March 18, 1952 THEODORE ARTHUR SOLWAY 2,589,884
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MANIFOLDING AND COPYING APPARATUS
Filed Nov. 28, 1947 2 SHEETS—SHEET 1

FIG. 1.

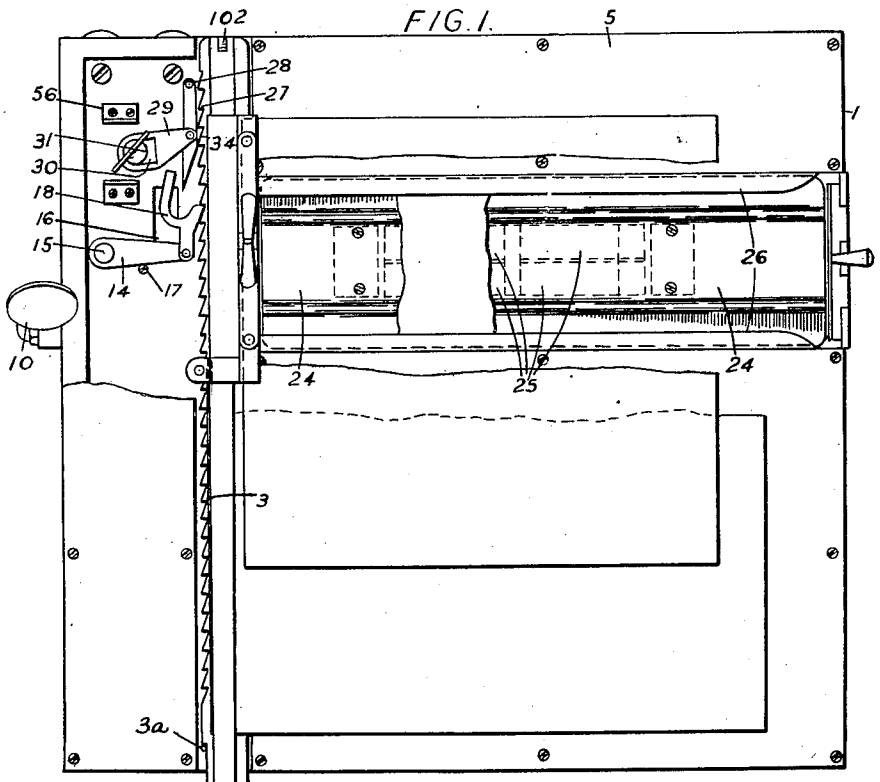
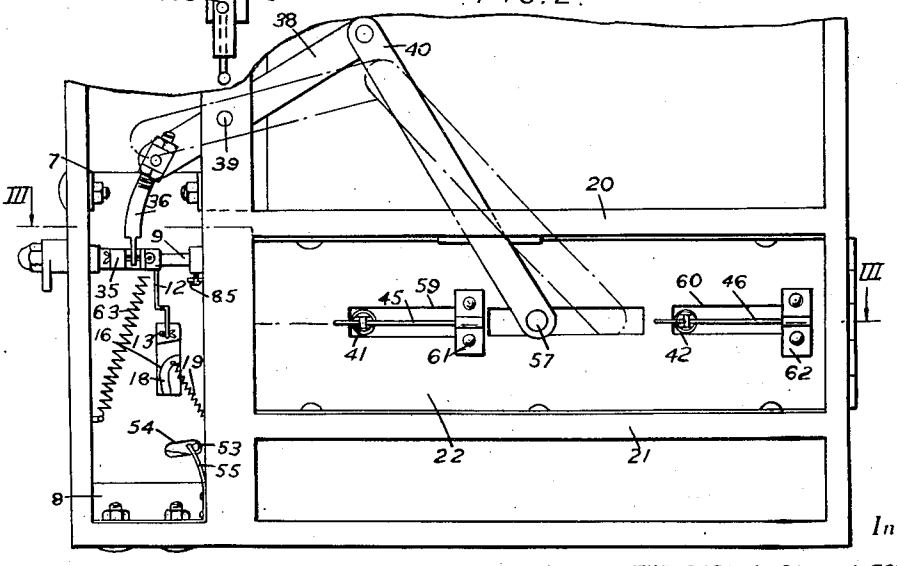



FIG. 2.




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FIG. 3.

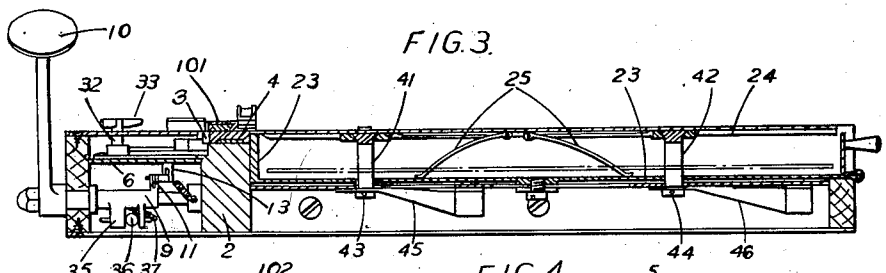



FIG. 4.

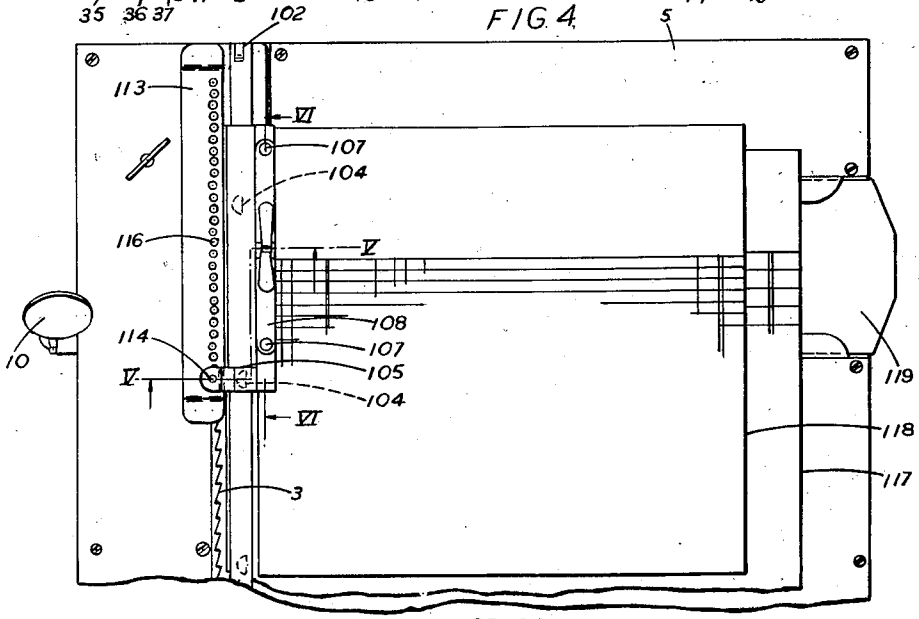



FIG. 5.

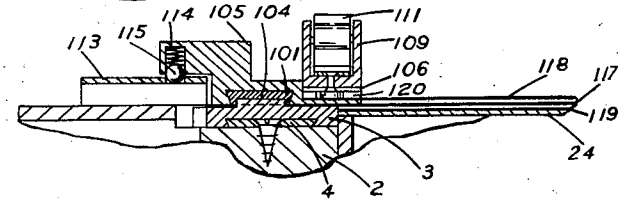
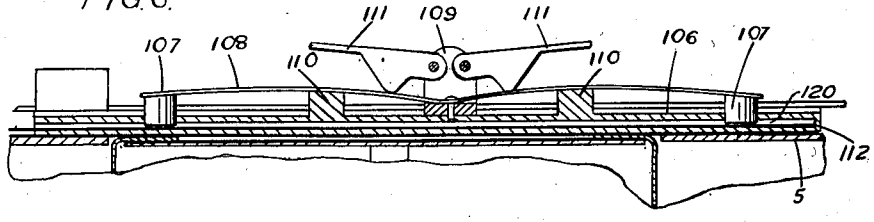



FIG. 6.




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# UNITED STATES PATENT OFFICE

2,589,884

## MANIFOLDING AND COPYING APPARATUS

Theodore Arthur Solway, formerly Tibor Zsolnai, London, England

Application November 28, 1947, Serial No. 788,574
In Great Britain February 8, 1946

Section 1, Public Law 690, August 8, 1946
Patent expires February 8, 1966

6 Claims. (Cl. 282—29)

1

This invention relates to a manifold or copying apparatus which is primarily intended for use in making from an original entry or record card two or more records of which one or more is a summary of the original entries and one or more is a copy of one or more lines of the original entry and summary. The apparatus is particularly suitable for use in connection with wages systems, as it enables an individual wages card, a summary sheet and a pay envelope to be written simultaneously in one operation. The apparatus, however, can be used for a variety of other purposes such as invoicing systems, sales and purchase ledger accounting, stores accounts and the like.

For the sake of simplicity, however, the invention will be hereinafter described in connection with a wages system in which an original entry card, a summary sheet and a pay envelope are used, but it will be understood that it may be applied to other systems.

In the specification of my British Patent No. 571,620 there is described a manifolding or copying apparatus comprising a baseboard, a magazine adapted to hold a stack of slips, sheets, envelopes or the like, with the uppermost exposed and substantially level with the surface of the baseboard and means for gripping the edges of sheets so that they are held in a predetermined position (at least in a direction at right angles to the gripped edges), relative to one another and to the slips or the like in the magazine. In a particular form of apparatus described in the said specification, the means for gripping the edges of the sheets placed on the baseboard comprises two releasable clamping devices arranged side by side in such a manner that the sheet gripped by one of the devices can be released and replaced by another sheet without interfering with the sheet gripped by the other clamping device and the two clamping devices are mounted on a rack which is fitted in the baseboard and can be operated by means of a handle, the rack being moved relatively to the magazine by a distance equal to the pitch of the rack teeth and to the distance between the horizontal rulings on the sheets at each operation of the handle, and the magazine being simultaneously operated and transferred into a position in which the uppermost envelope can be readily removed.

In operating the aforesaid machine, a stack of pay envelopes is placed in the magazine, the two clamping devices are released and a summary sheet is placed on the base-board above the magazine and clamped by both clamping devices. An individual record card is then placed on the summary sheet and gripped by the clamping device nearest the magazine without disturbing the summary sheet. Sheets of carbon paper are placed on either side of the summary sheet, or if the latter is transparent, a double sided carbon may be used, the carbon sheets being preferably held in position by a separate clamping device.

2

An entry is then made by hand on the individual record card, copies thereof being simultaneously produced on the summary sheet and on the top envelope of the stack in the magazine. The handle is then actuated whereby the magazine is rendered accessible and the uppermost envelope with the entry on it is removed. The actuation of the handle results also in the rack together with the summary sheet and individual record card gripped by the clamping devices attached thereto being moved upwards by a distance corresponding to the pitch of the rack teeth so that the next horizontal line of the summary sheet is in its proper position relatively to the envelope in the magazine. Then the individual record card is released from its clamping device and removed without disturbing the summary sheet and a fresh card inserted; care must be taken however that the free horizontal line (i. e. the line to be written on) of the individual record card coincides with the next free horizontal line of the summary sheet. The operations are then repeated as before.

It will be clear from the above that in the apparatus owing to the clamping devices for the record cards and summary sheet being mounted on and movable with the rack, it is necessary to take care each time a fresh individual record card is inserted that the free line (i. e. the line to be written on) of the record card coincides with the next free line on the summary sheet, and the record card must be carefully adjusted in position.

Now, a primary object of the present invention is to enable the individual record cards to be inserted in proper position in relation to the summary sheet without any necessity for careful observation.

According to the invention, the apparatus comprises a baseboard or the like with which is associated a magazine adapted to hold a number of slips, envelopes or the like, with the uppermost exposed and substantially level with the surface of the baseboard, a clamping device for gripping the edge of a summary sheet placed

on the baseboard above the magazine, means whereby the clamping device may be moved in steps relatively to the magazine, and a second clamping device for gripping the edge of an individual record card placed on the summary sheet, the second clamping device being provided with means whereby it may be fixed in a number of different positions and being provided with a stop by which the position of the gripped sheet relatively to the line of movement of the first mentioned sheet is fixed in such a manner that when a card is placed against the stop and the clamping device is fixed in the proper position the free line on the card coincides with the free line of the summary sheet and is above the slip or the like in the magazine.

In other words the apparatus of the aforesaid prior specification is modified in that the clamp for the individual record cards, instead of being fixed to and moving with the rack, is adjustable independently of the movable rack and can be fixed in a number of different positions and is provided with a stop which ensures that the free line of the record card coincides with the free line of the summary sheet and with the stationary line of entry of the slip or the like in the magazine.

In order that the invention may be clearly understood and readily carried into effect, a manifold or copying apparatus in accordance with the invention is illustrated by way of example, in the accompanying drawings in which:

Figure 1 is a plan view of the apparatus with a part of the cover broken away;

Figure 2 is an under plan view of the top part of Figure 1;

Figure 3 is a section on the line III—III of Figure 2;

Figure 4 is a plan view of the top part of the apparatus showing the record sheets etc. in position;

Figure 5 is a section on the line V—V of Figure 4, drawn to an enlarged scale; and

Figure 6 is a section on the line VI—VI of Figure 4, also drawn to an enlarged scale.

Referring to the drawings, the apparatus comprises a box or casing 1 which is divided into two compartments by a piece 2 which is spaced a short distance from the left-hand edge of the casing 1. A rack 3, the length of which is approximately equal to the distance between the top and bottom edges of the casing is slidably mounted on a bar 4 which is fixed to the top of the piece 2, the rack being formed with a dovetail groove which engages the correspondingly shaped edges of the bar 4. The upper surface of the rack is approximately level with the cover 5 of the casing. Between the piece 2 and the right-hand edge of the casing 1 are fitted two cross-pieces 20 and 21 which form a compartment to the sides of which are fixed by means of screws the downwardly flanged edges of a plate 22, the upper surface of which is some distance below the level of the cover 5 of the casing 1. In the space above the plate 22 is slidably fitted a magazine 23 which is open on top and at the outer side edge. The magazine 23 contains a platform 24 which is normally pressed upwards by means of four springs 25 so that its edges engage under the inwardly flanged edges 26 of the magazine 23 when the latter is empty.

Between the piece 2 and the adjacent side of the casing 1 a plate 6, which extends about halfway across the casing from the top edge, is fixed on brackets 7 and 8 respectively which are secured between the piece 2 and the adjacent side of the casing 1. Below the plate 6 is a shaft 9 which is journalled at one end in a bearing in or attached to the piece 2 and of which the opposite end passes through the adjacent side of the casing 1. A crank handle 10 is fixed on the projecting end of the shaft. The shaft is formed with an upwardly extending crank 11 to which is pivoted one end of a link 12, the other end of which is pivotally connected to a stud 13 fixed to and depending from a lever arm 14 which is swingable on the upper side of the plate 6 about a pivot 15, the stud passing through an aperture 16 in the plate 6. The downward movement of the lever arm in Figure 1 is limited by a stop 17. The free end of the arm is pivoted to a forked member 18, the inner limb of which is in the form of a ratchet tooth which can engage the teeth of the rack 3 and is normally held in engagement therewith by means of a spring 19 of which one end is attached below the plate 6 to a stud which is fixed to the forked member 18 and projects through the aperture 16 in the plate 6 and the other end is fixed to the piece 2. The longer limb of the forked member 18 is engageable by the end of a lever 27 which is pivoted at 28 on the upper surface of the plate 6. A stud 53 fixed to the lever 27 extends through an aperture 54 in the plate 6 and is acted upon by a spring 55 so that the lever 27 is normally pressed to the right (in Figure 1) into a position in which a tooth 34 formed on the edge of the lever 27 is in engagement with one of the teeth of the rack 3, and the longer limb of the forked member 18 is not engaged by the end of the lever 27. To the lever 27 is pivoted intermediate its ends a link 29 provided with an aperture 30 in which a cam 31 is disposed. The cam 31 is fixed on a shaft 32 which is journalled in the plate 6 and in a bracket 56 fixed thereto and passes through a hole in the cover 5 of the casing 1. To the free end of the shaft 32 is fixed an operating knob or handle 33, so that, by turning the handle 33, the lever 27 can be turned about its pivot 28 and caused to engage the longer arm of the forked member 18 whereby both the tooth 34 and the shorter arm of the forked member 18 are disengaged from the rack which is then free to be adjusted as desired or, if necessary, to be moved from the apparatus.

The shaft 9 is also formed or provided with a downwardly projecting crank 35 to which is pivotally connected by means of a pin 37 one end of a rod 36. The other end of the rod 36 is pivoted to one arm of a lever 38 which passes through a slot in the piece 2 and is pivoted thereto at 39. The other arm of the lever 38 is pivotally connected to one end of a link 40 of which the opposite end is pivoted to the bottom of the magazine 23, by means of a pivot or screw 57 which passes through an elongated hole in the plate 22. To the underside of the magazine platform 24 are fixed two studs 41 and 42 which project downwardly through two elongated holes 59 and 60 respectively in the plate 22. The studs have axial slots in which the ends of two ramps 45 and 46 respectively normally engage. The ramps are fixed at one end to the underside of the plate 22 by means of brackets 61 and 62 respectively and their opposite ends are soldered or welded to the plate. The edges of the ramps bear against pins 43 and 44 which pass through the studs 41 and 42 respectively transversely of the slots. Therefore, when the handle 10 is depressed, the magazine is moved bodily to the

right in Figures 1 and 2, the lever 38 and link 40 taking up the position indicated in dotted lines, and the magazine platform 24 is simultaneously lowered against the action of the springs 25 owing to the pins 43 and 44 being moved along the inclined edges of the ramps. At the same time the lever arm 14 is rotated about its pivot 15 so that the shorter limb of the forked member 18 moves the rack upwardly (in Figure 1) by a distance corresponding to the length of one tooth. Movement of the handle 10 may be limited by a suitable stop, or as shown in the drawing, by the edge of the handle abutting against the cover 5. When the handle 10 is released, the shaft 9 is returned to its original position by a spring 63, the movement of the shaft being limited by a stop 85, and the magazine is moved inwardly and its platform raised by the springs 25 as the pins 43 and 44 slide down the ramps. At the same time the arm 14 is returned to its original position and the shorter limb of the forked member 18 rides over one of the rack teeth and engages the next tooth, the rack being prevented from moving by the tooth 34 which remains in engagement.

A bar 101 is pivoted at 102 to one end of the rack 3 and its other end is provided with a locking device 103 by means of which it may be secured to the other end of the rack. The bar 101 forms, with the rack, a clamp for the edge of the summary sheet which is provided with two or more holes to be engaged by pins 104 which project from the rack and enter recesses in the bar. The longitudinal edges of the bar 101 are dovetailed to receive a dovetailed slot formed in the underside of a block 105 so that the block can slide on the bar. A clamping device projects from the block 105 towards the magazine and in this embodiment comprises a plate 106 having a horizontal slot 120 into which a record card or the like can be inserted. Two holes are formed through the upper face of the plate 106 and into the slot to receive two pins 107 attached to the ends of a flat spring 108 secured at its centre to a bracket 109 on the upper face of the plate 106. Two stops 110 are provided on the upper face of the plate 106, each of these stops being located intermediate the bracket 109 and one end of the spring 108, the spring bears against the stops and two levers 111 are pivoted one on each side of the bracket 109, each lever having a projection for engaging the spring intermediate the bracket 109 and the stop 110. The levers 111 are provided to enable the central portions of the spring to be depressed so as to raise its ends and move the pins 107 upwards to enable a record card or the like to be inserted in the slot in the plate 106 whereupon release of the levers will allow the pins to re-enter the holes in the plate 106 and clamp the record card or the like in position in the slot. At this upper end, the slot is closed by a stop 112 to be engaged by the record card or the like for location purposes. Alternatively the stop 112 may be provided at the lower end of the slot.

Means are provided for retaining the block 105, and consequently the clamping means together with the record card or the like secured thereby, in any one of a number of positions longitudinally along the bar 101. One embodiment of means for this purpose is illustrated in the drawings, see particularly Figures 4, 5 and 6, in which a plate 113 is secured to the casing and located alongside the bar 101. The block 105 has an extension 114 overhanging the plate



113 and a spring-pressed ball 115 carried thereby engages a series of holes 116 provided in the plate, the holes being spaced apart corresponding with the spacing of the lines of entry on the record card or the like. Numbers corresponding for example to the weeks of the year, or with the number of lines on the record card, may be marked on the plate alongside some or all of the holes. The spring-pressed ball 115 may be replaced by any other convenient device which be engaged with the holes 116. Any other convenient means may be provided for retaining the record card or the like in any one of a number of positions corresponding with the lines of entry thereon.

The method of operation of the apparatus, as applied to a wages system, is as follows:

The operating handle 10 is depressed to shift the magazine to the right and lower the platform 24, and a stack of pay envelopes 119 is inserted in the magazine. The handle is then released whereupon the magazine is returned to its original position and the envelopes are firmly held therein with the uppermost one substantially level with the cover 5 of the casing.

The locking device 103 is released and the bar 101 is swung about its pivot 102 so that it is clear of the rack. A summary sheet 117 is then placed on the baseboard 5 with its left hand side over the rack 3 so that the pins 104 project through the holes in the margin of the sheet 117. A sheet of carbon paper is placed on each side of the sheet 117, or if the latter is transparent, a double sided carbon may be used beneath the sheet 117, the carbon paper having holes for engagement with the pins 104. The sheets are clamped in position by returning the bar 101 to its original position and re-engaging the locking device 103. The tooth 34 and the shorter arm of the forked member 18 are disengaged from the rack by turning the handle 33 so that the rack can be moved to carry the sheet 117 until the first line of entry on the sheet coincides with the line of entry on the pay envelope, for which purpose a stop may be provided as at 3a, whereupon the handle 33 is again turned to allow the teeth to re-engage with the rack. The two levers 111 are then depressed to withdraw the pins 107 from the holes in the plate 106 and an individual record card 118 is inserted in the slot in the plate 106 with its upper edge engaging the stop 112 and clamped in position by the pins 107 when the levers 111 are released. The block 105 is then moved along the bar 101, carrying with it the record card and without disturbing the sheet 117, until the required or first free line of entry on the record card is in register with the first line of entry on the sheet 117 and the block is retained in this position by the spring pressed ball 115 or other retaining means engaging one of the holes 116 in the plate 113.

The apparatus is now ready for use and no further adjustments will be required for registering the lines of entry until a new summary sheet has to be inserted. An entry is now made by hand on the record card 118, copies thereof being simultaneously produced on the summary sheet and on the top envelope of the stack in the magazine. The handle 10 is then actuated whereby the magazine is rendered accessible and the uppermost envelope with the entry on it is removed. The actuation of the handle 10 results also in the rack, together with the summary sheet, being moved upwards a distance corresponding to the pitch of the rack teeth and also

to the spacing of the lines on the summary sheet so that the next line of entry on the summary sheet registers with the line of entry on the envelope in the magazine. The block 105 will not have been moved upwards when the handle 10 was actuated, as the spring-pressed ball in engagement with one of the holes in the plate 113 will retain it in position so that when the levers 111 are depressed, the record card removed, and a new record card inserted in the slot of the plate 106 with its upper edge engaging the stop 112, the required or first free line of entry on the card will be in register with the next free line of entry on the summary sheet. This cycle of operations is repeated until all the lines of entry on the summary sheet are completed and when the summary sheet is replaced by a new one, it will be necessary to re-adjust the position of the rack to bring the first line of entry of the new summary sheet in register with the line of entry on the uppermost pay envelope in the magazine.

Usually, after the entry has been made on an individual record card, e. g., of the wages in one week, a second similar entry will be made on the following week and so on. Consequently for each of the succeeding entries, it is only necessary to move the block 105 along the bar 101 until the spring pressed ball engages the next hole in the plate 113, so that when the record card is inserted with its upper edge engaging the stop 112, the next free line of entry will be in correct register with the lines of entry on the summary sheet and the pay envelope.

It will be understood that the clamping device for the record card and the method of retaining it in any one of a number of positions described above and illustrated in the drawings, are by way of example only and are capable of considerable modification.

I claim:

1. A manifolding or copying apparatus comprising a supporting member, a magazine adapted to hold a number of slips, of the kind including envelopes and slips of paper, the uppermost slip being substantially level with the surface of the supporting member, a first clamping device for gripping the edge of a sheet placed on the supporting member and above the said magazine, means whereby the said clamping device may be moved in steps relatively to the magazine, a second clamping device for gripping the edge of a second sheet placed above the first sheet, means whereby the said second clamping device is movable relatively to the first mentioned clamping device and to the magazine, and interengaging members mounted on said second clamping device and fixed to said supporting member respectively for retaining the said second clamping device in any one of a plurality of predetermined positions relatively to said magazine despite movement of said first clamping device.

2. Apparatus as defined in claim 1, in which the said second clamping device is provided with a stop for locating the position of the said second sheet.

3. A manifolding and copying apparatus comprising a supporting member, a magazine adapted



to hold a number of slips, of the kind including envelopes and slips of paper, the uppermost slip being substantially level with the surface of the supporting member, a first clamping device comprising a bar slidably mounted on said supporting member and a clamping bar pivoted at one end to one end of the said sliding bar and locking means for detachably securing together the ends of said sliding bar and said clamping bar remote from said pivot whereby the edge of a sheet of paper placed on the supporting member and above said magazine may be clamped between said bars, means for moving said first clamping device in steps relatively to said magazine, a second clamping device for gripping the edge of a second sheet placed above the first sheet, said second clamping device being slidably mounted on said clamping bar of said first clamping device, a plate having a series of recesses fixed on said supporting member, means mounted on said second clamping device for engagement with any one of said series of recesses whereby said second clamping device will be retained in any one of a plurality of predetermined positions relatively to said magazine, despite movement of said first clamping device.

4. Apparatus as defined in claim 3, wherein a plurality of pins project from the upper face of the said sliding bar to engage in holes in the first mentioned sheet, and the said clamping bar has recesses in its under face to receive the said pins.

5. Apparatus as defined in claim 3, wherein the said second clamping device carries a spring-pressed plunger for engagement in any one of the said series of recesses to retain the said second clamping device in any one of a number of positions.

6. Apparatus as defined in claim 5, wherein the said second clamping device comprises a plate having a slot therein whereby it is U-shaped in cross-section, two holes being formed through one face of said plate providing communication with said slot, a flat spring secured to said plate at its center and supported intermediate its ends by two stops on said plate, two pins carried by said flat spring one on each end thereof and aligning with and urged by said spring into said holes, and means for depressing said spring between said stops and its center whereby the ends of said spring will be raised to retract said pins from said holes in the plate.

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