E. T. EMLEY.

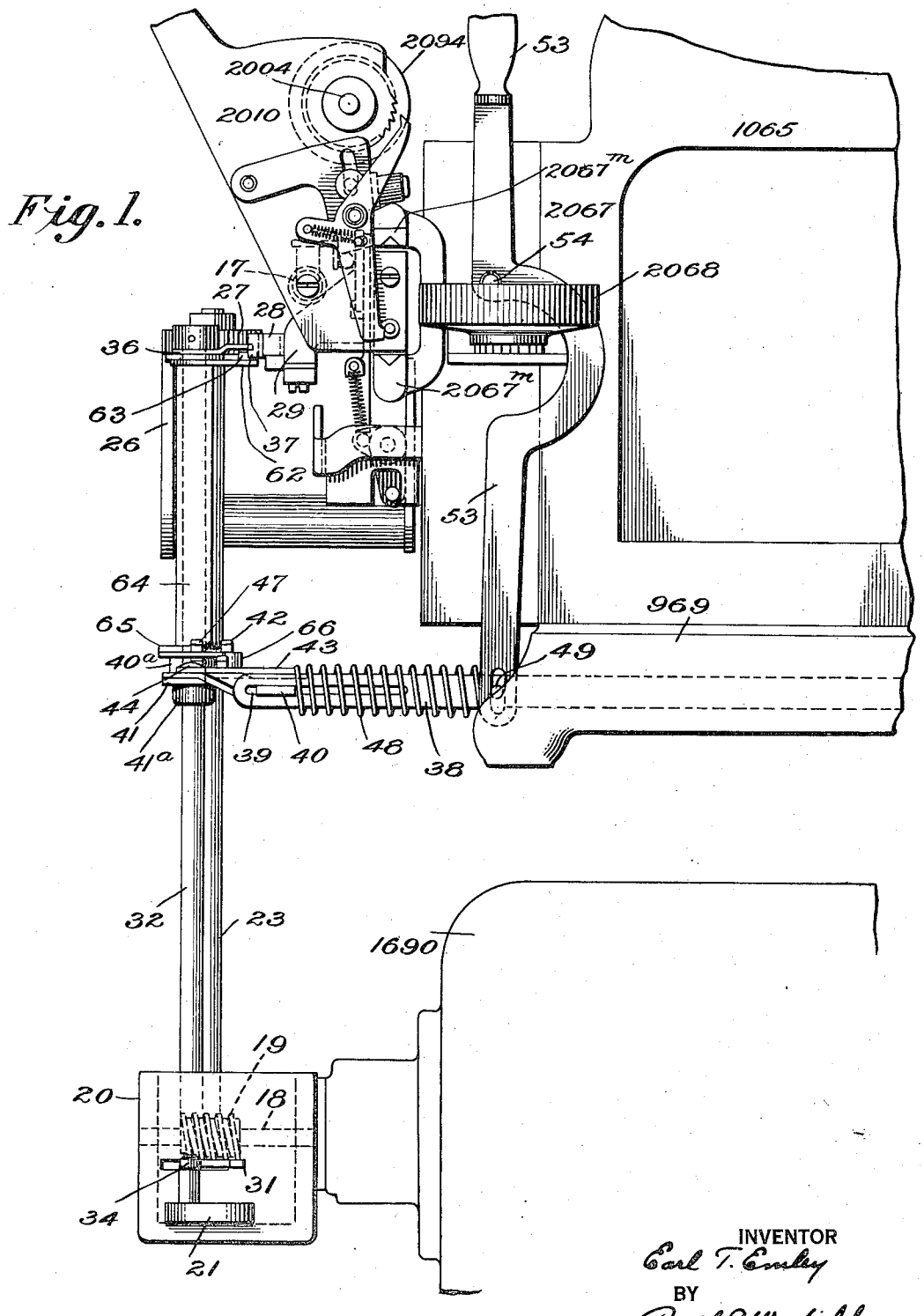
PAPER CARRIAGE RETURN MECHANISM.

APPLICATION FILED NOV. 2, 1920.

1,435,518. Patented Nov. 14, 1922.

4 SHEETS—SHEET 1.

Fig. 1.



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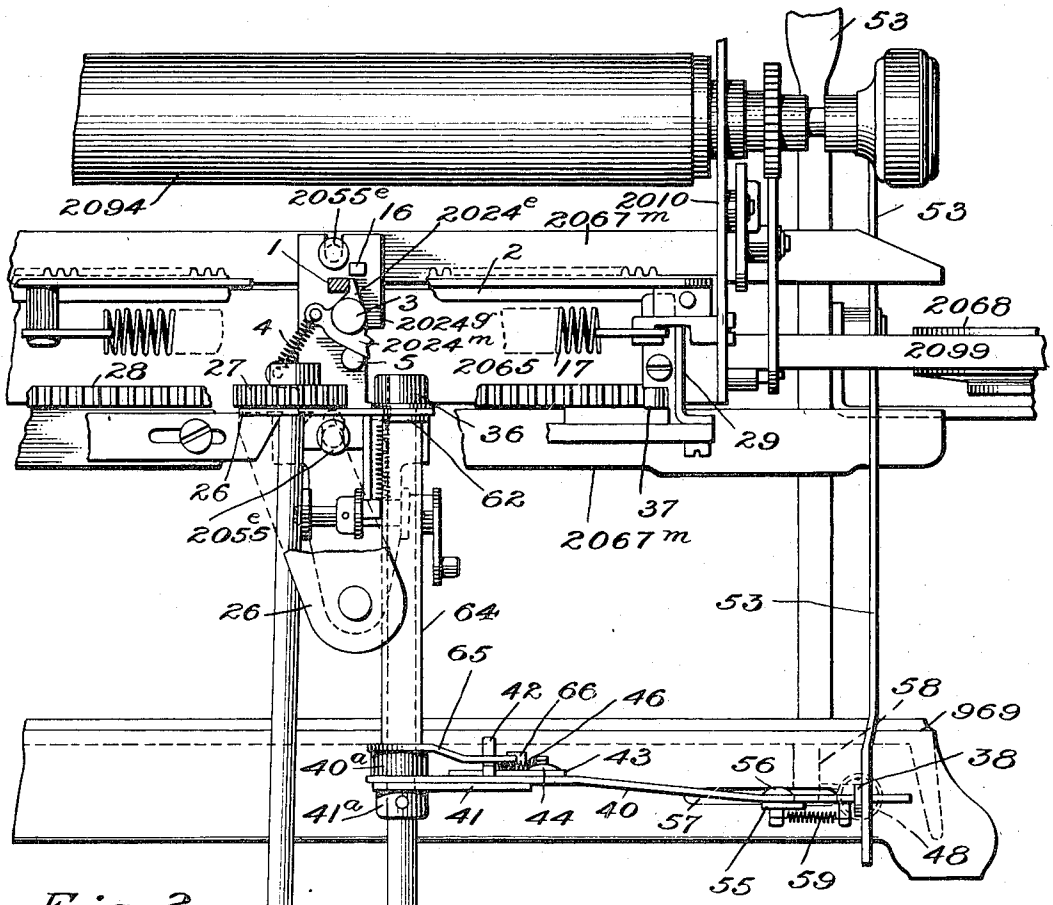
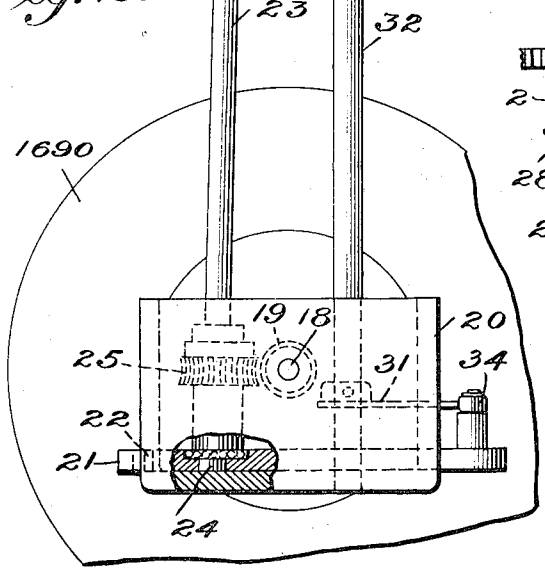


Fig. 2.



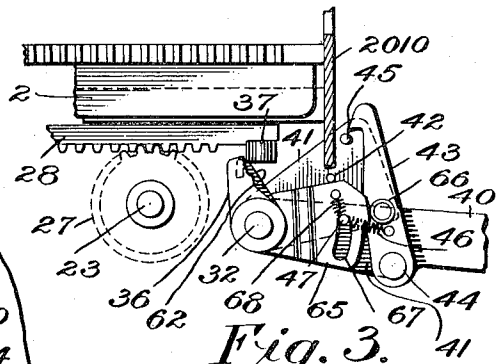


Fig. 3.

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4 SHEETS—SHEET 3.

Fig. 4.

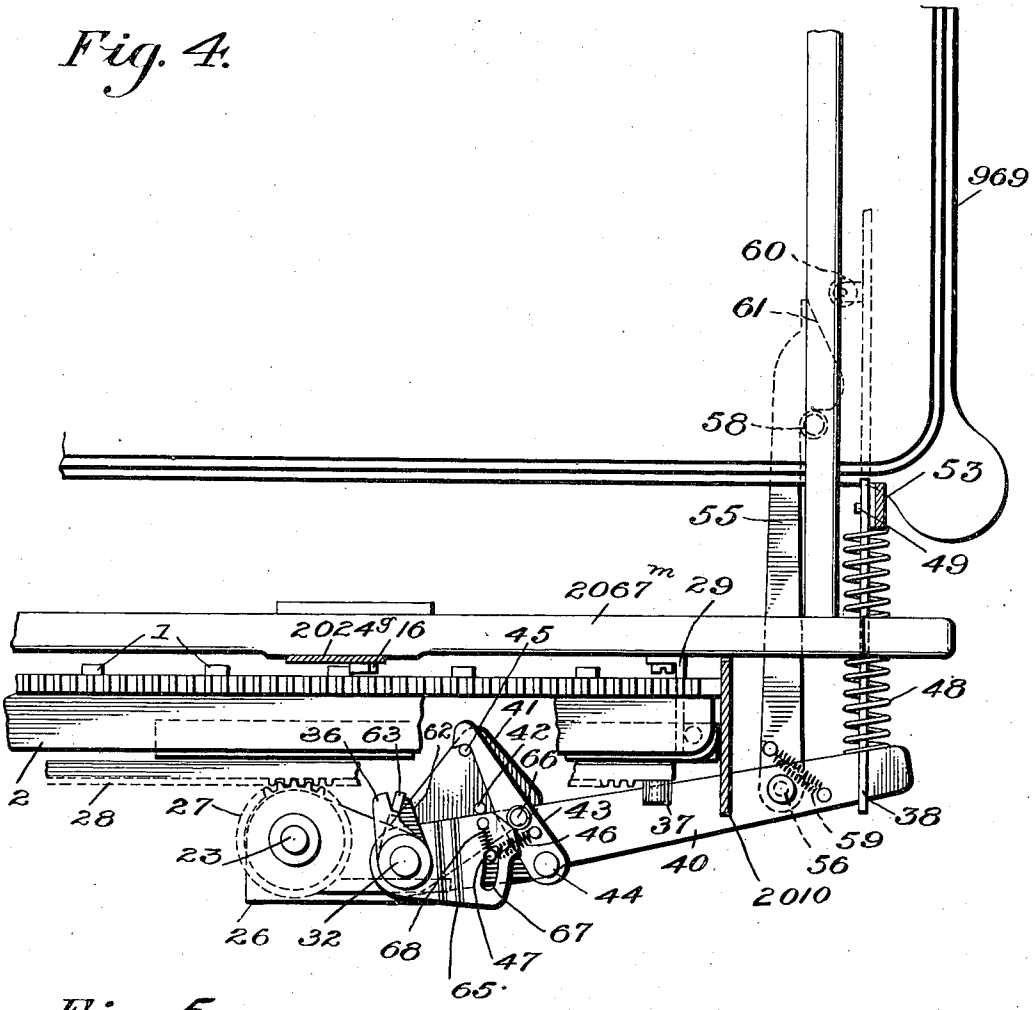
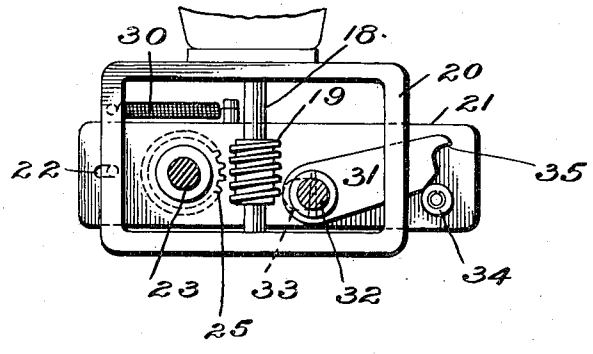


Fig. 5.



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4 SHEETS—SHEET 4.

Fig 6.

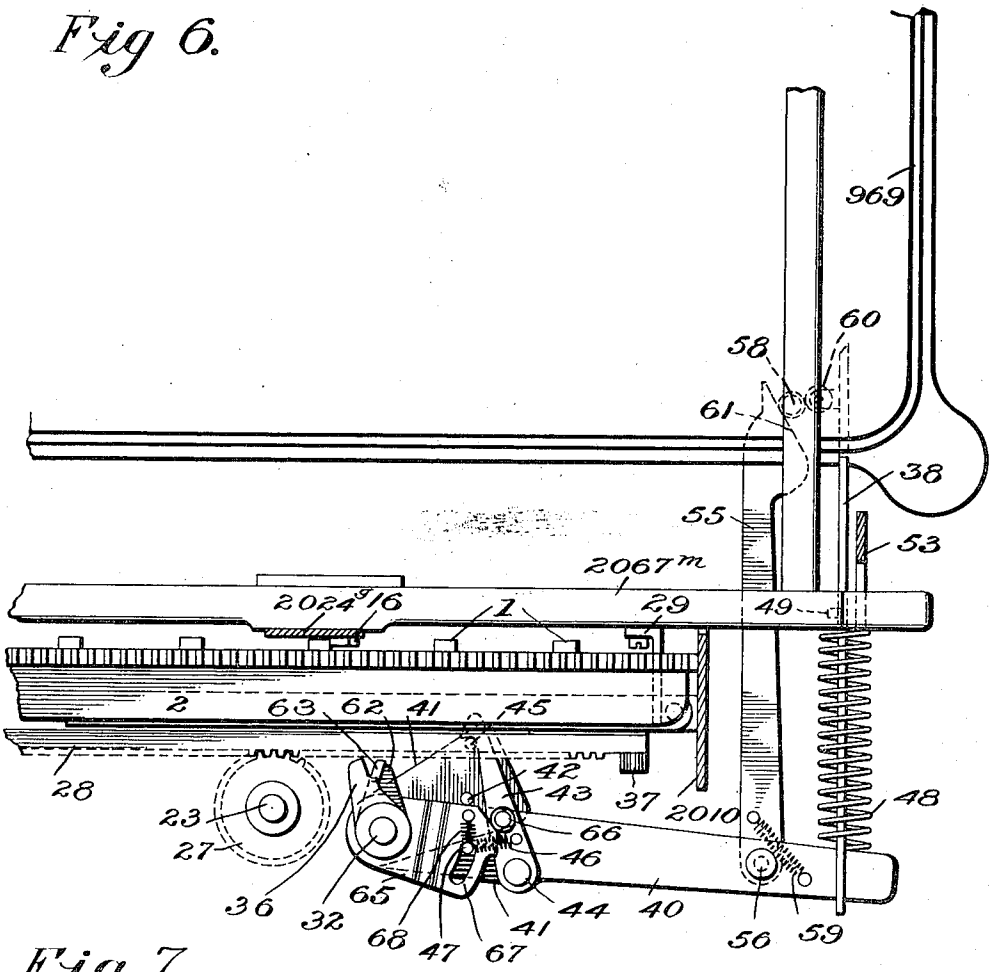
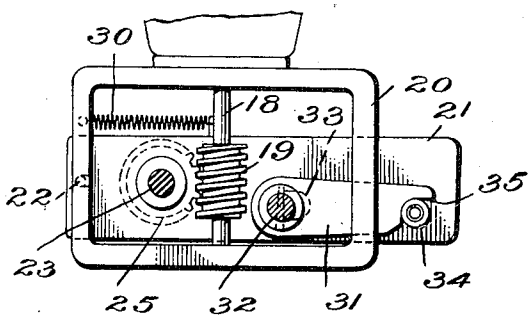


Fig. 7.



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Patented Nov. 14, 1922. 1,435,518

UNITED STATES PATENT OFFICE.

EARL T. EMLEY, OF BROOKLYN, NEW YORK, ASSIGNOR TO WALES ADDING MACHINE COMPANY, OF WILKES-BARRE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

PAPER-CARRIAGE-RETURN MECHANISM.

Application filed November 2, 1920. Serial No. 421,332.

To all whom it may concern:

Be it known that I, EARL T. EMLEY, a citizen of the United States, residing at No. 310 Windsor Place, borough of Brooklyn, county of Kings, city of New York, and State of New York, have invented new and useful Improvements in Paper-Carriage-Return Mechanisms, of which the following is a specification.

More especially, this invention relates to a releasable coupling mechanism which is employed as a part of the paper carriage return mechanism for calculating machines, set forth in the application of Arthur Pentecost, filed June 25, 1920, Serial No. 391,714, and I have illustrated my invention in conjunction with such device, although the invention is capable of uses in other mechanical arts.

In the carriage-return mechanism set forth in the Pentecost application abovementioned, the operator, when he desires to effect the travel of the paper carriage towards the beginning of a line, operates a handle to store power in a spring, such handle also controlling a means to release the spring for operation, after sufficient power is stored therein. The spring, when released, operates a lever to throw in a clutch whereby to connect the carriage-restoring mechanism with a source of power, as a motor, to return the carriage towards the beginning of a line.

Returning the handle to its normal position prior to or at about the moment of the arrival of the carriage at the beginning of a line effects the disengagement of the clutch members to disconnect the carriage-return mechanism from the source of power.

In case the operator omits to disconnect the carriage-return mechanism from the source of power, by the time the carriage has about reached the limit of its return travel, a tappet on the carriage strikes an arm to effect the positive disengagement of the clutch members connecting the carriage-return mechanism and the source of power, and my invention relates more particularly to this mechanism.

It might occur that an operator, through accident or by design, would continue to hold the operating lever in operated position after the paper carriage has arrived at its limit of return travel. In such case, injury and damage to the machine would almost certainly result.

One of the principal objects of my invention is to prevent injury or damage to the machine from such action, to which end, I provide means to automatically effect the disconnection of the clutch mechanism from the manual control thereof, as the carriage, when driven from the source of power, arrives at the limit of its travel in one direction, and the disengagement of the clutch members.

Another object is the provision of a simple coupling or releasable connection of this nature which comprises few parts, occupies but little space, and is readily assembled.

To these and other ends, my invention includes certain novel features and combinations of parts, all of which will be more fully explained hereinafter and particularly pointed out in the claims.

In the accompanying drawings, Fig. 1 is a view showing a part of a Wales calculating machine, the carriage-restoring mechanism and its connection with the armature shaft of the motor which drives the machine;

Fig. 2 is a rear view of the same;

Fig. 3 is a detail plan view of one embodiment of the releasable coupling forming the subject matter of this invention, the parts being shown at the moment of their automatic disconnection;

Fig. 4 is a plan view, parts broken away, showing the carriage-restoring mechanism, including the releasable coupling, in normal position;

Fig. 5 is a detail plan view, partly in section, of the clutch which connects the armature shaft of the motor, and the carriage-return mechanism, the clutch members being disconnected;

Fig. 6 is a plan view, similar to Fig. 4, but showing the positions assumed by the parts when operating; and

Fig. 7 is a view similar to Fig. 5, showing the clutch members engaged.

Traveling paper carriages shiftable in letter or column spacing direction, and returnable towards the beginning of a line, either manually or mechanically, are well known in the art.

Although I have chosen to illustrate my

invention in connection with the well-known Wales calculating machine, examples of which are disclosed in U. S. patents to Wales 797,032, August 15, 1905; McFarland 842,232, January 29, 1907; Wilgus 1,150,916, August 24, 1915, and Pentecost, 1,223,419, April 24, 1917, it is obvious that the device is capable of use in other connections.

Wales machines include a base 969 (Figs. 1, 2, 4 and 6) supporting the calculating and printing mechanisms partially enclosed in a case 1065 (Fig. 1) in the usual manner.

A carriage bracket 2067 is supported by and extends transversely across the rear end of the machine, the bracket including ways or rails 2067^m on which travels a carriage slide 2065. End plates 2010 secured to the carriage slide 2065 support a platen axle 2004 on which is mounted the platen 2094.

The paper carriage is drawn from right to left in the usual manner, by a spring drum 2068, (Figs. 1 and 2), the tape 2099 of which is connected to the carriage slide 2065 at any suitable point.

Tabulating stops 1 (Figs. 2, 4 and 6) on a tabulating bar 2 extending between and journaled at its opposite ends in the end plates 2010, are adapted to successively contact a flexible abutment 2024^e (Fig. 2), to arrest the carriage at various columnar positions along its path of travel. The abutment forms part of a carriage escapement whereby the carriage may be automatically stepped from right to left to bring successive columns to the printing point.

The stops 1 may be disengaged from their abutment 2024^e to permit the carriage to travel from column to column, by tilting the tabulating bar 2, as illustrated in the U. S. patent to Pentecost 1,223,419, April 24, 1917, above referred to, or in Schuppe, 1,308,117, July 1, 1919, and the stops 1 may be adjustable along the bar 2, as illustrated in such patents. In the present instance, the abutment 2024^e constitutes the pawl (Fig. 2) of an escapement, such pawl being pivoted at 3 on a sliding plate 2024^s spanning the space between the rails 2067^m and guided on studs 2055^e projecting from the respective rails 2067^m. A disabling spring 4 attached to one arm of the pawl tends to shift the tooth of the pawl out of the path of the tabulating stops 1. Contact of a tabulating stop 1 with the tooth of the pawl or flexible abutment 2024^e turns the latter in a clockwise direction (looking from the rear) against the tension of the disabling spring 4, until the pawl is arrested by the contact of its arm 2024^m, with a stop stud 5 on the sliding plate 2024^s, at which time, the tooth of the pawl lies squarely across the path of the tabulating stop 1 to arrest farther travel of the carriage under the influence of the spring drum 2068.

Means fully set forth and illustrated in the copending application of Arthur Pentecost, filed June 25, 1920, Serial No. 391,714, reciprocates the sliding plate 2024^s to effect column tabulation of the carriage.

The sliding plate 2024^s carries a fixed pallet 16 (Fig. 2), the left face of which (looking from the rear) lies substantially in line with the contact face of the tooth of the pawl 2024^e, and just above the path of travel of the tabulating stops 1, when the parts are in their normal positions.

As the sliding escapement plate 2024^s descends, and prior to the disengagement of the yielding pawl 2024^e from the adjacent tabulating stop 1, the plate interposes the fixed pallet 16 into the path of the adjacent stop 1 to retain the carriage against advancing in column spacing direction during the forward stroke of the main drive shaft.

As soon as the pawl or abutment 2024^e escapes the adjacent tabulating stop 1, the spring 4 connected to the pawl, rocks the latter in a counter-clockwise direction (looking from the rear) to displace the tooth of the pawl relatively to the tabulating stop, the carriage at that time being held stationary by the fixed pallet 16 with which the tabulating stop contacts.

As the escapement plate ascends, it displaces the fixed pallet 16 from in front of the adjacent tabulating stop 1, and the spring 4 having rocked the pawl or flexible abutment 2024^e, so that its tooth no longer lies adjacent the fixed pallet 16, the tabulating stop 1 escapes past the flexible abutment and the spring drum 2068 draws the carriage in column spacing direction.

However, the continued ascending travel of the sliding escapement plate 2024^s immediately introduces the end of the tooth of the flexible abutment 2024^e into the path of the succeeding tabulating stop 1, which, on the farther travel of the carriage, contacts the abutment and turns it in clockwise direction (viewing Fig. 2) until the arm 2024^m of the abutment strikes the stop stud 5, at which time the paper carriage is arrested with the succeeding column positioned at the printing line.

The impact of the successive tabulating stops 1 against the flexible abutment 2024^e under the influence of the spring drum 2068 and the consequent arrest of the comparatively heavy paper carriage, would impart a considerable jar and shock to the machine, to reduce which I preferably permit the tabulating bar 2 to have a slight amount of endwise play in the end plates 2010, the extent of which play is limited by the contact of the ends of the bar against the end frames 2010. One end of a cushioning device, as a spring 17 (Fig. 2), is attached to the tabulating bar 2 intermediate its ends, the opposite end of the cushioning device being secured to the adjacent end plate 2010,

to normally hold the tabulating bar 2 at the extreme right hand limit of its travel (as viewed in Fig. 2). The carriage, in traveling in column spacing direction (from left to right looking from the rear, as in Fig. 2) will impinge its stop 1 against the flexible abutment 2024[e] whereupon, the tabulating bar 2 will slide towards the left (in Fig. 2) against the tension of the cushioning device 17 which will thus absorb the greater portion of the shock and jar incident to the arrest of the carriage, and then reassert itself against the influence of the spring drum 2068 to restore the tabulating bar 2 to its normal position of rest.

The paper carriage may be fed step by step in column spacing direction, until it reaches the end of the line.

It then becomes necessary to return the carriage part way or entirely to its opposite limit of travel, depending upon whether a new line is to be commenced intermediate the left and right hand margins, or at the left hand margin.

A carriage-return mechanism, driven from the usual motor 1690 of a calculating machine, automatically restores the carriage from any point which it may have reached in its column spacing travel, to a preceding point, or to the beginning of a line, at the will of the operator.

As explained in the application of Arthur Pentecost, above-mentioned, the armature-carrying or motor shaft 18 (Figs. 1 and 2) extends rearwardly and carries a worm 19 forming one of two coacting separable clutch members.

The motor shaft 18 projects over or within a housing or other suitable support 20. A support or plate 21 is slidably mounted in the housing in any convenient manner, as by a pin and slot connection 22, for movement transversely to the axis of the motor shaft. The lower end of a carriage-return shaft 23 is provided with a step bearing 24 (Fig. 2) in the shiftable support 21, and carries a worm wheel 25 adapted to releasably mesh with the worm 19 on the motor shaft 18, and constituting the remaining member of the separable clutch. The carriage-return shaft 23 extends upwardly through a guide bracket 26 mounted on the rear of the calculating machine, and carries a gear 27 in mesh at all times with a rack 28 supported by brackets 29 projecting from the carriage slide 2065.

A spring 30 (Figs. 5 and 7) connected to the housing 20 and to the shiftable plate 21, respectively, tends to hold the worm wheel 25 apart from and out of mesh with its worm 19. This spring constitutes a clutch-disengaging means.

It will be noted that normally, the worm wheel 25 is out of mesh with its worm 19, and as a consequence, the carriage-return mechanism remains at rest, eliminating unnecessary wear.

Engagement of the worm wheel 25 with its worm 19 will enable the rotatable motor shaft 18 to turn the carriage-return shaft 23 and, through the gear 27 and rack 28, to drive the carriage to the right (the left, viewing Figs. 2, 4 and 6), towards the beginning of a line.

To effect such connection, a clutch-engaging element in the form of a cam 31 is fast on a control shaft 32, the lower end of which shaft passes through a slot 33 (Figs. 5 and 7) in the sliding plate 21 and has a bearing in the bottom of the housing 20. The control shaft 32 coacts with the pin 22 to guide the shiftable plate 21 in its travel. The face of the cam 31 is adapted to wipe against a roller stud or toe 34 mounted on the sliding plate 21, and the cam face may terminate in an abrupt rise 35 which, by contact with the toe 34, arrests the travel of the cam in one direction.

The clutch-control shaft 32 extends upwardly substantially parallel with the carriage-return shaft 23, through the guide bracket 26 which serves as a bearing therefor, and at its upper end, carries a trip arm 36 fast thereon, adapted to enter the path of travel of a tappet 37 mounted at or near one end of the carriage-return rack 28.

Rotation of the clutch-control shaft 32 in clockwise direction (Fig. 5) wipes the cam 31 against the toe 34 to crowd the sliding plate 21 to the right (in said figure) against the tension of the clutch-disengaging spring 30, to engage the worm wheel 25 with the worm 19. The spiral thread on the worm 19, when the worm wheel 25 is partially meshed therewith, tends to lead the worm wheel into complete mesh, and it will be observed that the clutch-engaging element 31 acts to positively enforce the connection of the separable members 19 and 25.

The clutch-engaging element 31 might be shifted to effective position automatically, but a manually-operable means is shown to initiate the operation of mechanism by which the engagement of the clutch members 19 and 25 is effected.

Such manually-operable means is so arranged that the operator has only an indirect control of the clutch-engaging element 31 when the latter is to be shifted to effective position, in order to prevent accidental or intentional mismanipulation of the clutch-engaging element, whereby the outer ends or lands of the spiral teeth of the worm 19 and worm wheel 25 might be brought to and held in contact, to the injury and possible breakage of the parts.

This manually-operable means may be located at the rear of the machine adjacent the paper carriage where it will be convenient for operation as the operator com-

pletes the removal of a ledger sheet from the machine, after having made the desired entries thereon. By this arrangement, the carriage-return mechanism can be restoring the carriage to the beginning of a line, while the operator is filing the ledger sheet away, and selecting the next ledger sheet to be inserted in the paper carriage.

In ledger posting, it is customary to list at the left hand the old balance, shift the carriage to bring the next column to the printing line, list the debits, if any, tabulate the carriage to the next column, and list the credits, after which the carriage shifts to the next column, in which the new balance is printed. In banking, several columns may be assigned to the debit items, which may be the amounts of individual checks, and in case a greater number of checks are to be listed than there are columns appropriated therefor, it is necessary to restore the carriage from the last debit column partway towards the beginning of the line to bring the first of the debit columns to the printing point, whereby to start a new line of debit entries.

The operator can at will, initiate or interrupt the return travel of the carriage at any point in its path of travel, to accommodate the carriage to the exigencies of the particular work being done.

A manually-operable member, as a link 38 (Figs. 1, 4 and 6) extends from front to rear of the machine near the base 969, the rear end of the link projecting beyond the base and being slotted, as at 39 (Fig. 1) to accommodate the outer end of an actuating lever 40. And my invention is employed as a releasable connection between the actuating lever 40 and the clutch-control shaft 32.

Pursuant thereto, the hub 40ª of the actuating lever 40 is journaled on the clutch-control shaft 32 to turn freely thereon. An arm 41, which may be in the form of a segmental plate, is fast on the clutch-control shaft adjacent the hub of the actuating lever 40, and a check stud 42 mounted on the arm 41 and projecting into the path of the lever 40, limits the travel of the lever towards or over the arm, to arrest the lever in its home position. The angular travel of the arm 41 is, of course, controlled by the angular travel of the clutch-engaging element 31 fast on the lower end of the clutch-control shaft 32.

A dog 43 pivotally mounted at 44 on the actuating lever 40, releasably engages a keeper 45 carried by the arm 41, whereby to enable the actuating lever 40 to turn the clutch-control shaft 32, in one direction only, and cause the clutch-engaging element 31 to effect the engagement of the clutch member 25 with the driving clutch member 19.

A spring 46 connected at its opposite ends to the dog 43 and to an anchor post 47 on the actuating lever 40, tends to enforce the engagement of the dog with its keeper 45.

A driving means, as a spring 48, is utilized to shift the actuating lever 40, and consequently, the clutch-engaging element 31 to effective position, such drive spring 48 being conveniently mounted on the rear end of the operable member or link 38 between the outer end of the actuating lever 40 and a cross stud 49 mounted in the operable member. The drive spring 48, when energized, is superior to the clutch-disengaging spring 30 and the friction caused by the contact of the cam 31 with the toe 34.

A handle 53 (Figs. 1 and 2) pivoted intermediate its ends at 54, to the machine and loosely connected, preferably by the cross stud 49, to the operable member 38, extends upwardly to a point adjacent the left hand side of the carriage to facilitate the operation of the clutch-engaging member 31 by the operator just as he removes the work from the machine.

The indirect control of the clutch-engaging element 31 by the operable member 38 whereby mismanipulation is prevented, is arranged as follows:

Rocking the handle 53 forwardly, thrusts the operable member or link 38 rearwardly relatively to the actuating lever 40, the operable member shifting relatively to the actuating lever due to its slotted connection 39 therewith. The cross stud 49 in the operable member or link 38 tends to press the spring 48 against the actuating lever 40, and obviously, if no restraint is provided, as soon as sufficent power is stored in the spring 48 to overcome the clutch-disengaging spring 30 and the inertia and friction of the parts, the drive spring 48 would rock the actuating lever 40 to operate the clutch-engaging element 31.

To prevent such quasi-control of the clutch-engaging element 31 by the operable member 38, the actuating lever 40 is retained in its normal idle position by means of a catch or detainer 55 (Figs. 4 and 6) pivoted at 56, to the actuating lever 40, and extending forwardly through a guide slot 57 (Fig. 2) in the base 969 of the machine to take over a keeper 58 mounted on the base 969. A spring 59 connected at its opposite ends to the catch 55 and to the actuating lever 40, respectively, tends to maintain the catch in yielding engagement with its keeper 58.

The catch 55 restrains the actuating lever 40 against shifting the clutch-engaging element 31 to effective position as the operable member 38 travels rearwardly, and as a result, power is gradually stored in the drive spring 48 until it is sufficiently strong to snap the clutch-engaging element 31 smartly to its effective position, to engage the separable clutch members 19 and 25.

As this stage is reached, a trip finger 60 conveniently mounted on the shifting operable member 38 to travel therewith, contacts a cam face 61 on the catch or detainer 55 to disengage the latter from its keeper 58, and thereby free the actuating lever 40 and its connected parts to the action of the drive spring 48.

The drive spring thereupon rocks the actuating lever 40 independently of the operable member 38, towards the outer end of the slot 39 formed therein, and through the releasable dog 43 and keeper 45, turns the arm 41 and clutch-control shaft 32 to wipe the clutch-engaging element 31 along the toe 34 and thereby shift the slide 21 to bring the clutch member or worm wheel 25 into mesh with the drive worm 19, against the tension of the clutch-disengaging spring 30. Contact of the abrupt cam rise 35 against the toe 34 arrests and maintains the parts in effective position.

Engagement of the clutch members 19 and 25, assuming the motor 1690 to be running, enables the motor to drive the carriage-return shaft 23 and the gear 27 in mesh with the rack 28, to restore the carriage towards the beginning of a line.

It will be noted that the foregoing arrangement absolutely precludes the possibility of mismanipulation of the clutch-engaging element 31 by the operator.

The actuating lever 40 normally lies near the outer end of the slot 39 in the operating link 38. The link, when operated by the handle 53, shifts its slot 39 rearwardly relatively to the actuating lever, but immediately after the trip finger 60 releases the catch 55, the drive spring 48 snaps the actuating lever 40 rearwardly towards the outer end of the slot 39 in the operable member 38, in meshing the clutch members, and thereby places the actuating lever 40 under the control of the operator through the handle 53 and the link 38. This enables the operator at will to swing the clutch-engaging element 31 to its ineffective position, by the contact of the actuating lever 40 with the check stud 42 on the arm 41, and thereby permits the clutch-disabling spring 30 to effect the disengagement of the clutch members and interrupt the return travel of the carriage at any point.

When the operator desires to return the carriage partway only to the beginning of a line, he will rock the handle 53 forwardly, and the drive spring 48 will effect the engagement of the clutch members, whereupon the carriage will start its return travel. The operator, by watching the progress of the columns past the printing point, can determine when the column in which he wishes to print the next item, has returned to the printing point, at which time he will rock the handle 53 rearwardly, thereby advancing the link 38, which draws the actuating lever 40 forwardly to withdraw the clutch-engaging element 31 to its ineffective position and thereby free the sliding plate 21 for operation by the clutch-disengaging spring 30 to disconnect the clutch members 19 and 25. The flexible abutment 2024^e yields against the tension of its spring 4 in a counter-clockwise direction (viewed from the rear) to permit the passage of the successive tabulating stops 1 as the carriage returns towards the beginning of a line.

The suspension of the transmission of power to the carriage on its return, may occur when none of the tabulating stops 1 are closely adjacent the left side (viewed from the rear) of the tooth of the abutment, but the carriage feed spring 2068, through the tape 2069 will draw the carriage in column-spacing direction until the carriage is arrested by contact of the nearest tabulating stop 1 with the abutment 2024^e.

The cam face 61 on the detainer or catch 55, with which the trip finger 60 cooperates to release the catch, is of sufficient extent to maintain contact with the keeper 58 when the catch is released, so as to guide the catch back to its effective position upon the return of the actuating lever 40 to normal, under the control of the operator through the link 38, or automatically as hereinafter set forth.

The trip finger 60 is withdrawn from its proximity to the cam face 61 as the operable member or link 38 advances to its normal position, whereby to enable the catch 55 to engage its keeper 58 under the influence of its spring 59.

To effect the automatic disconnection of the motor 1690 and the carriage-returning means, when the carriage reaches the beginning of a line, the carriage-return rack 28 carries a tappet 37 located at or near the right hand end of the rack (looking from the rear, as in Figs. 1, 2, 4 and 6). As the carriage arrives at the beginning of a line, the tappet 37 collides with the trip arm 36 fast on the upper end of the clutch-control shaft 32, to turn the shaft in a counter-clockwise direction and thereby swing the clutch-engaging element 31 to its idle position, to free the shiftable clutch member 25 to the action of the clutch-disengaging means or spring 30.

The consequent separation of the clutch members 25, 19, interrupts the transmission of power from the motor to the drive gear 27, and permits the carriage feed spring 2068 to reassert itself and draw the carriage in column spacing direction until the first active tabulating stop 1 contacts the abutment 2024^e.

It might be possible for the operator, either intentionally or unintentionally, to interfere with the automatic shifting of the clutch-disengaging element 31 to its inef-

fective position, by continuing to hold the handle 53 forward after the carriage reaches the beginning of a line, which would maintain the operable member or link 38 in its rearward position.

To prevent such mismanipulation, I provide an automatically operated means for releasing the actuating lever 40 from control of the clutch-engaging element. Thus, a releasing arm 62 having a lip 63 thereon, is fast to the upper end of a hollow shaft or sleeve 64 (Figs. 1 and 2) encircling the upper part of the clutch-control shaft 32. The releasing arm 62 extends into the path of return of the tappet 37 which is adapted to collide therewith just prior to its contact with the trip arm 36, and turn the sleeve in counter-clockwise direction. The lower end of the hollow shaft or sleeve 64 rests loosely upon the hub 40^a (see Fig. 2) of the actuating lever 40, which hub, in turn, rests loosely upon and is supported by the hub 41^a of the segmental plate or arm 41 secured to the clutch-control shaft 32. A releasing cam 65 fast on the hollow shaft or sleeve 64, extends over the plate or arm 41 and lies adjacent a releasing stud 66 on the dog 43, which connects the actuating lever 40 with the clutch-control shaft 32 through its engagement with the keeper 45 on the plate 41.

The anchor post 47 mounted in the plate 41, passes through a slot 67 in the release cam 65 to define the throw of the release cam, and a spring 68 connected to the cam and to the anchor post, normally holds the cam 65 at one end of its travel, with the releasing arm 62 in the path of the tappet 37, and near one end of such path.

In case the operator, after actuating the handle 53, releases control of the same by removing his hand therefrom, the carriage on its return, will cause its tappet 37 to contact the release arm 62 to turn the hollow shaft 64 and the release cam 65 counter-clockwise, against the tension of the spring 68, thereby causing the cam to wipe over the releasing stud 66 on the dog 43 to disengage the dog from its keeper 45.

The carriage immediately thereafter brings its tappet 37 into contact with the trip arm 36 to turn the latter and the clutch-control shaft 32, and thereby shift the clutch-engaging element 31 to its ineffective position.

The tappet 37, in turning the trip arm 36, continues to turn the release arm 62, and the spring 68 acting as a flexible link between the actuating lever 40 and the release cam 65 will, in the absence of restraint imposed by the operator, cause the return of the actuating lever 40, and catch 55, to normal position, the actuating lever being pressed against its check stud 42 so that the dog 43 lies in position to take over its keeper 45, although disengaged therefrom. The actuating lever, on its return, will restore the operating link or member 38 and the handle 53 to normal.

As soon as the power is disconnected from the carriage-return mechanism, the carriage moves slightly towards the right (in Figs. 3, 4 and 6) as the first active tabulating stop contacts the flexible abutment 2024^e, thereby withdrawing the tappet 37 from proximity to the trip arm 36, and release arm 62, which latter, under the influence of the tensioned spring 68, turns in a clockwise direction, to its normal position, the spring also swinging the release cam 65 to idle position to permit the dog 43 to reengage its keeper 45.

Assume, however, that the operator maintains control of the operable member 38 to prevent its return, together with the actuating lever 40, catch 55 and dog 43, to normal position, when the carriage arrives at the beginning of a line. The tappet 37 on the carriage, after first actuating the release arm 62 to cast off the dog 43 from its keeper 45, will, in its farther travel, during which it acts upon the trip arm 36, merely turn the release cam 65 a little farther in its counter-clockwise travel and further tension spring 68.

The arm 41, being disconnected from the actuating lever 40, will swing in a counter-clockwise direction under the pressure of the tappet against the trip arm 36, relatively to the dog 43 to shift the keeper 45 away from the dog, as the clutch-engaging element 31 is restored to idle position. Hence, the operator cannot prevent the disconnection of the carriage-returning mechanism from the motor when the carriage reaches the beginning of a line, as the connection between the actuating lever 40, link 38 and lever 53, with the arm 41 is completely broken.

Upon the advance of the carriage in column spacing direction at the beginning of a line to take up the slight space between the first tabulating stop 1 and the flexible abutment 2024^e, as above explained, the spring 68 restores the release arm 62 and release cam 65 to normal, thereby freeing the dog 43 to the action of its spring 46, but the keeper 45 has shifted beyond the dog 43, and the operator, in order to reestablish his indirect control of the clutch-engaging element 31, is forced to manually restore the handle 53 to normal position, such restoration of the handle, returning the operable member 38, actuating lever 40, catch 55 and dog 43 to normal.

From the foregoing, it will be noted that the operator can initially effect the operation of the mechanism by which the carriage is returnable towards the beginning of a line, and that he may interrupt the op-

eration of such mechanism at any time during the return travel of the carriage, but that control by the operator of such mechanism to maintain it effective is absolutely prohibited.

Changes may be made in the form and arrangement of the several parts without departing from the spirit and scope of this invention.

What I claim as new, is:—

1. The combination with a reciprocatory carriage; means to drive the carriage in one direction; a shiftable element to control the operation of the drive means, and means to actuate the shiftable element to one of its positions; of manually-operative means movable in one direction to effect the operation of the actuating means for the shiftable element, and in another direction, to switch the shiftable element to its opposite position, said manually-operative means including a releasable connection between the actuating means and the shiftable element; means actuated by the reciprocatory carriage to release the connection between the actuating means and the shiftable element to prevent control of the element by the manually-operative means; and means also actuated by the reciprocatory carriage, to switch the shiftable element to its opposite position independently of the manually-operative means.

2. The combination with a reciprocatory carriage; means to draw the carriage in one direction; mechanism to return the carriage; and a shiftable element to control the operation of the return mechanism; of actuating means to move the shiftable element to effective position; a releasable connection between the actuating means and the shiftable element; a manually-operable member having a loose connection with the actuating means; and means controlled by the reciprocatory carriage to release the connection between the actuating means and the shiftable element, and to move the shiftable element independently of the manually-operable member.

3. The combination with a traveling carriage; a carriage-return mechanism; a shiftable element to control the operation of the carriage-return mechanism; and actuating means to shift the element to one of its positions; of manually-operative means movable in one direction to operate the actuating means, and in another direction to switch the shiftable element to its opposite position, including means to releasably connect the actuating means with the shiftable element; means operated by the carriage to release the connection between the drive means and the shiftable element, to prevent the control of the element by the manually-operative means; and means also actuated by the carriage to switch the shiftable element to its opposite position independently of the manually-operative means.

4. The combination with a traveling carriage; a carriage-return mechanism; and a shiftable element to control the operation of the carriage-return mechanism; of actuating means to shift the element to one of its positions, including means to releasably connect the actuating means with the shiftable element; manually-operative means movable in one direction to control the actuating means and in the opposite direction, to return the shiftable element to normal position; and means operated by the carriage at a predetermined point in its travel, to interrupt the connection between the actuating means and the shiftable element; and to operate the shiftable element, independently of the manually-operative means.

5. The combination with a traveling carriage; carriage-return mechanism therefor; and a shiftable element to control the operation of such mechanism; of actuating means to shift the element in a direction to cause the operation of the carriage-return mechanism; a manually-operable member movable in one direction to cause the actuating means to move the shiftable element to effective position, and in the opposite direction to directly restore the shiftable element to ineffective position; a connection between the manually-operable member and the shiftable element; and carriage-controlled means to disable the connection and thereafter, to actuate the shiftable element to idle position independently of the manually-operable member.

6. The combination with a traveling paper carriage; means to feed the carriage in column spacing direction; means to return the carriage towards the beginning of a line; and a shiftable element to control the operation of the carriage-return means; of actuating mechanism to operate the shiftable element to its effective position; a manually-operated member adapted to indirectly control the actuating mechanism to effect the operation of the shiftable element to effective position, and to directly control the actuating mechanism to operate the shiftable element to ineffective position; a releasable connection between the actuating mechanism and the shiftable element; release mechanism for the connection; and means on the carriage to operate the release mechanism and to operate the shiftable element to ineffective position.

7. The combination with a traveling paper carriage; means to feed the carriage in one direction; mechanism to return the carriage; and a shiftable element to control the operation of the carriage-return

mechanism; of actuating mechanism, including a spring and a lever, to operate the shiftable element to its effective position; a manually-operable member adapted to press the spring against the lever to rock the latter in one direction, the member having a loose connection with the lever to permit relative movement; a releasable connection between the lever and the shiftable element; and carriage-controlled means to release the connection and operate the shiftable element independently of the manually-operable member.

8. The combination with a traveling paper carriage; means to feed the carriage in one direction; mechanism to return the carriage; and a shiftable element to control the operation of the carriage-return mechanism; of mechanism, including a manually-operable member and a lever, connected for relative movement, to operate the shiftable element to its effective and ineffective positions at will; means to take up the lost motion between the manually-operable member and the lever; a releasable connection between the lever and the shiftable means; and carriage-controlled means to release the connection and operate the shiftable element independently of the manually-operable member.

9. The combination with a traveling paper carriage; means to feed the carriage in one direction; mechanism to return the carriage; and a shiftable element to control the operation of the carriage-return mechanism; of mechanism, including a manually-operable member and a lever, connected for relative movement, to operate the shiftable element to its effective and ineffective positions at will; means to take up the lost motion between the manually-operable member and the lever; an arm connected with the shiftable element; a dog to releasably connect the arm and the lever; a release cam to throw off the dog and enable the shiftable element to operate independently of the lever; a flexible link to connect the arm and cam; means to limit the relative movement of the arm and lever in one direction; and means on the carriage to cause the release cam to throw off the dog, said last-named means also adapted to operate the shiftable element independently of the manually-operable member.

10. The combination with a traveling paper carriage; means to feed the carriage in one direction; mechanism to return the carriage, including separable clutch members; and a shiftable means, including a shaft and a clutch-engaging member controlled thereby, for effecting the connection of the clutch members; of an arm fast on the shaft; an actuating lever; a releasable connection between the arm and lever; means to limit the movement of the actuating lever relatively to the arm in one direction; a manually-operable member loosely connected with the lever; a drive spring controlled by the manually-operable member to shift the actuating lever in one direction; means to delay the operation of the lever; a trip finger controlled by the manually-operable means to disable the delaying means; a release cam to interrupt the connection between the arm and the lever; and a tappet on the carriage to actuate the release cam and the shiftable means in succession.

11. The combination with a traveling paper carriage; means to feed the carriage in one direction; mechanism to return the carriage, including separable clutch members; and a shiftable means, including a shaft and a clutch-engaging member controlled thereby, for effecting the connection of the clutch members; of an arm fast on the shaft; an actuating lever; a releasable connection between the arm and lever; means to limit the movement of the actuating lever relatively to the arm in one direction; a manually-operable member loosely connected with the lever; a drive spring controlled by the manually-operable member to shift the actuating lever in one direction; means to delay the operation of the lever; a trip finger controlled by the manually-operable means to disable the delaying means; a release cam to interrupt the connection between the arm and the lever; a tappet on the carriage to actuate the release cam and the shiftable means in succession; and a flexible link to connect the actuating lever and the release cam.

EARL T. EMLEY.