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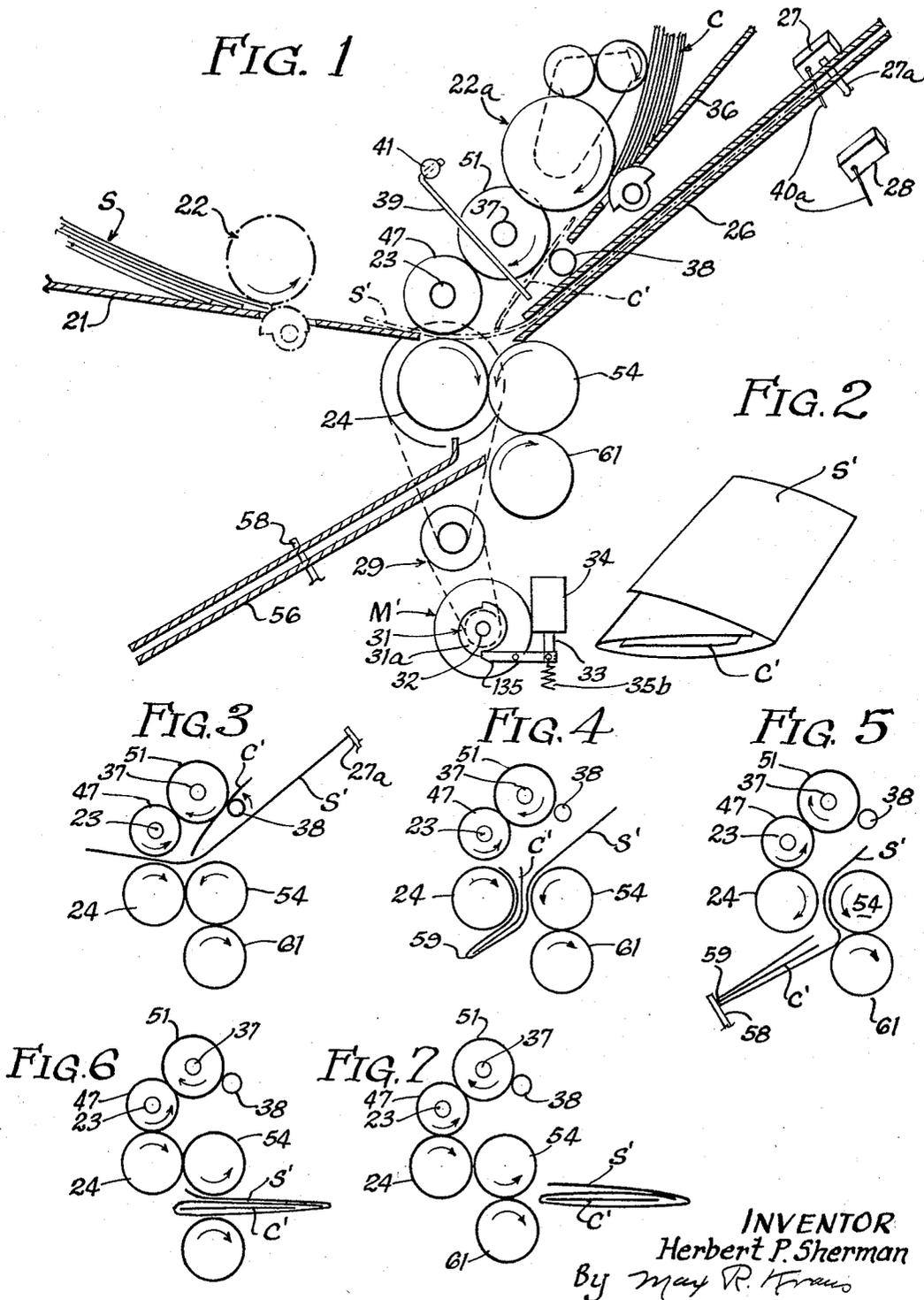
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PAPER NESTING AND ENVELOPING APPARATUS

Filed May 18, 1964

2 Sheets-Sheet 1



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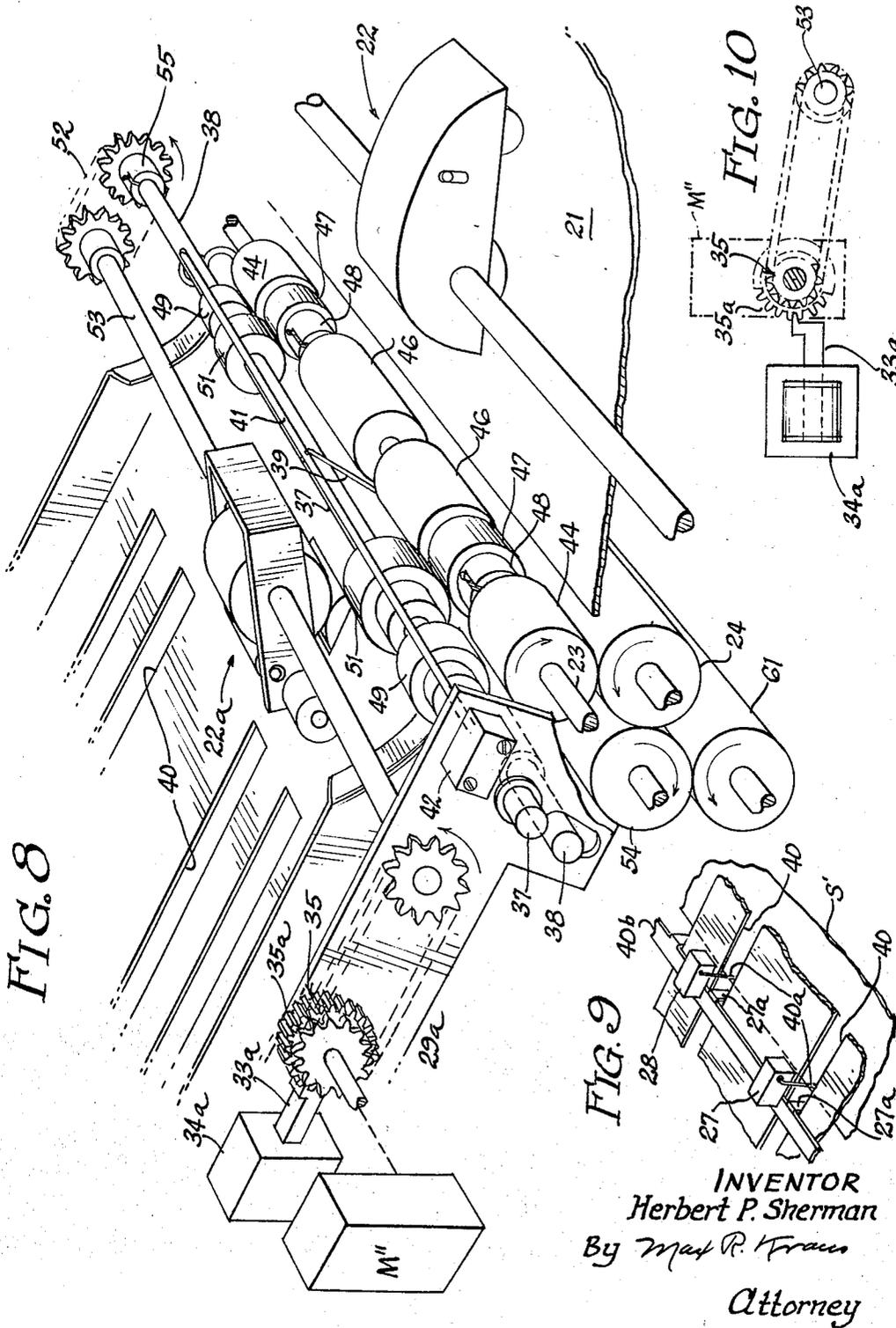


FIG. 8

FIG. 9

FIG. 10

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PAPER NESTING AND ENVELOPING APPARATUS
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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 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 my 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;

FIG. 2 is a perspective view of a folded sheet with a card nested and enveloped therein;

FIGS. 3 to 7 are diagrammatic vertical cross-sectional views, on a reduced scale, illustrating the sequence of folding, nesting, and enveloping steps in the operation of my invention;

FIG. 8 is a fragmentary perspective view of the operating components of my invention;

FIG. 9 is a fragmentary perspective view of certain structural details, and

FIG. 10 is a more or less diagrammatic view of one of the driving mechanisms of the apparatus.

My invention comprises the combination of a modified generally conventional buckle-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 the invention will be shown and described herein.

Referring to the drawings, particularly FIG. 1, there is illustrated a paper folding machine which includes a platform 21 on which is supported a supply of sheets of paper S to be folded. In this instance they are to be folded in what is known as a standard letter fold, as shown in FIG. 2. A feed mechanism 22 of a known type separates a single sheet S' from the top of the supply and feeds the same forwardly into the nip of a series of rollers on shaft 23 and roller 24 which feed the sheet forwardly into a buckle or first fold chute 26 until it strikes an adjustable stop 27a to which are attached two microswitches 27 and 28. The position of the sheet S' in this operation is illustrated in broken lines in FIG. 1.

The roller 24 is driven by a motor M' by means of a belt and pulley arrangement 29 in which is interposed a spring-type clutch 31. The outer sleeve 31a of the clutch 31 which is mounted on motor shaft 32 is provided with a plurality of teeth or circumferentially spaced abutments arranged to be engaged by one end of a lever 135, the other end of which is attached to the plunger 33 of a solenoid 34, which when de-activated, as will be hereinafter described, arrests movement of the sleeve 31a and effects a declutching action, thereby preventing the

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pulley on the shaft of motor M' from rotating and thus cutting off the power required to rotate roller 24. The solenoid 34 is connected in electrical circuit with normally closed microswitch 27 which is adapted to be engaged and opened by the leading edge of sheet of paper S' fed into the first fold chute 26.

Solenoid 34 is de-energized by sheet S' and plunger 33 is drawn out of solenoid 34 by a spring 35b, causing the free end of lever 135 to engage the teeth of the sleeve 31a of clutch 31 so that the clutch is inoperative and prevents transmission of power from the motor M' to roller 24. This stops sheet S' in chute 26 at stop 27a.

Concurrently with the actuation of microswitch 27, microswitch 28 also is actuated. Microswitch 28 which is normally open is connected in electrical circuit with solenoid 34a is normally de-energized (FIG. 8). In such condition a spring biasing plunger 33a maintains the plunger in engagement with the teeth of clutch sleeve 35a of spring clutch 35 rendering this clutch inoperative. When microswitch 28 is closed, solenoid 34a is energized and plunger 33a is caused to move inwardly thereby freeing clutch sleeve 35a and rendering this clutch operative to transmit power from motor M'' to the feed mechanism 22a through a sprocket wheel and chain arrangement 29a.

Cooperating with the feed mechanism 22a is a platform 36, FIG. 1, disposed above the first fold chute 26 and adapted to support a supply of cards, letters, envelopes C, or other similar items intended to be nested within respective sheets S', as will be hereinafter explained. First fold chute 26 is provided with a pair of longitudinally extending slots 40 above which are disposed microswitches 27 and 28. Each microswitch is provided with a finger 40a which extends into a respective slot so as to be disposed in the path of movement of a sheet of paper S' and to be engaged and actuated by such sheet (FIG. 9). The microswitches preferably are mounted on a transverse support member 40b which carries depending stops 27a extending into slots 40 and which may be adjustably moved longitudinally of the chute 26 and secured in an adjusted position.

The feed mechanism 22a similarly functions to separate a single card from the top of the supply of cards C and to feed the same between a solid rubber roller on shaft 38 and rollers 51 on shaft 37 which feed the card C' in the direction of sheet S' for superposition thereon. In such movement the leading edge of card C' engages and displaces a feeler wire 39 disposed in the path of movement of the card. Said feeler wire is rigidly mounted on a transverse rod 41 (FIG. 8) operatively connected to microswitch 42 which is connected in circuit with solenoid 34. Microswitch 42 is thereby closed to energize solenoid 34 which renders clutch 31 operative to transmit power from the motor M' to roller 24 which also drives shaft 23 so that both rotate concurrently in the directions indicated by the arrows, as illustrated in FIG. 3.

Referring to FIG. 8, it will be seen that roller 24 is a rubber or like type roller of uniform diameter throughout its length. Shaft 23 is comprised of a plurality of segments. End segments 44 and intermediate segments 46 are fixed on shaft 23 and are all of equal diameter. Segment 46 is provided with a medial groove to afford clearance for the feeler wire 39. Segments 47 are disposed intermediate segments 44 and 46 and are connected to the shaft 23 through spring clutches 48. Segments 47 are of somewhat smaller diameter than segments 44 and 46, permitting contact with rollers 51.

Roller shaft 37 also is comprised of a plurality of segments 49 and 51, all fixed on the roller shaft to rotate therewith. Inner segments 51 are disposed in alignment with segments 47 and have a greater diameter than the outer segments 49 so as to insure contact between segments 51 and 47. The frame of the apparatus carrying the roller

shafts 37 and 38 and feed mechanism 22a is spring biased so as to afford some degree of pressure between the roller segments 47 and 51. Roller shaft 37 is driven through a chain and sprocket arrangement 52 carried on the ends of shaft 53 of the feed mechanism 22a and the roller shaft 37, there being a spring-type clutch 55 interposed between the shaft 37 and the chain and sprocket arrangement 52. It will be seen that roller shaft 37 rotates concurrently with the operation of feed mechanism 22a when the same is driven by motor M". Roller on shaft 38 is spring biased by suitable means against rollers on shaft 37.

Referring again to FIG. 3, as the rollers on shafts 23 and 24 are caused to be rotated in the direction of the arrows, the sheet S' is caused to be fed in a forwardly direction. The leading edge of the sheet S' is arrested against movement by stops 27a and the de-energization of solenoid 34 by the actuation of microswitch 27. Renewed feeding of the sheet S' after having been completely arrested is caused when card C (FIG. 2) strikes feeler 39 (FIG. 8) attached to rod 41 which is operatively connected to microswitch 42. Closing of this switch effects re-energization of solenoid 34 and renders clutch 31 operative to transmit power from motor M' to the rollers on shafts 23 and 24. This renewed feeding of sheet S' causes it to buckle in a known manner down into the nip of roller pair 24 and 54 where it is folded and is caused to enter the second fold chute 56 (FIGS. 1 and 4). As the sheet S' begins to buckle so as to enter the nip of roller pair 24 and 54, as above described, the leading edge of the sheet is disengaged from the microswitch 28 which results in opening of the circuit to the solenoid 34a rendering the clutch 35 inoperative and arresting movement of the sprocket and chain drive 29a. However, because of the spring clutch 55 in the sprocket on roller shaft 37, the segments 49 and 51 of said roller may be freely driven by rollers 47 on shaft 23 independently of the chain and sprocket arrangement 52 normally driven by motor M". Thus, the card C' is caused to be driven by the rollers on shafts 37 and 38 further into the buckled portion of sheet S' just before said buckled sheet enters the nip of roller pair 24 and 54. The card C nested within folded portions of sheet S' together with the sheet are carried down between rollers 24 and 54 into second fold chute 56.

The second fold chute 56 is provided with an adjustable stop 58 (FIG. 5) which is engaged by the folded edge 59 of sheet S' causing the sheet to be arrested. However, continued driving of the sheet by the roller pair 24 and 54 effects buckling of the sheet along a transverse area spaced from the first fold line. As illustrated in FIG. 5, the sheet is buckled into the nip of the roller pair 54 and 61 which effects folding of the sheet to completely envelop the card C', as illustrated in FIG. 6. The folded sheet and enveloped or nested card are finally ejected by the roller pair 54 and 61, as illustrated in FIG. 7.

It will be understood that succeeding sheets and cards are operated upon sequentially in the aforedescribed manner, so that as long as a supply of sheets and cards are provided the operation of the apparatus is continuous and automatic.

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 for feeding a first sheet, 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 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 operation of said first folding 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 sheet and nested second sheet 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 first feed mechanism, a first buckle chute into which a first sheet is fed by said feed mechanism, stop means positioned to engage the leading edge of the first sheet in said chute, a first motor and clutch for driving said first feed mechanism, first control means associated with said stop means and operative to control said first clutch, said first control means arranged to be actuated by the leading edge of said first sheet to arrest movement of said first feed mechanism, a second motor and clutch, second control means associated with said stop means and operative to control said second clutch, a second feed mechanism driven by said second motor and clutch and arranged to superpose a second sheet on said first sheet, said second control means arranged to be actuated by the leading edge of the first sheet to effect driving of said second feed mechanism, the actuation of both of said control means being substantially simultaneous, first fold means, a second buckle chute, third control means operative to control said first clutch and arranged to be actuated by said second sheet to cause said first motor to drive said first feed mechanism to buckle said first sheet into said first fold means and 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 first sheet is buckled for folding said first sheet in superposed relation to a first folded portion thereby to completely envelop said second sheet within said first sheet.

3. The invention as defined in claim 3 in which each feed mechanism includes a shaft carrying roller segments, and spring-type clutch means.

4. The invention as defined in claim 2 in which each of the control means includes an electrical switch, each of the clutches comprises a spring-type clutch operated by a solenoid, and each feed mechanism includes a shaft carrying roller segments and a spring-type clutch means.

5. A paper nesting and enveloping apparatus comprising, a first feed mechanism including a first shaft and roller fixed thereon, a second shaft carrying a plurality of spaced roller segments, certain of said segments being fixed on said second shaft and other of said segments being connected to said second shaft by means of spring clutches so as to rotate with said shaft in one direction of rotation but being freely rotatable relative to said second shaft in an opposite direction of rotation, said first roller and said fixed roller segments on said second shaft being in cooperative engagement, a first buckle chute into which a first sheet is fed by said first feed mechanism, stop means positioned to engage the leading edge of the first sheet in said chute, a first motor and clutch for driving said first shaft and roller, first control means associated with said stop means and operative to control said first clutch, said first control means arranged to be actuated by the leading edge of said first sheet to arrest rotation of said shaft and roller, a second motor and clutch, second control means associated with said stop means and operative to control said second clutch, a second feed mechanism for feeding a second sheet in superposed relation to said first sheet, said second feed mechanism including a third shaft having a plurality of roller segments fixed to rotate with said shaft, certain of said segments being in cooperative engagement with the roller segments on said second shaft which are connected to said second shaft by spring clutches, a fourth shaft and roller fixed thereon and arranged to cooperatively engage the roller segments on said third shaft, said second control means arranged to be actuated by the leading edge of said first sheet to effect driving of said second feed mechanism, the actuation of both of said control means being substantially simultaneous, a fifth shaft and roller fixed thereon in contact with the segments on said first roller and

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together constituting a first fold means, a second buckle chute, third control means operative to control said first clutch and arranged to be actuated by said second sheet to cause said first motor to drive said first feed mechanism to buckle said first sheet into said first fold means and said second buckle chute so as to enclose said second sheet within folded portions of said first sheet, a sixth shaft and roller fixed thereon in cooperative engagement with said fifth roller and together constituting a second fold means into which said first sheet is buckled for folding said first sheet in superposed relation to a first folded portion thereby to completely envelop said second sheet within said first sheet.

6. A paper nesting and enveloping apparatus comprising, a first feed mechanism including a first shaft and roller fixed thereon, a second shaft carrying a plurality of spaced roller segments, certain of said segments being fixed on said second shaft and other of said segments being connected to said second shaft by means of spring clutches so as to rotate with said shaft in one direction of rotation but being freely rotatable relative to said second shaft in an opposite direction of rotation, said fixed segments being larger in diameter than the freely rotatable segments, said first roller and said fixed roller segments on said second shaft being in cooperative engagement, a first buckle chute into which a first sheet is fed by said first roller and the roller segments of said second shaft, stop means positioned to engage the leading edge of the first sheet in said chute, a first motor and clutch for driving said first shaft and roller, first control means associated with said stop means and operative to control said first clutch, said first control means arranged to be actuated by the leading edge of said first sheet to arrest rotation of said first shaft and roller, a second motor and clutch, second control means associated with said stop means and operative to control said second clutch, a second feed mechanism for feeding a second sheet in superposed relation to said first sheet, said

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second feed mechanism including a third shaft having a plurality of roller segments fixed to rotate with said shaft, a fourth shaft and roller fixed thereon and arranged to cooperatively engage the roller segments on said third shaft thereby to feed said second sheet, certain of said segments on said third shaft being larger in diameter than other segments on said shaft and being in cooperative engagement with the roller segments on said second shaft which are connected to said second shaft by spring clutches, said second control means arranged to be actuated by the leading edge of said first sheet to effect driving of said third shaft, the actuation of both of said control means being substantially simultaneous, a fifth shaft and roller fixed thereon in contact with the segments on said first roller and together constituting a first fold means, a second buckle chute, third control means operative to control said first clutch and arranged to be actuated by said second sheet as it is fed into superposed relation to said first sheet to cause said first motor to drive said first roller 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, a sixth shaft and roller fixed thereon in cooperative engagement with said fifth roller and together constituting a second fold means into which said first sheet is buckled for folding said first sheet in superposed relation to a first folded portion thereby to completely envelop said second sheet within said first sheet.

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