April 23, 1968 H. G. HARRISON 3,379,129

PRINTING MACHINE

Filed July 28, 1966 4 Sheets-Sheet 1

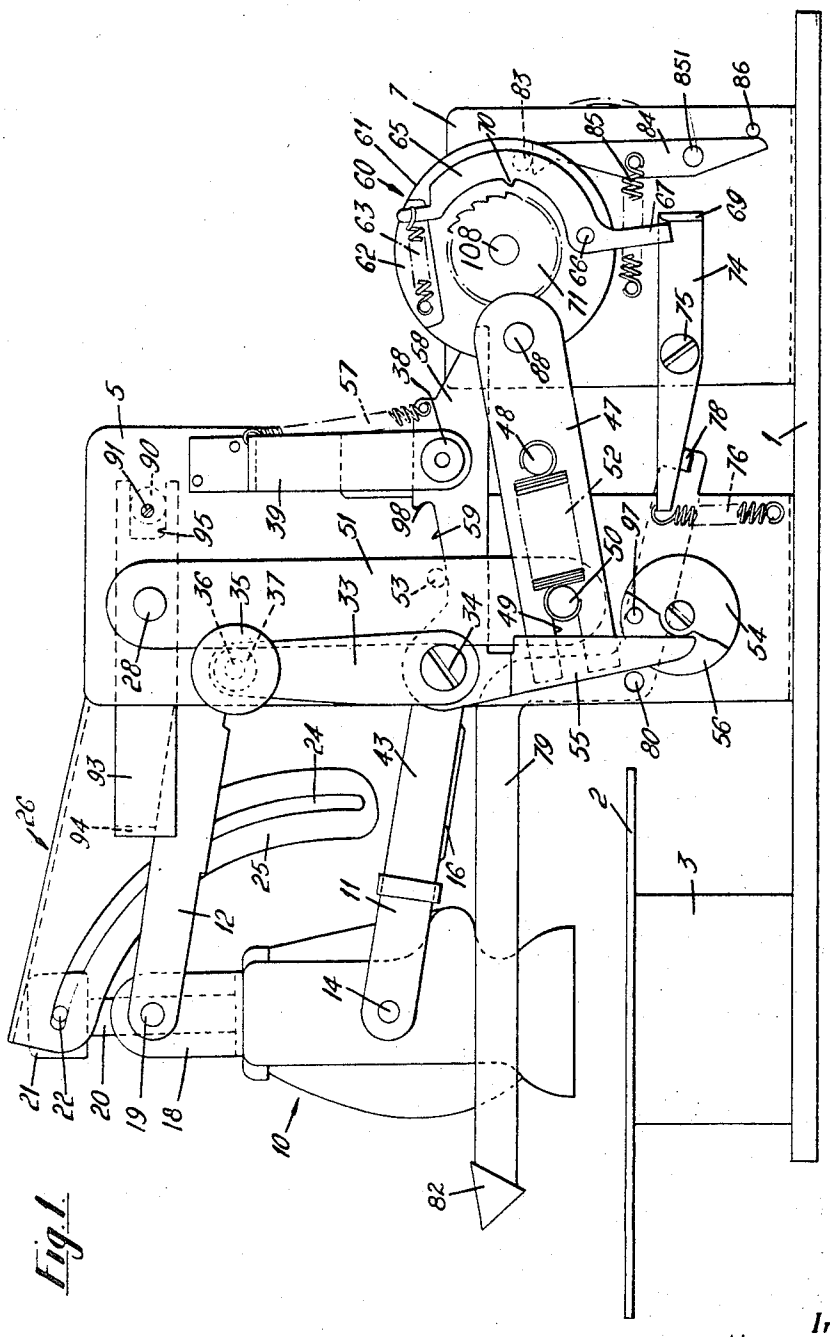


Fig. 1.

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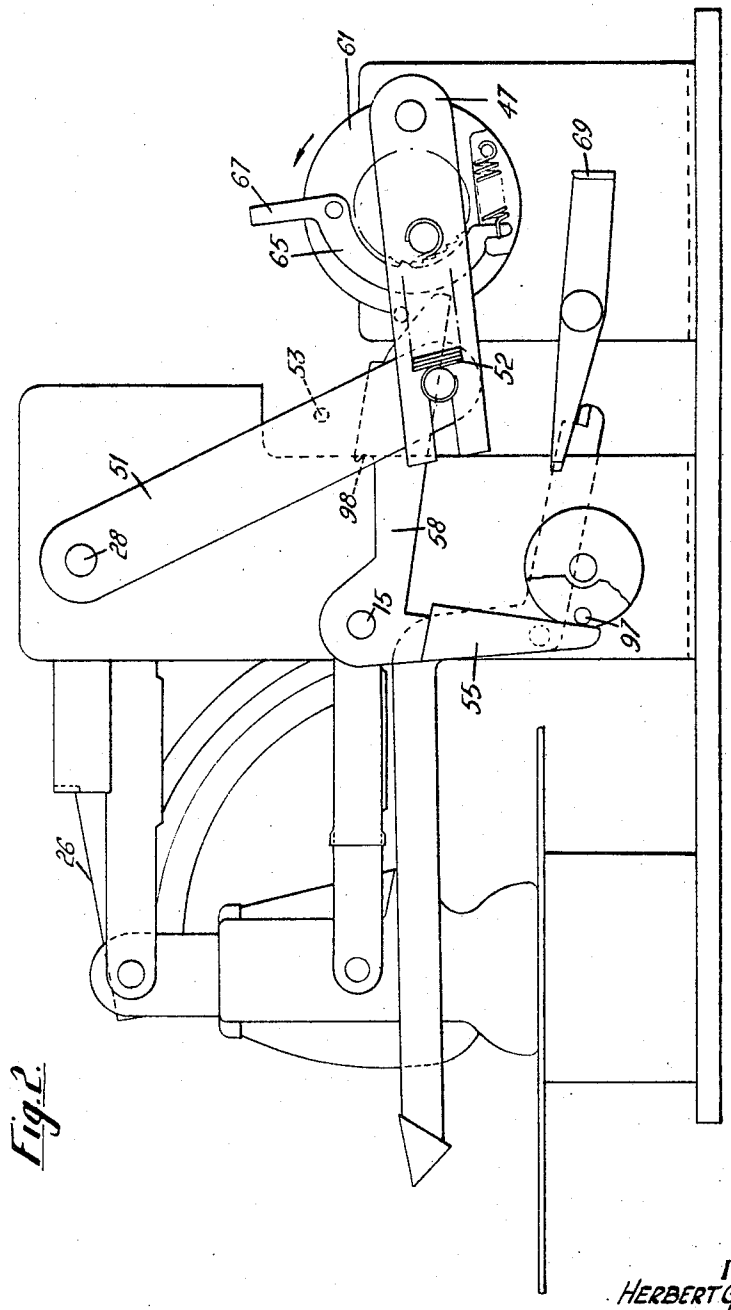


Fig. 2.

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Fig. 3.

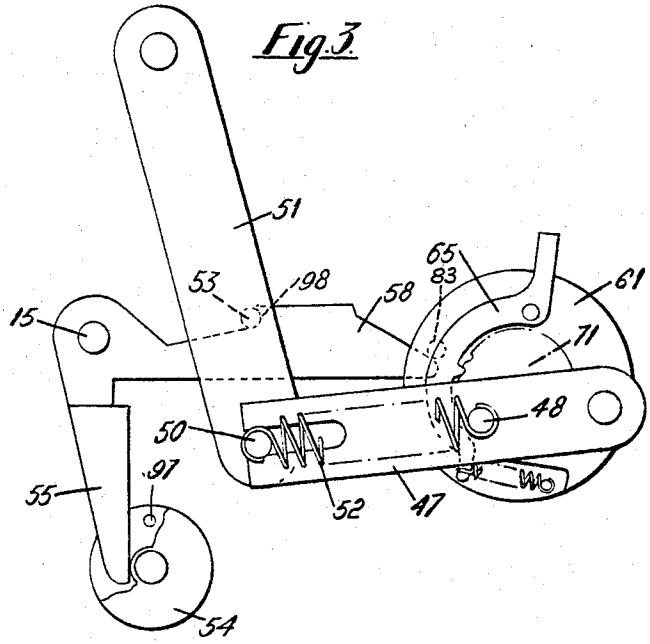
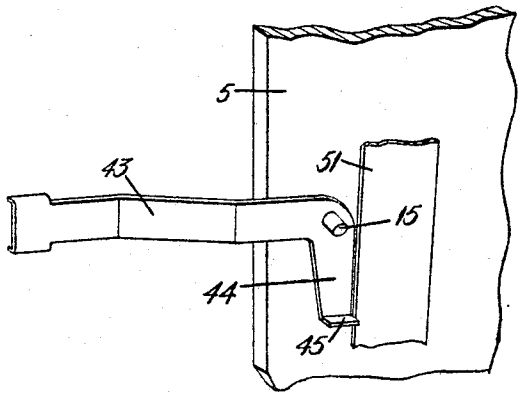


Fig. 4.



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Fig. 5

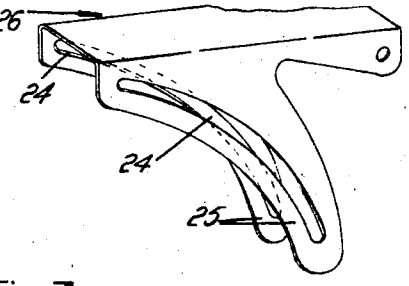


Fig. 6

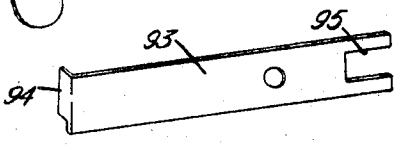


Fig. 7

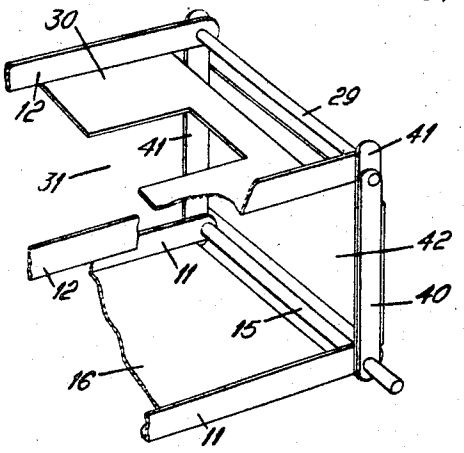
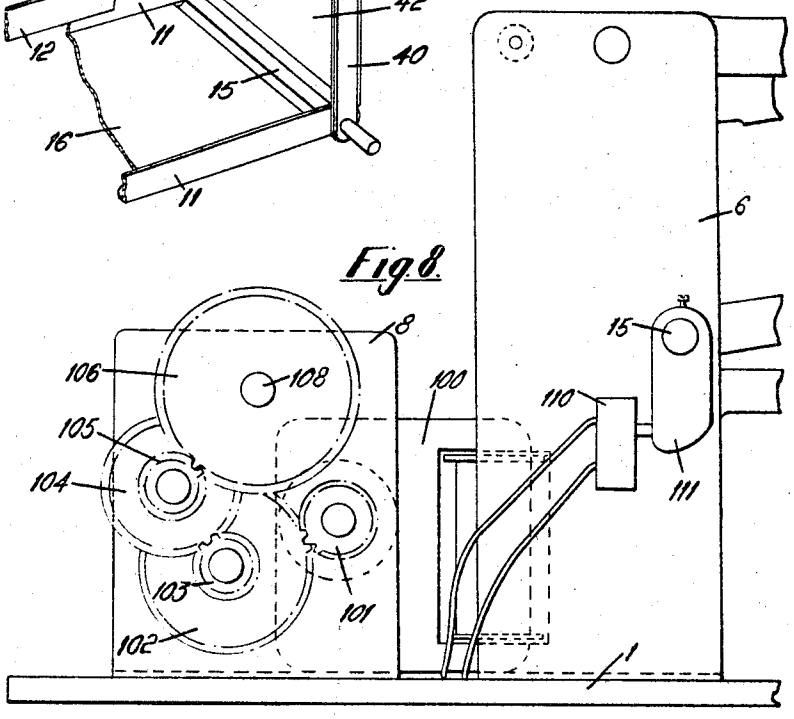


Fig. 8



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3,379,129

PRINTING MACHINE

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3 Claims. (Cl. 101—316)

ABSTRACT OF THE DISCLOSURE

The invention relates to a printing mechanism comprising a single mechanism for setting the mechanism to print alternatively under 2 different printing pressures, the mechanism is set for printing under a weak printing pressure when only a single sheet has to be printed and under a heavier printing pressure when a plurality of carbon copies are simultaneously to be made during printing. In the first case printing is effected under the action of a single-revolution clutch through two levers coupled together by spring means. In the second case movement of one lever is restricted so that during rotation of the single-revolution clutch the spring means are tensioned whereupon the restriction of said lever is removed and printing is effected under the action of the spring means.

Disclosure of the invention

The present invention relates to printing mechanisms.

For some purpose, for example for manually operable printing machines for printing numbers sequentially, it is desirable to provide a printing machine which enables the printing pressure to be varied so that a light printing pressure can be employed when single sheets are printed and a heavy printing pressure can be employed when a number of copies are made simultaneously with the printing by means of carbon paper.

It is an object of the invention to provide a printing mechanism in which the printing pressure is controllable.

The invention consists in a printing mechanism comprising a printing unit arranged to carry out a printing movement in response to operation of a control mechanism, wherein the control mechanism comprises a spring means and an adjustable pressure control member which, for varying the printing pressure of the printing unit, is movable into a first position and into a second position, the arrangement being such that the spring means are stressed during the printing movement by an amount which varies in dependence on the position of the pressure control member.

Other objects and advantages of the invention will become apparent from the following detailed description when read in conjunction with the accompanying drawings which are given by way of erample and in which:

FIG. 1 shows a side view of a printing mechanism;

FIG. 2 shows a side view corresponding to FIG. 1 but with some parts of the machine omitted and with other parts in different positions;

FIG. 3 shows, in side view, parts of the machine of FIGS. 1 and 2 during operation of the machine;

FIG. 4 shows a view taken in perspective of a support member;

FIG. 5 shows a view, taken in perspective, of a lever provided with side walls having guide slots;

FIG. 6 shows a view, taken in perspective, of a stoparm;

FIG. 7 shows a view, taken in perspective, of parts of a parallel motion linkage; and

FIG. 8 shows a view of parts of the mechanism of FIGS. 1 and 2 viewed from the opposite side of the machine.

As shown in FIG. 1, the machine has a base **1** on which a support plate **2** is mounted by means of a pedestal **3**. Four side plates **5**, **6**, **7** and **8** (see FIGS. 1 and 8) extend upwardly from the base **1** and carry the parts of the machine described below.

A printing unit **10** of the type which prints numbers sequentially is carried by four support arms **11** and **12** (see FIGS. 1 and 7). The support arms **11** are connected by pivot pins **14** to opposite sides of the printing unit **10**, only one of the pivot pins **14** being illustrated in the drawings, and are freely pivotable about a shaft **15** (see also FIG. 2) journalled in the side plates **5** and **6**, the arms **11** being connected rigidly together by a plate **16**. The arms **12** are respectively connected to the arms of a U-shaped bracket **18** by pivot pins **19**, of which only one is shown.

A plunger rod **20** projecting upwardly from the printing unit **10** is fixedly secured at its upper end to a collar **21** which, on opposite sides, is provided with projecting pins **22**, of which only one is shown, the pins **22** slidably engaging in arcuate guide slots **24** (FIGS. 1 and 5) in depending side walls **25** of a lever **26**.

This lever **26** is fixedly secured to a shaft **28** journalled in the side walls **5** and **6**, the lever **26** extending from between the side walls **5** and **6**.

The support arms **12** are freely pivotable about a shaft **29** (FIG. 7), which extends between but not into the side plates **5** and **6**, and are rigidly joined together by a plate **30** which is formed with a cutout **31** through which the side walls **25** of the lever **26** extend.

Means for turning the printing unit **10** are provided in the form of a lever **33** (FIG. 1) fixedly secured to the shaft **15** by a screw **34** and carrying a knob **35** attached to a spring pin **36** which extends through the lever **33** and is engageable either in a recess in a retainer **37** secured to the side wall **5** or, by pivoting of the lever **33** about the axis of the shaft **15**, in a recess in a retainer **38** secured by a bracket **39** to the side plate **5**. By pivoting the lever **33** from the position shown, in which the pin **36** engages in the retainer **37**, into the position in which the pin **36** engages with the retainer **37**, an arm **40** secured to the shaft **15** (see FIG. 7) and engaging the shaft **29** causes the shaft **29** to rotate about the axis of the shaft **15** so that by means of the arms **12** the printing unit **10** is tilted, the projecting pins **22** sliding along the guide slots **24** and causing the plunger rod **20** to be pushed into the printing unit **10** to bring the type wheels to an opening (not shown) in the bottom of the printing unit **10** where they are readily accessible for adjustment purposes. During this movement of the parallel motion linkage formed by the arms **11** and **12**, the printing unit **10**, the bracket **18** and arms **41**, which are freely rotatably mounted on the shafts **15** and **29** and rigidly secured together by a plate **42**, the arms **11** are held stationary by a support arm **43** (FIGS. 1 and 4) engaging one of the arms **11**. The support arm **43** is carried on the shaft **15** and is joined to a downwardly extending arm **44** which is bent at its free end to form an abutment lug **45**.

One end of a lever **47** is formed with a slot **49** which slidably receives a pin **50** extending from a first lever **51**. When the lever **51** is in the position in which it is shown in FIGS. 1 and 4, it abuts the lug **45** on the arm **44** to hold the support arm **43** in position. The lever **51** is rigidly secured to the shaft **28**, and, at the side of the lever **51** opposite to the pin **50**, has a first abutment member in the form of a projection **53**. A strong tension spring **52** is secured at one of its ends to the pin **50** and at its opposite end to a pin **48** on the lever **47**. The first lever **51** constitutes first means for moving the printing unit **10** into printing position, and the lever **47** constitutes a second lever or second means for moving the printing unit **10** into printing position.

A printing pressure control member comprising a pressure control knob **54** carrying a pin **97** is rotatably secured to the side plate **5**, and one arm **55** of a two-armed control lever projects into an annular slot **56** in the knob **54**. The arm **55** is urged radially inwardly of the slot **56** by means of a tension spring **57** which is secured at one of its ends to the bracket **39** and at its other end to another arm **58** of the two-armed lever. This arm **58** acts as releasing means. The arm **58** has a stop shoulder **98** acting as a second abutment member and is formed with a recess **59** into which extends the projection **53** acting as limiting means. Said two-armed control lever constitutes control means for controlling the printing pressure.

A single revolution clutch indicated generally by reference numeral **60** is mounted on the side plate **7** and comprises a driven clutch member in the shape of a disc **61** formed with a recess **62** containing a tension spring **63** which is secured at one of its ends to the disc **61** and at its other end to a pawl **65**.

The pawl **65** is pivotally connected by a pivot pin **66** to the disc **61** and has a projecting arm **67** which, in the position shown in FIG. 1, is retained by a lug **69** so that a projection **70** on the pawl **65** is held out of engagement with the toothing of a toothed wheel **71** which is co-axial with the disc **61**.

The lug **69** is provided on one arm of a two-armed lever **74** secured by a pivot pin **75** to the side plate **7**, the other arm of the lever **74** being urged by a tension spring **76**, which is secured to the lever **74** and to the side plate **5**, against a lug **78** projecting laterally from a manually actuable lever **79**. The lever **79** extends between the side plates **5** and **6** and is pivotably secured to the side plate **5** by a pivot pin **80**. A finger rest **82** is provided on the end of the lever **79** opposite to the lug **78**.

Means on said driven clutch member in the form of an abutment pin **83** projecting from the rear of the disc **61** towards the side plate **7** co-operates with a support lever **84**. This lever **84** is pivotable about a pivot pin **851** secured to the side plate **7** and urged by a tension spring **85** against an abutment pin **86** projecting from the side plate **7**, the tension spring **85** being secured to the lever **84** and the side plate **7**.

The lever **47** is pivotably secured to the disc **61** by a pivot pin **88**.

A shaft **90** extending between and abutting against the side plates **5** and **6** is supported by a pair of screws **91** which are in threaded engagement with holes formed in the shaft **90** but offset from the axis of the shaft **90**, and which extend through the side plates **5** and **6** and rigidly but adjustably secure the shaft **90** to the side plates **5** and **6**. A stop arm **93**, through which the shaft **28** extends, is formed at one end with a laterally extending lug **94** (FIGS. 1 and 6) and at its opposite end with a slot **95** which receives the shaft **90**. The lug **94** serves to limit upward movement of one of the arms **12**, and thus of the printing unit **10**, when the rod **20** is pulled upwardly from the printing unit **10** into the position shown in FIG. 1 by the lever **26**. This ensures that the type wheels of the printing unit **10** are pressed against an inking pad (not shown) even when the machine is not in operation. By loosening the screws **91**, rotating the shaft **90** and then re-tightening the screws **91**, the position of the lug **94** can be adjusted.

An electric motor **100** (FIG. 8) is arranged for driving the toothed wheel **71** through a reduction gearing comprising gears **101** to **106**, to rotate a shaft **108** journalled in the side plates **7** and **8** and carrying the toothed wheel **71**, which is fixedly secured to the shaft **108**.

A normally open microswitch **110** on the side plate **6** is actuated by an arm **111** on the shaft **15** and serves to interrupt the current supply to the electric motor **100** when the shaft **15** is pivoted to allow the type wheels of the printing unit **10** to be adjusted as described above.

The operation of the machine is as follows:

For printing with a light printing pressure, for example when printing only one copy at a time, the pressure control knob **54** is rotated to bring the pin **97** thereon into contact with the lever arm **55** to pivot the arm **58** about the shaft **15** into the position in which it is shown in FIG. 2. This pivoting moves the stop shoulder **98** on the arm **58** into a predetermined first position in which said stop shoulder lies out of the path of travel of the projection **53** on the lever **51** on pivoting of the lever **51** abut the axis of the shaft **28**. The machine is then ready for operation with a light printing pressure.

The electric motor **100** is energized and the toothed wheel **71** begins to rotate, but no drive is transmitted from the toothed wheel **71** since the projection **70** is disengaged from the toothing of the toothed wheel **71**.

After placing a sheet of paper to be printed on the support plate **2** beneath the printing unit **1**, the finger rest **82** is manually depressed to pivot the lever **79** about the pivot pin **80** and thus to pivot the lever **74** so that the lug **69** is disengaged from projection **67**.

When this happens, the projection **70** on the pawl **65** is urged by the spring **63** into engagement with the toothed wheel **71** so that drive is transmitted from the toothed wheel **71** to the disc **61**. Rotation of the driven disc **61** draws the lever **47** to the right, as shown in FIG. 2, and the movement of the lever **47** is transmitted through the spring **52** to the lever **51** which, through the shaft **28**, causes the lever **26** to pivot downwardly so that the printing unit **10** descends onto the paper and effects a print. As the disc **61** continues to rotate from the position shown in FIG. 2 back to its initial position, the lever **47**, and thus the printing unit **10** are returned to their initial positions.

The projecting arm **67** of the pawl **65** again strikes the lug **69**, which in the meantime has been returned to its initial position by removal of the operator's fingers from the finger rest **82**. When the projection **67** strikes the lug **69**, the pawl **65** is disengaged and the disc **61** is no longer driven. The projection **83** then rests on the support lever **84** and prevents reverse rotation of the disc **61**.

To set the machine for printing with a heavier printing pressure, for example for simultaneously making a number of copies by means of sheets of paper interleaved with carbon paper, the pressure control knob **54** is rotated into the position shown in FIG. 1 so that the projection **97** is moved away from the arm **55** and the stop shoulder **98**, under the action of the spring **57** of the arm **58**, moves into a predetermined second position in which said stop shoulder lies in the path of the projection **53**.

When the finger rest **82** is then depressed and the disc **61** is caused to rotate as described above, the lever **51** pivots about the axis of the shaft **28** until the projection **53** abuts against the stop shoulder **98**. On further rotation of the disc **61**, the spring **52** becomes tensioned. Eventually, the abutment pin **83** on the disc **61** strikes the tip of the arms **58**, as shown in FIG. 3, and pivots the arm **58** about the shaft **15** and thus releases the projection **53**. The lever **51** is then free to pivot and the printing unit **10** is driven down towards the support plate **2** under the action of the spring **52**.

No adjustment of the above-described mechanism to take into account variations in the thickness of the sheet or sheets being printed is necessary.

The finger rest **82** must be depressed and released for each printing operation, thus reducing the chance of inadvertent and incorrect printing.

It should be clearly understood that the embodiment described is given by way of example and that modifications, additions and omissions are possible without departing from the scope and spirit of the invention.

I claim:

1. In a printing mechanism comprising a printing unit, a single-revolution clutch having a driven member, and spring means for urging said printing unit into printing position, said spring means being tensionable prior to printing, the combination of: first means linked to said printing unit for moving said printing unit into printing position, second means linked through said spring means to said first means, said second means being movable by said driven clutch member, control means, means for limiting movement of said first means when said control means is in one predetermined position, said limiting means allowing free movement of said first means when said control means is in another predetermined position, and means on said driven clutch member for releasing said first means after its movement has been limited by said limiting means, said first means freely following movement of said second means in response to movement of said driven clutch member when said control means is in said other position to operate said printing unit by said driven clutch member through said first means and said second means, whereas when said control member is in said one position and after said limiting means have limited movement of said first means, said spring means are tensioned by said second means in response to movement of said second means by said driven clutch member and, after release of said first means by said releasing means, said first means is moved and operates said printing unit under the action of said spring means.

2. A combination as defined in claim 1, and further comprising means for turning said printing unit independently of said clutch for facilitating setting of said printing unit.

3. In a printing mechanism comprising a printing unit, a single-revolution clutch having a driven clutch member, and spring means for urging said printing unit into printing position, said spring being tensionable prior to

printing, the combination of: a first lever linked to said printing unit for moving said printing unit into printing position, a second lever linked through said spring means to said first lever and pivoted to said driven clutch member, a control member, a control lever movable by said control member, a first abutment member on said first lever, a second abutment member on said control lever, said second abutment member lying out of the path of said first abutment member when said control lever has been moved by said control member into a predetermined first position in which said first lever can freely follow said second lever to operate said printing unit under the action of said driven clutch member, said second abutment member lying within the path of said first abutment member when said control lever has been moved by said control member into a predetermined second position to enable said first abutment member to strike said second abutment member thereby limiting movement of said first lever and causing said spring means to be tensioned on movement of said second lever in response to movement of said driven clutch member, and means on said driven clutch member for moving said control lever out of its second position towards said first position to release said first abutment member from said second abutment member and to enable said first lever to move and to operate said printing unit under the action of said spring means.

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