printing impression is the printing line of the printing mechanism.

The printing mechanism is operated by the lever 30 which carries an abutment arm 30^a pivoted to it and projecting forward, said arm being held in position by a spring as shown in Fig. 1. The forward end of the arm 30^a has an abutment face adapted to engage a square stud 30^b on the hammer member 13^a. As the lever 30 moves forward, the end of arm 30^a engages said stud 30^b and rocks the hammer member 13^a clockwise, thereby tensioning a spring 13^b. As said arm 30^a reaches the end of its forward movement, its abutment end slips off of the stud 30^b, thereby releasing the hammer 13^a which is fired by the spring 13^b and retracted as described in detail in my copending application Serial No. 147,431 filed June 10, 1937.

The ink ribbon R is moved by a reversible feed mechanism including two pawls 100 and 101 (Fig. 1) carried on the ends of a lever 102 pivoted on the shaft 103. Fixed to the shaft 103 is an arm 104 having a cam slot in its lower end in which is engaged a stud 105 on the end of one of the arms of one of the bell cranks 32^a which support the general operating bail 32. Each time the bail 32 is moved, the lever 104 is rocked to cause one of the pawls 100 or 101 to engage its ratchet wheel to move the ribbon. The ribbon

moves in one direction until the resistance to its movement is such that, at the time the active pawl engages the ratchet wheel to operate it, the connection 106 between the lever 102 and arm 104 will be moved so as to change the relation of the pawls, causing the feed to be reversed.

Moving paper from visible to printing position and return

The machine is provided with a paper table 15 which is located at some distance from the printing line of the printing mechanism but preferably as close thereto as circumstances will permit. The portion of the paper strip on the paper table is normally positioned so that the last entry on the strip is visible. The table of the illustrated embodiment has sufficient width and breadth to permit the operator to make written entries opposite the printed entries which type of table is sometimes called an "autographic table." But the size and nature of this table are unimportant insofar as the present invention is concerned. All that is necessary is some support for the paper and a sight opening in the casing so that the last entry is visible. The term "table" as used herein is to be construed broadly as including any support for holding the strip in a position where the last entry is visible.

The paper strip P passes from a rotatable paper-supply spool 10 (Fig. 1) under the stationary guiding shaft 11, past the printing line of the printing mechanism, under and about a stationary guide shaft 14, over the table 15, and over a stationary guide shaft 16 to a rotatable, paper-storage spool 18. In the normal position of the parts shown in Fig. 1, the paper strip passes about the parts as above described and the last entry is visible on the paper table 15.

The paper strip is moved from a visible to a printing position and returned by making the supply and storage spools bodily movable and by arranging them so that, as one spool moves toward one end of the table, the other spool moves away from the opposite end so that the paper strip is slid over the stationary guides and the stationary table from a visible to a printing position and then returned.

The paper spools are carried by a pair of bell crank levers 21 and 22 (Fig. 4) pivoted on a shaft 23 of the frame of the paper section which frame will be presently described. The supply spool 10 is rotatably mounted on a shaft 19 carried by the forward arms of said bell crank levers and the storage spool 18 is rotatably mounted on a shaft 20 carried by the upwardly extending arms of said bell crank levers. The bell cranks 21 and 22 with the spools supported by them are urged to the normal position of Fig. 1 by a spring 23^a shown in Fig. 3, the purpose and advantage of which will be described later.

The supply and storage spools are moved bodily by means of an arm 26 pivoted at 27 to the machine frame and provided with a cam slot 28 engaging a stud 29 on the lever 30. The arm 26 has a cam slot 25 cooperating with a roller 19^a (Fig. 3) on the end of the shaft 19 that is supported by the two bell cranks 21 and 22. When the lever 30 is rocked forward, as for example by depression of the amount keys, the arm 26 is rocked clockwise, whereupon the cam 25, acting on the roller 19^a, rocks the bell cranks 21 and 22 counterclockwise and thus moves the storage spool 18 toward one end of the paper table 15 while the supply spool moves away from the printing mechanism and the opposite end of said

paper table. This slides the paper strip to a position such that the entry being printed will be just below the preceding entry. The parts are timed so that, after the paper strip has been moved to printing position and while it is stationary, the printing mechanism operates to print the current entry. When the parts are released, as by release of the amount keys, they are returned to normal by the spring 23^a, assisted by springs 32^b, and 33.

The above operation requires very little force and may be made with a very light key depression. In the first place, only a minimum number of parts are moved and these are pivoted rather than sliding parts. The result of moving the paper from visible to printing position and return is obtained by simply moving the two paper rolls about a pivot and sliding the paper over the other parts which remain stationary. The force is applied through a simple lever mechanism comprising a lever 30 engaging a pivoted arm 26 which acts directly on the support for the paper spools. The spools are mounted so that, were it not for the spring 23^a, they would rock forward by gravity. When the lever 28 is moved it must, of course, overcome the tension of the spring 23^a but this is not great and the small resistance that it offers is a uniform resistance. Likewise the swinging of the paper spools about their pivot and the sliding of the paper strip over its guide offers only a small and uniform resistance as distinguished from the irregular application of loads and the movement of a large number of parts. It is of course necessary to overcome the resistance of spring 33 as the arm 30 is moved forward but, here again, the resistance to be overcome is a uniform one and is not great, being very little greater than the resistance normally to be overcome in operating the printing mechanism.

Automatic line spacing

When the paper strip is moved from visible to printing position, it remains in printing position long enough to receive the next entry, after which it is returned to position where said entry is visible. This means that the paper strip must be line spaced and provision is made for automatically accomplishing this as follows:

Connected to the storage spool 18 (Fig. 4) is a ratchet wheel 38. This connection is a disconnectible one that will be hereinafter described. For present purpose it is sufficient to understand that, when the ratchet wheel 38 is moved, the storage spool 18 will move with it.

Positioned to engage the ratchet wheel 38 is a driving pawl 39 pivoted at 41 (Fig. 4) to one of the side plates 4 of the printing frame that will be presently described. Also positioned to engage the ratchet wheel 38 is a locking or blocking dog or pawl 40 pivoted at 43 to one arm of the bell crank 22. Both pawls are urged in a clockwise direction into engagement with the ratchet wheel 38 by a spring 44 tensioned between the lower ends of the two pawls.

As the storage spool 18 is rocked bodily in a counterclockwise direction from its Fig. 1 to its Fig. 3 position, the ratchet wheel 38 moves with it, whereupon the driving pawl 39 engages one of the teeth of said wheel and causes the storage spool 18 to be rotated clockwise a predetermined distance, the driving pawl slipping off the ratchet wheel after the required rotation. The safety or blocking pawl 40 slides over the ratchet wheel during this operation and acts to prevent reverse

rotation of the ratchet wheel 38 and storage spool 18.

The result is that, as the storage spool 18 is rocked downwardly in the operation of the mechanism for moving the paper from visible to printing position, the paper strip is advanced upward in the opposite direction the proper distance so that, when the paper strip is next returned, the entry that has just been made will be the one that is visible.

During the return of the parts from the position of Fig. 3 to that of Fig. 1, they are operated under the urge of the springs 32 and 23^a (Fig. 3) during which movements pawl 39 slides over the teeth of the ratchet wheel 38, pawl 40 still acting to prevent reverse rotation of the storage spool.

Keeping paper taut

For the most efficient action in sliding the paper strip over the stationary guides and paper table, it should be taut at all times. Furthermore, it is desirable to have the paper taut over the printing line in order to obtain clear printing.

A friction brake for the paper supply spool is provided so that a measurable force is required to unwind the paper strip from said spool. It will be recalled that, as the paper is shifted from visible to printing position, the line spacing mechanism operates automatically to rotate the storage spool so as to pull a limited amount of the paper from the supply spool to the storage spool. Thus, as the paper is shifted from visible to printing position, it is automatically tightened because the line-spacing mechanism pulls on it against the resistance of the brake on the supply spool. Thus the paper becomes taut for the sliding movement and is also held taut for the printing operation. It remains in this condition during the return of the parts to normal. From Figs. 1 and 3 it will be apparent that the locations of the spool supports 19 and 20 on the bell cranks 21 and 22, the location of shaft 23 on which said bell cranks rock, and the movements of said bell cranks and spools relative to the ends of the paper table 15 are such that during the return movement by which the print is brought to visible position, the paper is maintained taut by reason of the distance of the storage spool from its end of the table being increased a substantially greater extent than the distance between the supply spool and its end of the paper table is decreased. During the forward stroke in which the paper strip is moved to printing position, the rotation of the storage roll by the pawl 39 and ratchet 38 is always more than sufficient to take up any slack that would otherwise be created in the paper strip by reason of the distance of the supply roll from its end of the paper table being increased to an extent less than that to which the distance of the storage roll from its end of the paper table is decreased. A novel means has been provided to secure unusually efficient action in braking the paper supply spool.

The paper strip P (Fig. 2) is wound on a wooden spool 54 which is slotted at 35 to receive a stud 56 on the hub 53 of the supply spool 10 so that the wooden spool 54 and the hub 53 will rotate as a unit on the shaft 19. Mounted on the shaft 19 within the wooden spool 54 is a coil spring 57. The right-hand end 58 of spring 57 is inserted in the hub 53 of the spool 10 and its left-hand end frictionally encircles and grips an enlarged portion 19^a of the shaft 19.

As the paper strip P is unwound, it tends to turn the wooden core 54 which, in turn, tends to

rotate the spool 18 and the spring 19. This movement is resisted by the frictional resistance of the spring 57 on the shaft 19, due to the tight engagement between the spring 57 and the enlarged portion 19^a of the shaft 19.

Paper attachment and alignment

When the paper is slid back and forth from one position to the other, it must slide in a straight line. If it tends to slew off to one side, the edge of the paper will become torn and the mechanism will not operate properly. This requires that, when the paper strip is attached to the storage spool, it be properly aligned so that it will wind on said spool in a straight, uniform manner. Novel means has been provided for enabling the paper to be attached to the storage spool in such a manner that it will automatically align itself, and this means is a very simple one that can be quite easily used by the operator without any tedious adjustment to secure proper alignment of the paper.

Referring to Fig. 4, the storage spool includes a hollow sleeve 60 which is provided with a slot 61 through which the leading or free edge of the paper strip is inserted by the operator when starting a new roll of paper on the storage spool. The edges of the slot are separated an appreciable distance near the outer ends of the slot. These edges are brought close together near the longitudinal center of the slot. In the embodiment illustrated, this is obtained by having the leading edge of the slot diverge from the center 62 toward the two ends of the slot, as will appear clearly from Fig. 4.

With this construction, the operator can very easily insert the paper by slipping it into one of the wider ends of the slot and moving it along the slot until it is approximately centered, after which he can turn the storage spool to start the paper winding about the hub. As he does this, the supply spool will offer a resistance to the movement of the paper and the effect is similar to that of a crown pulley, namely, that the paper automatically aligns and centers itself so as to wind evenly on the storage spool. The construction is very simple and inexpensive, yet automatic in its operation. The end of the paper strip does not have to be cut in any special way but is simply inserted in the slot. This aligning means has been found to be a very desirable feature in paper equipment of the kind described.

Manual line spacing

It is sometimes desirable for the operator to line space the paper strip independently of the automatic spacing. In order that this may be accomplished, a depressible key 49 (Fig. 1) is provided having a stem slidably mounted on a stud 51 on one of the stationary plates of the machine. The lower end of the key stem is shaped to form a tooth 50 positioned to engage the teeth in the ratchet wheel 38. The key is urged upward by a spring 52.

When the operator desires to manually line space the paper strip, he simply depresses the key 49, which causes the tooth 50 to engage the ratchet wheel 38 and turn said ratchet wheel one notch in a clockwise direction to thereby advance the paper strip one line space. When the key is released, it returns to normal and may be again depressed to move the strip another line space if such action is desired.

Operation by total-taking means

When a total is taken, it is desired to print it

and, at that time, the paper strip must be moved from visible to printing position and returned in the same manner as if amount keys had been depressed.

A total is taken by means of a total-taking lever 45 (Fig. 1) pivoted at 45^a and normally concealed under the front cover of the machine, the total being taken by pulling said lever forward. Pivotaly connected to the lower end of the lever 45 is a link 46 having a closed slot 47 at its rear end in which is positioned a stud 48 on the left-hand lever 30 which is on the far side of the machine in Fig. 1, and behind the lever 30 illustrated in said figure. In the normal position of the parts shown in Fig. 1, the stud 48 is at the rear end of slot 47 and said slot is of sufficient length to permit the stud 48 to slide forward during item-entering operations when the ball 32 is moved forward without rocking the total lever 45. But, when the total lever 45 is pulled forward, the link 46 pulls the arm 30 forward, and this operates the member 26 as well as the abutment arm 30^a for operating the printing mechanism. This operation occurs independently of the universal ball 32 which remains unmoved, but the operation of the paper and printing mechanism is exactly the same as if the amount keys had been depressed.

Unwinding paper from storage roll

Occasionally the operator may desire to inspect a previously printed entry on the portion of the paper strip that has been wound on the storage spool 18. This not only requires that he be able to unwind the paper from the spool but also that he be able to rewind it again. The storage spool is below the front face of the machine, and, in prior paper equipment of the general type herein described, it has been very difficult to get at this storage roll for unwinding the paper. But, in the present invention, provision has been made whereby the operator can very quickly unwind the paper from the storage roll and quickly rewind it without detaching any of the paper section parts.

The storage roll is normally prevented from rotating reversely by means of the blocking pawl 40 which prevents reverse rotating of the ratchet wheel 38.

The ratchet wheel 38 is connected to the storage spool through a connection as follows: The ratchet wheel 38 is fixed to a hub 69 freely rotatable upon the shaft 20. This hub has a rotating fit within a sleeve 60, which is a part of the storage spool, the sleeve 60 and the hub 69 being shown separated in Fig. 5. Positioned in a notch 68 in the hub 69 is a square-headed pin 66 urged upward by a spring 70. When the parts are in their normal position with the hub 69 within the sleeve 60, the square head of pin 66 engages the edge 71 of a notch in the sleeve 60 with the result that the hub 69 is operatively connected to the sleeve 60 so that, when the ratchet wheel is moved around by its driving pawl, sleeve 60 of the storage spool 18 will be rotated.

Mounted to rotate freely on the hub 69 is a cam disk 36 having a knurled periphery. This disk has a cam slot 65 (Fig. 5) in it and the head of the pin 66 is of sufficient size to extend beyond the end of the sleeve 60 and into the cam slot 65.

If the operator wishes to unwind the strip from the storage spool, he inserts a finger into the machine against the knurled edge of the cam disk 36 and rotates the disk forward, or clock-

wise in Fig. 5, to a position such that the cam 65, acting on the pin 66, presses the pin downward below the edge 71 of the notch in the sleeve 60. This frees the sleeve 60 from the hub 69 and the storage spool is free to rotate reversely. The operator can then grasp the paper strip and unwind as much of it as he desires. It is to be noted that the knurled disk was moved in the direction in which the operator desired the paper to move.

After having inspected the desired entry, the operator can easily rewind the strip by inserting his finger again and pushing against the edge of the knurled disk 36 to rotate it counterclockwise, at which time this disk becomes a manual means for rotating the storage spool. The first movement of the disk releases the pin 66 which thereupon moves into a position to engage the edge 71 of the slot in sleeve 60. The shoulder at the end of the cam slot 65 in the knurled disk 36 engages the pin 66 and the knurled disk thereupon becomes an actuating means for rotating the storage spool. By simply pushing around on the knurled disk with his finger, the paper can be rapidly and easily rewound.

Detachability

As previously mentioned, it is desirable to have paper equipment of the type disclosed easily accessible for service and repair but ordinarily this type of mechanism is so tied in with the other elements of the machine and so located in the interior of the machine that it is almost inaccessible. However, in the present invention, and because of the very simple combination of parts and the arrangement of them, it is possible to make the entire unit detachable by an operation that involves nothing more than taking the unit out without loosening any screws or fastening devices.

Referring to Figs. 3 and 4, it will be observed that the various parts of the paper section are carried by two side plates 4 having notches 5 in their forward ends shaped to fit over a cross shaft 6 (Fig. 3) in the machine. These side plates carry the guide shafts 11, 14 and 16 as well as the paper table 15, which join the two side plates together to form a frame-like structure. The shaft 23 on which the bell cranks 21 and 22 are mounted, which bell cranks carry the paper spools, is also carried by the side plates 4. Also, the printing hammer 13^a with its platen 13 and the springs for operating them are mounted between and carried by the side plates 4.

The side plates with the various parts carried by them normally occupy the position shown in Fig. 1. If it is desired to remove the paper section, the operator merely pulls forward on the finger piece 4^a to rock the entire paper section about the shaft 6 until it is in a position where it can be lifted bodily out of the machine. To reinsert the paper section the operator merely puts it into position with the notches 5 on the shaft 6 and then swings the section back to normal where it rests by gravity, the studs 4^b in the side plates 4 resting in notches 7^a in the stationary plates 7 of the machine. In connection with reinserting the section, several features are to be noted which make it possible to easily accomplish the result.

The slot 25 in the arm 26 that moves the paper spools bodily must receive the stud 19 on the bell crank arm 22. Since the slot 25 is well within the machine and inaccessible, provision must be made to insure that the stud 19 will

move into said slot when the paper section is attached. One of the functions of the torsion spring 23^a, heretofore described, is to hold the paper spools and the bell cranks 21 and 22 supporting them in a normal upward position. The result is that the bell crank 22 with its stud 19 is held in a normal position on the detachable section so that, when the section is put in the machine and swung about the shaft 6, the stud 19 on lever 22 will automatically move into the slot 25 without requiring any attention on the part of the operator. The open end of slot 25 is also constructed to facilitate this action. This is an important practical feature that makes the section easily attachable after having been detached.

It will also be noted that, when the section is placed in position, the hammer 13^a (Fig. 1) of the printing mechanism is positioned so that its stud 30^b is opposite the end of the arm 30^a that operates said printing mechanism. Thus, the actuating means for the printing mechanism is associated with the general operating mechanism of the machine when the paper section is placed in position.

This detachability is made possible by the combination and arrangement of parts. It will be noted that the paper table is in the same plane as the front face of the machine and also that the printing mechanism is located closely adjacent the lower end of the paper table. Added to this is the fact that there is no complicated mechanism for moving the paper strip from visible to printing position and return. The paper rolls and their simple pivoted support are easy to move and the paper is easily slid over stationary guides that are part of the detachable section. Also, the operating stud 19 and lever 22 for swinging the paper rolls can be carried by said section. Likewise a part of the printing mechanism is carried by the section and this is made possible by reason of its location and the general arrangement of the parts.

Another important advantage of the construction is that, when the paper unit is detached, a new paper strip may be quickly put in operative position without the necessity of threading it through, under or around inaccessible parts. Assuming that the unit has been detached and that a new supply spool has been placed in position, all that the operator needs to do in order to put the paper strip in operative position is to wrap it over the outside of the unit. This operation is like wrapping a paper strip one turn about a cylinder because the guides and the paper table are mounted toward the outside of the unit. In wrapping the paper about the unit it passes on the outside of the printing hammer and over the paper table to the storage spool. It can then be attached very quickly and easily to the storage spool by simply inserting the end of the strip in the slot in said spool and winding the storage spool a few turns so that the strip is properly started. The attaching device on the storage spool automatically aligns the paper strip relative to the guides and paper table. The whole operation is very easy and simple. The advantages are made possible by the construction and arrangement of parts and by the fact that the printing hammer is on the detachable unit so that it becomes unnecessary to thread the paper between the printing hammer and the ribbon or between other devices. When the unit is placed in an operative position

on the machine the paper strip, spools and printing hammer are in position for operation by the machine without any attention from the operator.

Another element of the machine that must occasionally be replaced is an ink ribbon. Instead of complicating the paper section by having the ink ribbon and the operating mechanism for it made a part of the paper section, the ink ribbon is carried by a separate detachable frame. This frame comprises two side plates 8 (Fig. 1) carrying the ribbon spools 9. A stretch of ribbon extends from one spool to the other over suitable guides carried by said side plates. The detachable ribbon section is placed in position by inserting it over the type wheels so that notches in the rear end of the frame engage over a cross shaft 8^a, the front end of the ribbon section resting on the shaft 6. When the section is thus placed in position, the ratchet wheels 9^a for the ribbon spools are automatically located in operative relation to the pawls 100 and 101 which actuate them.

In order to remove the ink ribbon section it is necessary to first remove the paper section but, since the latter is easily detachable, this offers no serious difficulty. When replacing the sections, the ink ribbon section is put in first, after which the paper section is inserted in a position over the ribbon section.

Paper replacement

When the paper supply has been exhausted, a new roll of paper must be inserted, at which time the old roll which has been wound on the storage spool is also removed. In order to do this conveniently it is necessary that the spools be easily accessible and this operation should not necessarily require that the paper section be removed from the machine.

When the operator desires to change the paper spool he grasps the finger piece 4^a (Fig. 1) and swings the paper section forward about shaft 6 without, however, removing the section from the machine. This brings the paper spools out beyond the front face of the machine. Since these spools are supported by two bell cranks 21 and 22, it still remains necessary to move the spools from the paper section.

Referring to Fig. 4, it will be noted that the bell crank 21 on the left-hand side of the paper section is offset inwardly at 21^a where it is pivoted on the shaft 23. In other words, the plane of the bell crank where it is pivoted to shaft 23 is a different plane than that of the two arms of the bell crank. This permits the bell crank to be moved outward slightly on the shaft 23 without, however, disengaging it from said shaft. The parts are proportioned so that the bell cranks may be moved outward sufficiently to disengage them from the shafts 19 and 20 without interference from the arm 4^c of the left side plate of the paper section. Fixed to the inner side of the bell crank 21 is a knurled sleeve 72 slidable on the shaft 23. A compression spring 73 on the left-hand end of the shaft 23 is positioned between the arm 4^c of the left side plate 4 of the paper section and the sleeve 72. This spring urges the bell crank 21 to the right (Fig. 4) and maintains it in normal position with the openings in its arms over the shafts 19 and 20. But, by grasping the sleeve 72 and pushing it to the left, the bell crank 21 can be moved far enough to disengage its arms from the shafts 19 and 20 without interference from the arm 4^c, because of the offset 21^a in the bell crank. The bell crank is then free to swing about the shaft 22 out of the way of the

spools so that they can be removed from their respective shafts 19 and 20 and new ones installed.

Thus, when the operator desires to replenish the paper supply and take off the old storage spool, he simply swings the paper section outward, pushes the knurled sleeve 72 to the left and swings the bell crank 21 out of the way, after which he can remove both the supply and storage spools and replace them with others. The paper section is in a position where he can easily thread the new paper supply around the guides and over the paper table and then attach it to the new storage spool by the novel attaching means which automatically aligns the paper strip to insure its proper operation. After putting the spools in position, the bell crank 21 is swung back to a position such that its ends will move over the shafts 19 and 20 and, upon releasing the sleeve 72, said bell crank automatically moves to normal.

I claim:

1. In a machine of the class described comprising a platen and type members, the combination of a paper supply roll, a storage roll upon which the paper is rewound, means for rotating said storage roll to cause the feeding of said paper, means for guiding the paper from said supply roll between the platen and type members and to said storage roll, a common pivoted support for said storage and supply rolls, and means for rocking said support and rolls as a unit from and returning them to a normal position to shift the paper from visible to printing position and return, and means for detachably supporting said common support, rolls, record strip and rotating means, as a unit in said machine, whereby said elements may be readily installed in operative position in the machine or removed therefrom as a unit without disturbing other elements of the machine.

2. In a machine of the class described, the combination of a paper supply roll, a supporting shaft therefor, a storage roll upon which the paper is rewound, a shaft for said storage roll, means for guiding the paper from said supply roll to said storage roll, a pair of members supporting said roll-carrying shafts, means to allow pivoting of one of said shaft-supporting members, and means permitting limited axial movement of said pivoted supporting member along its pivot to cause its disengagement, from said roll-carrying shafts so as to allow independent pivotal movement thereof to facilitate replacement of said rolls.

3. In a machine of the class described having a platen and type members, the combination of a paper supply roll, a supporting shaft therefor, a storage roll upon which the paper is rewound, a shaft for said storage roll, means for guiding the paper from said supply roll between the platen and type members and to said storage roll, a pair of members supporting said roll-carrying shafts, said shafts, supporting members, rolls and paper being removable as a unit, means to allow pivoting of one of said shaft-supporting members, and means permitting limited axial movement of said pivoted supporting member along its pivot to cause its disengagement from said roll-carrying shafts so as to allow independent pivotal movement thereof to facilitate replacement of said rolls.

4. In a machine of the class described, the combination of a shaft, a paper roll sleeve carried by and detachably secured to said shaft and having a means adapted to receive the free end

of the paper for rewinding the same on the sleeve and also having a recess at its outer end, a disk loosely mounted on said shaft and having a cam slot therein, a pin depressible into said shaft and having a head extending into both said recess and said cam slot when in normal position thereby detachably connecting said shaft to said sleeve and whereby the sleeve may be disconnected from said shaft by rotation of said disk.

5. In a machine of the class described the combination of a paper supply roll, a supporting shaft therefor, a spring member tightly wound upon said supporting shaft at one end in a manner to frictionally resist rotation relatively thereto and fixed to said roll at its other end for rotation with said roll, a storage roll upon which the paper is rewound, a second supporting shaft for said latter roll, means for guiding the paper from said supply roll to said storage roll, and means for rotating said storage roll to cause feeding of said paper from said supply roll to said storage roll, said spring member acting to maintain the paper taut during feeding thereof.

6. The combination in a machine of the class described having a general operating mechanism for actuating the various parts of said machine, a printing mechanism having a printing line, and a stationary paper table located at a distance from said printing line and in a position where the portion of the paper on said table is easily visible; of a rotatable paper-supply spool carrying a roll of paper strip, a rotatable paper-storage spool for receiving said strip, stationary guiding means for guiding said paper strip from said supply spool past the printing line of said printing mechanism and over said table to said storage spool, means operating automatically during an operation of said machine to bodily move both of said spools simultaneously to slide said paper over said stationary guiding means and table, and relatively to said printing mechanism, from a position where the last entry is visible on said table to a printing position and to return it to visible position, and means operating automatically to line space said strip during its movement.

7. The combination in a machine of the class described having a general operating mechanism for actuating the various parts of said machine; of a stationary table in a position where it is easily visible, a printing mechanism having a printing line away from said table but near one end thereof, a rotatable paper-supply spool carrying a roll of paper strip, a rotatable paper-storage spool for receiving said strip, pivotally mounted means supporting said spools with the supply spool normally near said printing mechanism and said end of said table and the storage spool near the other end of said table, stationary guiding means for guiding said paper strip from said supply spool past the printing line of said printing mechanism and over said table to said storage spool, means operating automatically during an operation of said machine to rock said mounting means on its pivot to swing said supply spool away from said printing mechanism and its end of said paper table and said storage spool toward its end of said table to thereby slide said paper over said guiding means and table, and relatively to said printing mechanism, from a position where the last entry is visible on said table to a printing position and to return it to visible position, and means operating automatically to rotate said storage spool a

predetermined amount during its bodily movement to thereby automatically line space said strip, said spools being so positioned on said supporting means, the pivot of said supporting means being so located relative to said table, and the movement of said supporting means and spools, and said line spacing rotation of said storage spool all being such that said paper strip passing over said table is maintained taut during the movements of said spools and their supporting means.

8. The combination in a cash register of the class described having a general operating mechanism for actuating the various parts of the machine and a printing mechanism having a printing line; of a readily detachable paper section comprising a frame, a paper table on said frame, a rotatable paper-supply spool, a rotatable paper-storage spool, guiding means for guiding a paper strip from one of said spools over said paper table to the other of said spools and for holding said strip in a position such that, when said section is placed in position, said strip will pass the printing line of said printing mechanism, supporting means for said spools mounted on said frame to enable said spools to be moved bodily with respect to said frame and simultaneously to slide said paper over said guiding means and table and relatively to said printing line from a position where the last entry is visible on said table to a printing position and return, and operating means having portions structurally combined with and so positioned on said detachable section that, by placing said detachable section in place on said machine, said portions of the operating means are brought into cooperative relation with said general operating mechanism to enable the latter to move said spools.

9. The combination in a cash register of the class described having a general operating mechanism for actuating the various parts of the machine and a printing mechanism having a printing line; of a readily detachable paper section comprising a frame, a paper table on said frame, a rotatable paper-supply spool, a rotatable paper-storage spool, a printing hammer movably mounted on said frame, guiding means for guiding a paper strip from one of said spools over said paper table to the other of said spools and for holding said strip in a position such that, when said section is placed in position, said strip will pass the printing line of said printing mechanism, supporting means for said spools mounted on said frame to enable said spools to be moved bodily with respect to said frame and simultaneously to slide said paper over said guiding means and table and relatively to said printing line from a position where the last entry is visible on said table to a printing position and return, and operating means having portions structurally combined with and so positioned on said detachable section that, by placing said detachable section in place on said machine, said portions of the operating means are brought into cooperative relation with said general operating mechanism to enable the latter to move said spools and operate said hammer.

10. The combination in a cash register of the class described having a general operating mechanism for actuating the various parts of the machine and a printing mechanism having a printing line; of a readily detachable paper section comprising a frame, a paper table on said frame, a rotatable paper-supply spool, a rotatable paper-storage spool, guiding means for guid-

ing a paper strip from one of said spools over said paper table to the other of said spools and for holding said strip in a position such that, when said section is placed in position, said strip will pass the printing line of said printing mechanism, supporting means for said spools mounted on said frame to enable said spools to be moved bodily with respect to said frame and simultaneously to slide said paper over said guiding means and table and relatively to said printing line from a position where the last entry is visible on said table to a printing position and return, an operating means for moving said spools, and means urging said spools and their operating means to a position such that, when said detachable section is placed in position on said machine, said operating means is automatically brought into operative relative with said general operating mechanism to enable the latter to move said spools.

11. The combination in a cash register of the class described having a general operating mechanism for actuating the various parts of the machine and a set of type wheels having a printing line; of a readily detachable ink ribbon section supporting a stretch of ribbon between two spools in such a manner that, when said section is placed in position, said ribbon will extend across said type wheels and said spools will be in position to be rotated by operation of said general operating mechanism, a readily detachable paper section comprising a frame arranged to be placed in position in said machine over said ink ribbon section, a paper table on said frame, a rotatable paper-supply spool, a rotatable paper-storage spool, supporting means on said frame for said spools mounted to enable both of said spools to be moved bodily with respect to said frame and simultaneously, guiding means for guiding a paper strip from one of said spools over said paper table to the other of said spools and for holding it in a position such that, when said section is placed in position, said paper strip will pass the printing line of said type wheels, moving means on said frame for moving said spools bodily to slide said paper over said guiding means and table past said type wheels to move said strip from a position where the last entry is visible on said table to a printing position and return, and a printing hammer and operating means therefor on said detachable paper section frame, said moving means for said spools and said operating means for said printing hammer having portions which, when said paper section is placed in position, operatively associate themselves with said general operating mechanism of the machine.

12. The combination in a machine of the class described having a printing mechanism, a rotatable paper-supply spool, a rotatable storage spool, and means for winding a paper strip from said supply spool about said storage spool; of blocking means normally preventing reverse rotation of said storage spool, and manual means operable, when moved to a predetermined position in one direction, to release said storage spool from said blocking means to free said spool to enable said paper strip to be readily unwound by pulling on the same and, when moved in the opposite direction, to act as a manual means for rotating said storage spool to rewind said strip on said spool.

13. The combination in a machine of the class described having a printing mechanism, a rotatable paper-supply spool, a rotatable storage spool,

and means for winding a paper strip from said supply spool about said storage spool; of blocking means normally preventing reverse rotation of said storage spool, and a manually movable cam disk rotatable on the axis of said storage spool and operable, when moved to a predetermined position in one direction, to release said storage spool from said blocking means to free said spool to enable said paper strip to be readily unwound by pulling on the same and, when moved in the opposite direction, to act as a manual means for rotating said storage spool to rewind said strip on said spool.

14. The combination in a machine of the class described having a printing mechanism, a rotatable paper-supply spool, a rotatable paper-storage spool, and means for winding a paper strip from said supply spool about said storage spool; of actuating means for rotating said storage spool in one direction including mechanism for preventing reverse rotation of said spool, a disconnectible connection between said actuating means and said storage spool, and a rotatable cam disk operable, when moved to a predetermined position in one direction, to disable said connection to free said storage spool to enable said paper strip to be unwound by pulling on the same, and, when moved in the opposite direction, to re-enable said connection and act as a manual means for rotating said storage spool to rewind the paper strip on said spool.

15. The combination in a cash register of the class described having a printing mechanism provided with a printing line, a paper table positioned at a distance from said printing line where the portion of the paper on said table is readily visible, a paper-supply spool, a storage spool, guiding means for guiding a paper strip from one spool to the other and past said printing mechanism and over said paper table, and means operating automatically during a machine operation to move said strip from a position where the last entry is visible on said table to a printing position and return; of actuating means operating automatically to rotate said storage spool to line space said paper strip during a machine operation, blocking means normally preventing reverse rotation of said storage spool, and manual means operable, when moved to a predetermined position in one direction, to disable said actuating means and said blocking means to release said spool to enable said paper strip to be readily unwound by pulling on the same and, when moved in the opposite direction, to re-enable said actuating and said blocking means and to act as a manual means for rotating said spool to rewind said strip on said spool.

16. The combination in a machine of the class disclosed having a printing mechanism including type carrying members, means for indexing said members, and an ink ribbon positioned over the printing line of said members; of a paper supporting unit detachably mounted in operative position adjacent said members and ink ribbon; said unit comprising a frame; a printing impression device, forming a part of said printing mechanism, movably mounted on said frame; and paper guides and a paper table on said frame; a pair of paper supply and storage spools movable bodily relative to said paper table to slide a paper strip connected between said spools over said table; said spools, impression device, table and guides being so constructed and mounted on said frame that, when said frame is detached,

a paper strip connected to said supply spool may be passed outside of said impression device and connected to said storage spool by simply wrapping it over said guides and table, which are mounted toward the outside of said unit, and attaching said strip to said storage spool after which, when said unit is placed in operative position on said machine, said paper strip, spools and printing mechanism will be in condition for operation by said machine.

17. The combination in a machine of the class disclosed having a printing mechanism including type carrying members, means for indexing said members, and an ink ribbon positioned over the printing line of said members; of a paper supporting unit detachably mounted in operative position over said members and ink ribbon; said unit comprising a frame; a printing hammer, forming part of said printing mechanism, movably mounted on said frame; and paper guides and a paper table on said frame; a pair of paper supply and storage spools movable bodily relative to said paper table to slide a paper strip connected between said spools over said table; said storage spool having a paper attaching device for receiving the end of a paper strip and holding it in such a manner that, when said strip is pulled by rotation of said storage spool, said strip will be automatically aligned relative to said guides and table; said spools, hammer, table and guides being so constructed and mounted on said frame that, when said frame is detached, a paper strip connected to said supply spool may be passed outside of said hammer and connected to said storage spool by simply wrapping it over said guides and table, which are mounted toward the outside of said unit, and placing the end of said strip in said attaching device on said storage spool and rotating the spool a few turns after which, when said unit is placed in operative position on said machine, said paper strip, spools and printing mechanism will be in condition for operation by said machine.

18. The combination in a machine of the class disclosed having a printing mechanism including type carrying members, means for indexing said members, and an ink ribbon positioned over the printing line of said members; of a paper supporting unit detachably mounted in operative position adjacent said members and ink ribbon; said unit comprising a frame; a paper-supply spool and a paper storage spool; a printing impression means, forming a part of said printing mechanism, movably mounted on said frame;

paper guides and a paper table on said frame; said spools being also mounted on said frame for bodily movement to slide a paper strip connected to them over said guides and table; and a device on said frame by means of which said spools may be moved bodily; said spools, impression device, table, and guides being so constructed and mounted on said frame that, when said frame is detached, a paper strip connected to said supply spool may be passed outside of said impression device and connected to said storage spool by simply wrapping it over said guides and table, which are mounted toward the outside of said unit, and attaching said strip to said storage spool, after which, when said unit is placed in operative position on said machine, said paper strip, spools, and printing mechanism will be in condition for operation by said machine.

19. The combination in a machine of the class disclosed having a printing mechanism including type carrying members positioned within the body of said machine, means for indexing said members, and an ink ribbon positioned over the printing line of said members; of a paper supporting unit detachably mounted in operative position over said members and ink ribbon and in a recess in the body of said machine; said unit comprising a frame; a paper-supply spool and a paper storage spool; a printing hammer and device by means of which it may be operated, which form a part of said printing mechanism, movably mounted on said frame; paper guides and a paper table on said frame; said spools being also mounted on said frame for bodily movement to slide a paper strip over said guides and table; and a device on said frame by means of which said spools may be moved bodily; said spools, hammer, table, and guides being so constructed and mounted on said frame that, when said frame is detached, a paper strip connected to said supply spool may be passed outside of said hammer and connected to said storage spool by simply wrapping it over said guides and table, which are mounted toward the outside of said unit, and attaching said strip to said storage spool; said operating devices for said hammer and said spools, and said paper strip, being so positioned on said frame that, when said unit is placed in position on said machine, said devices will be in position to be operated by said machine and said paper strip will be in position to receive printing impressions.

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