

Dec. 17, 1968

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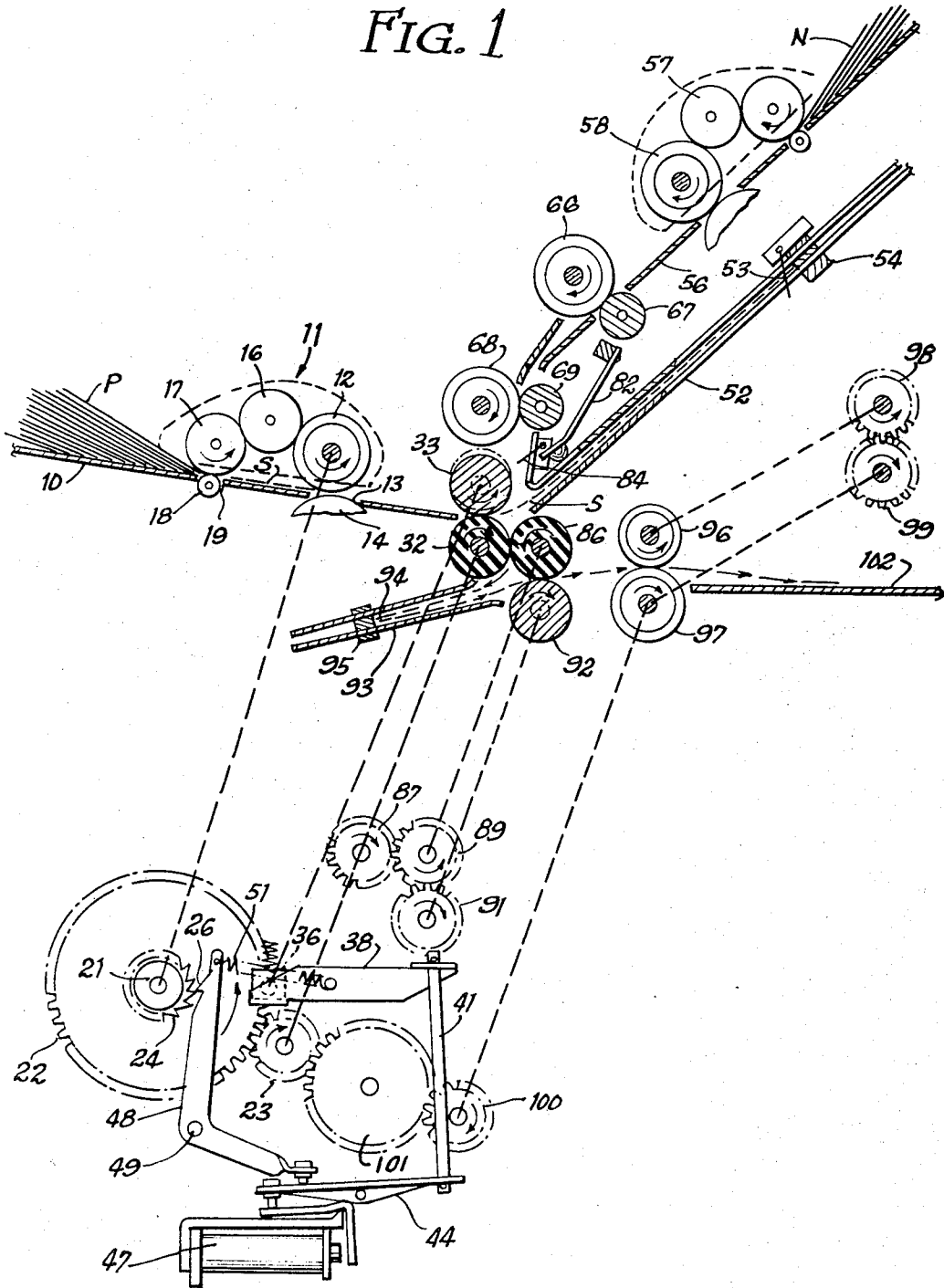
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PAPER NESTING AND ENVELOPING APPARATUS

Filed Jan. 24, 1966

3 Sheets-Sheet 1

FIG. 1



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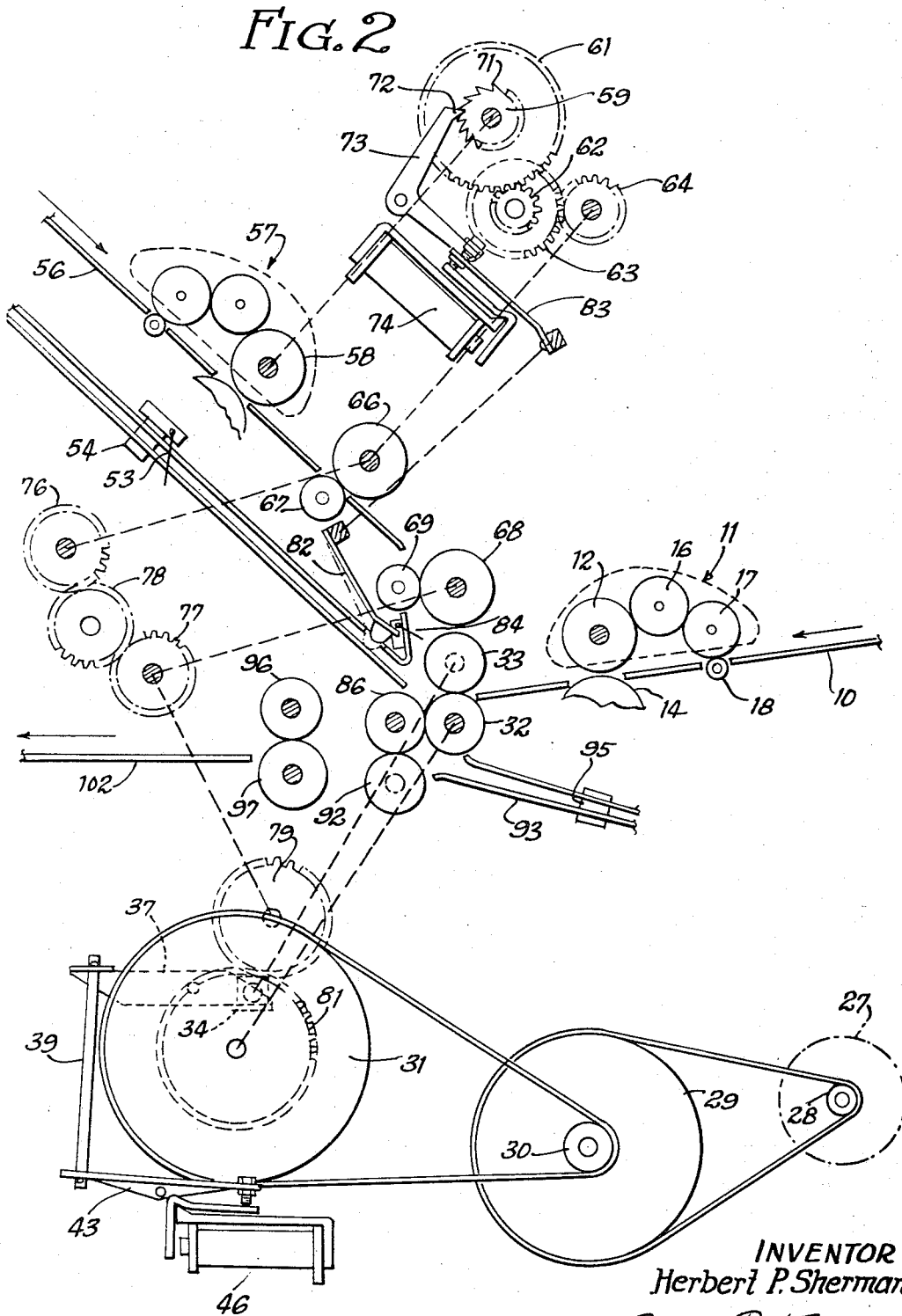
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PAPER NESTING AND ENVELOPING APPARATUS

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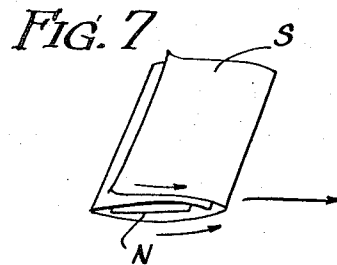
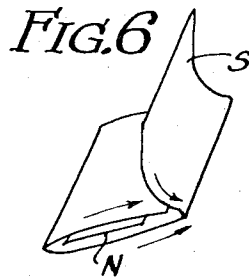
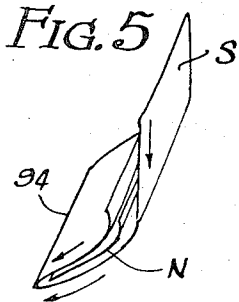
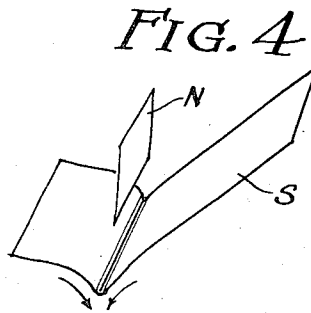
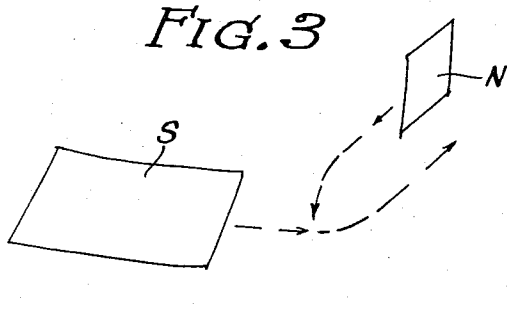
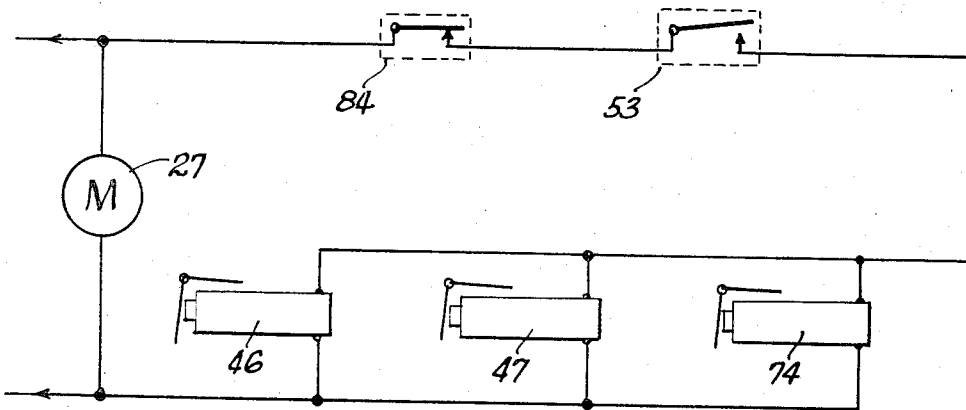


FIG. 8



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PAPER NESTING AND ENVELOPING APPARATUS
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 5 Claims. (Cl. 270—45)

ABSTRACT OF THE DISCLOSURE

A paper nesting and enveloping apparatus including a pair of cooperating separable rollers for feeding a first sheet into a first buckle chute. At a predetermined point the leading edge of the sheet engages a control which effects separation of the rollers to stop feeding of the sheet and simultaneously actuates a holding means to hold the sheet in the chute and a second feeding means to feed a second sheet into superposed relation to the first sheet. The second sheet in its movement actuates a control which effects cooperation of the rollers and release of the holding means to buckle the first sheet into first fold means with the second sheet folded within portions of the first sheet and to feed the same into a second buckle chute. The first sheet is then buckled into second folding means which effects a second folding of the first sheet to completely envelope the second sheet.

This invention relates to a paper nesting and enveloping apparatus.

One of the objects of my invention is the provision of an apparatus for nesting and/or enveloping a card, return envelope, advertisement, letter or the like, within a sheet of paper, larger than that which is being nested and/or enveloped, and then completely enveloping said card, etc. within said sheet.

Another object of my invention is the provision of a combination sheet folding apparatus of the buckle chute type and a nesting apparatus effective to enclose and completely envelop a card or the like within the folded sheet.

Still another object of my invention is the provision of an apparatus of the foregoing character which is automatic and efficient in operation, simple in construction, and economical to manufacture.

Other and further objects and advantages of this invention will become apparent from the following description when the same is considered in connection with the accompanying drawings, in which:

FIG. 1 is a more or less diagrammatic vertical cross-sectional view illustrating the relationship of the main operating components of my invention, and further illustrating the associated drive means for said components located on one side of the apparatus.

FIG. 2 is a similar view and illustrating the associated drive means located on the opposite side of the apparatus.

FIGS. 3-7 are perspective views illustrating the sequence of folding, nesting and enveloping sheet materials in accordance with my invention.

FIG. 8 is a diagram of the electrical circuit embodied in my invention.

The invention comprises the combination of a modified generally conventional buckle chute type paper folding machine and a novel nesting and/or enveloping apparatus.

To avoid undue prolixity of the specification, only those portions of the paper folding machine as are necessary for a complete understanding of my invention will be shown and described herein. In the drawings, broken lines connecting the centers of components indicate that said components are co-axially disposed.

Referring to the drawings, particularly to FIG. 1, there

is illustrated a paper folding machine which includes a platform 10 on which is supported a supply of sheets of paper P to be folded. In this instance, the sheets are to be folded in what is known as a standard letter fold, as shown in FIG. 7. A paper feed mechanism 11, presently to be described, operates to separate a single sheet S from the top of the supply P and to feed the same forwardly into the nip of a pair of a series of rollers, hereafter to be described.

The paper feed mechanism 11 comprises a driving roller 12 in vertical registration with a transverse slot 13 in the platform 10 under which is mounted a rotatable cam 14 affording adjustment for different paper thicknesses. The roller 12 drives an intermediate idler roller 16 which in turn drives the roller 17 cooperating with a back-up roller 18 projecting through a transverse slot 19 in the platform 10 and which engages the topmost sheet in the supply P. The roller 12 is driven through a spring-type clutch 21 carried on one end of the roller shaft and interposed between said shaft and the gear 22 driven by drive gear 23. The spring clutch 21 includes a ratchet wheel 24 which is adapted to cooperate with a pawl 26, hereinafter to be described, to render the clutch effective or ineffective.

Referring to FIG. 2, a single motor 27 is provided to operate the entire apparatus, the motor being operatively connected through a train of reducing pulleys 28, 29, 30 and 31 and associated belts to the same shaft as that on which gear 23 is fixed. As will be noted, roller 32 is fixed to rotate with pulley 31. Roller 33 is disposed in vertical registration with roller 32 and has its shaft ends journaled in bearings 34 and 36, the bearings being carried at the ends of pivoted arms 37 and 38 respectively. The free ends of the arms 37 and 38 are connected through rods 39 and 41 respectively, to pivoted levers 43 and 44 respectively, operatively connected to electro-magnets 46 and 47 respectively. Energization of said electro-magnets, as will be hereinafter explained, will effect rocking of the arms 37 and 38 and corresponding elevation of the bearings 34 and 36 to raise the upper roller 33 to the broken line position in FIG. 1 out of engagement with the drive roller 32 for a purpose as will be hereinafter explained.

Referring to FIG. 1, the ratchet pawl 26 is part of a substantially L-shaped lever 48 pivoted as at 49 and having one arm thereof engageable with lever 44. The lever 48 is biased by a spring 51 in a direction away from the ratchet wheel 24 so as to be normally disengaged therefrom, thereby rendering the spring clutch 21 effective to drive roller 12 to feed a sheet S into the nip of rollers 32 and 33 which drive said sheet into the first buckle chute 52. The leading edge of the sheet S engages a normally open micro-switch 53 disposed adjacent a stop 54 which serves to arrest movement of the sheet in the chute 52. The switch 53 is connected in electrical circuit with electro-magnets 46 and 47 so that when the switch is closed the electro-magnets are energized to effect rocking of the arms 37 and 38 in a direction to elevate the roller 33 away from engagement with roller 32, thereby rendering the drive of said roller ineffective on sheet S. Correspondingly, the rocking of lever 44 will effect rocking of lever 48 to cause the pawl 26 to engage the ratchet wheel 24, thereby rendering clutch 21 ineffective so that no power is transmitted to roller 12 to feed a succeeding sheet into the first buckle chute 52 and to cause a discontinuation of the feeding of sheet S.

Disposed above the first buckle chute 52 is a platform 56 arranged to support a supply of cards, letters, envelopes, and other similar items, intended to be nested within respective sheets S, as will be hereinafter explained. A feed mechanism 57, similar to the mechanism 11 hereinabove described, operates to feed successive insert sheets

or cards N for super position on sheet S, part of which is disposed in the first buckle chute 52. The feed mechanism 57 includes a feed roller 58 which is driven through a spring clutch 59 by a train of gears 61, 62, 63 and 64 connected to roller 66, which in cooperation with roller 67 drives an insert card N into the nip of rollers 68 and 69. The spring clutch 59 includes a ratchet wheel 71 adapted to cooperate with the pawl 72 on the end of an L-shaped lever 73, the opposite end of said lever being in engagement with and actuated by an electro-magnet 74 in electrical circuit with the switch 53. The clutch 59 is normally ineffective by reason of the pawl 72 engaging the ratchet wheel 71 so that no power is transmitted to roller 58. When electro-magnet 74 is energized, lever 73 is rocked so that pawl 72 disengages from the ratchet wheel 71, permitting transmission of power to roller 58 which operates to feed an insert card N into the nip of rollers 66 and 67 which then drive said card into the nip of rollers 68 and 69.

Referring to FIG. 2, roller 66 is driven by gear 76 and roller 68 is driven by gear 77. An idler gear 78 is interposed between gears 76 and 77. Gear 77 is driven by gear 79 which in turn is driven by gear 81 fixed to pulley 31.

A paper brake 82 which includes a friction element at the end of an arm is adapted to project through an aperture in the upper wall of the first buckle chute 52. As seen in FIG. 2, the brake 82 is carried on an arm 83 connected to electro-magnet 74. The brake normally is disposed in the solid line position illustrated in FIGS. 1 and 2. When the electro-magnet 74 is caused to be actuated, as hereinabove described, arm 83 is caused to be rocked downwardly, as viewed in FIG. 2, whereby the friction element of the brake impinges on sheet S within the buckle chute 52 to secure the sheet in position against movement.

Referring to FIGS. 1 and 2, it will be seen that as the insert card N leaves the nip of rollers 68 and 69 it engages a normally open micro-switch 84 which is in electrical circuit with the electro-magnets 46, 47 and 74. The electro-magnets 46 and 47 upon being energized effect downward movement of the roller 33 into engagement with roller 32, whereby the sheet S is caused to be buckled into the nip of rollers 32 and 86, which are in continuous operation by reason of roller 32 being driven by gear 23. A gear 87 is fixed to rotate with gear 23 and to transmit power to roller 86 through gear 89 which drives gear 91 which drives roller 92. The insert card N is caused to drop into the fold of the buckled sheet, in the manner illustrated in FIG. 4, and the folded sheet with the insert card interposed between the folded portions is caused to be buckled into a second buckle chute 93, as indicated by the arrows in FIG. 1, to assume the condition illustrated in FIG. 5. The folded edge 94 is abutted against a stop 95 within the chute and the sheet S is caused to be buckled, as illustrated in FIG. 6, into the nip of rollers 86 and 92. Final folding of the sheet, as illustrated in FIG. 7, is effected between rollers 96 and 97 which are interconnected by gears 98 and 99, roller 97 being driven by gear 100 which is in turn driven by an intermediate gear 101 meshed with gear 23.

In summary the sequence of operations of my invention is as follows. A main switch is closed to effect operation of the motor 27 which effects rotation of the paper feed roller 12 to feed the uppermost sheet S of the supply P into the nip of rollers 32 and 33, which are in engagement with each other and which rollers drive the sheet into the first buckle chute 52 where the leading edge of the sheet actuates the micro-switch 53 and is thereafter caused to be arrested upon engagement with the fixed stop 54. Actuation of the micro-switch 53 effects energization of electro-magnets 46 and 47 which actuate the lever arrangements associated therewith to elevate the roller 33 away from contact with roller 32, thereby removing the driving means from the sheet. Concurrently, electro-magnet 74 is energized to move the paper brake

82 into engagement with the sheet to retain the sheet in position. Electro-magnet 74 also acts on lever 73 to render the clutch 59 associated with the insert feed mechanism 57 effective so that the feed roller 58 is caused to be rotated to drive an insert card N into the nip of rollers 66 and 67 which then drive the insert card into the nip of rollers 68 and 69, the insert card being guided by a guide member in the proper direction. The leading edge of the insert card N actuates the micro-switch 84 which functions to open the circuit to the electro-magnets 46, 47 and 74, causing the same to be deenergized, whereupon the roller 33 is caused to again engage roller 32 affording a driving action on the sheet S and causing the sheet to buckle into the nip of rollers 32 and 86 and thereafter into the second buckle chute 93. It will be noted that actuation of switch 84 effects deenergization of the electro-magnet 74, whereupon the spring clutch 59 is rendered ineffective and roller 58 is caused to be arrested so that a succeeding insert card N is not fed from the stack.

As sheet S is buckled into the second buckle chute 93 the insert card N drops in between the folded portions of the sheet, in the manner illustrated in FIG. 4. Within the buckle chute 93 the sheet and insert card assume substantially the relationship illustrated in FIG. 5. The folded edge 94 of the sheet engages against the stop 95 in the second buckle chute 93, arresting movement of the sheet, and since the rollers 32 and 86 continue to rotate the sheet is caused to be buckled into the nip of rollers 86 and 92, substantially as illustrated in FIG. 6, and to pass between said rollers into the nip of the final pressing rollers 96 and 97 from which it is discharged onto a receiving platform 102. The foregoing cycle is continuously repeated during the course of operation of the apparatus.

It will be understood that various changes and modifications may be made from the foregoing without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A paper nesting and enveloping apparatus comprising means including a pair of cooperating rollers for feeding a first sheet, one of said rollers being movable into and out of engagement with the other of said rollers, a first buckle chute into which said sheet is fed, means for arresting the feeding of said first sheet at a predetermined point in said chute, means simultaneously releasably holding said first sheet in said chute and for moving said movable one of said rollers out of engagement with the other of said rollers, means for feeding a second sheet into superposed relation to said first sheet when the feeding of said first sheet is arrested, first fold means, means actuable by the movement of said second sheet for effecting cooperative engagement of said rollers and release of said holding means whereby said first sheet is buckled into said first fold means with said second sheet nested within folded portions of said first sheet, a second buckle chute into which said folded first and nested second sheets are fed, and second fold means into which said first sheet is buckled to effect a second folding of said first sheet whereby said second sheet is completely enveloped within said first sheet.

2. A paper nesting and enveloping apparatus comprising a motor, a first feed means, a first buckle chute into which a first sheet is fed by said feed means, stop means positioned to engage the leading edge of said first sheet in said chute, means for releasably holding said first sheet in said chute, said first feed means including first and second cooperating rollers, said first roller being operatively connected to said motor, means supporting said second roller movement into and out of cooperative engagement with said first roller, a second feed means arranged to superpose a second sheet on said first sheet, first control means associated with said stop means and operative when actuated by the leading edge of said first sheet in said buckle chute to control said supporting means to move said second roller out of engagement with said first roller to render said first feed means ineffective and to render

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said holding means and said second feed means effective, first fold means, a second buckle chute, second control means arranged to be actuated by said second sheet to render said holding means and said second feed means ineffective and to effect cooperative engagement of said second roller with said first roller so as to buckle said first sheet into said first fold means and into said second buckle chute so as to enclose said second sheet within folded portions of said first sheet, and second fold means into which said second sheet is buckled whereby to fold said first sheet in superposed relation to a first folded portion, thereby to completely envelope said second sheet within said first sheet.

3. The invention as defined in claim 2 in which the supporting means for said second roller is operatively connected to a pair of electro-magnets which are caused to be energized by the actuation of said first control means.

4. The invention as defined in claim 2 in which the second feed means includes a roller operatively connected to the motor through a spring clutch including a ratchet wheel, and a pawl actuated by an electro-magnet in circuit with said first control means, the spring clutch being

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normally ineffective but being rendered effective by actuation of said first control means.

5. The invention as defined in claim 2 in which the first feed means includes a sheet feed roller operatively connected to the motor through a spring clutch including a ratchet wheel, and a pawl actuated by an electro-magnet in circuit with said first control means, the spring clutch being normally effective but being rendered ineffective by the actuation of said first control means.

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U.S. Cl. X.R.

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