

No. 782,176.

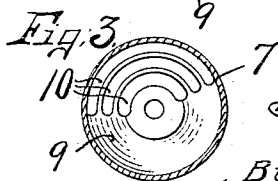
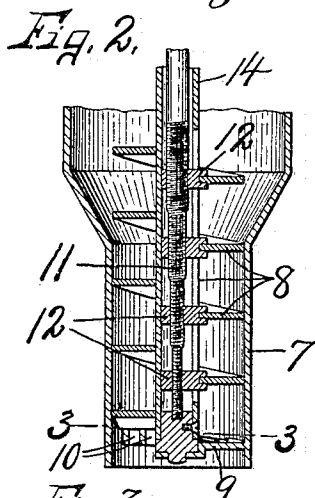
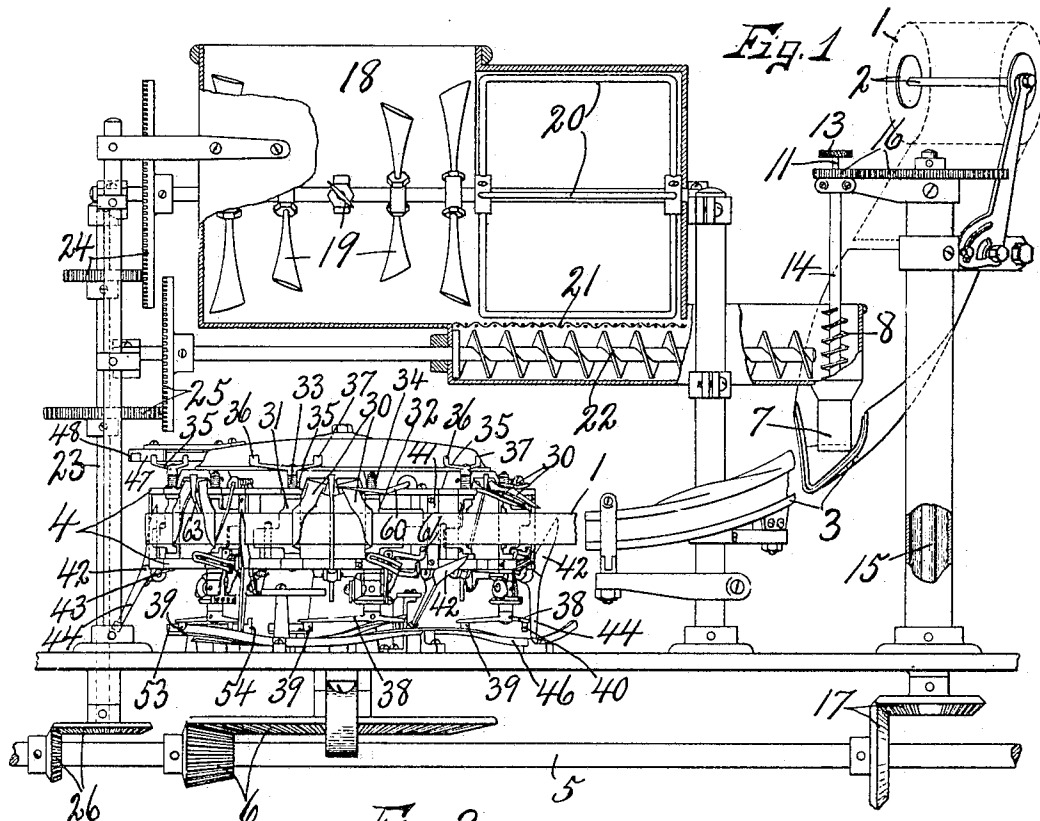
PATENTED FEB. 7, 1905.

F. A. ROBINSON.

MACHINE FOR FILLING AND FOLDING POWDER PACKETS.

APPLICATION FILED OCT. 27, 1903.

3 SHEETS—SHEET 1.



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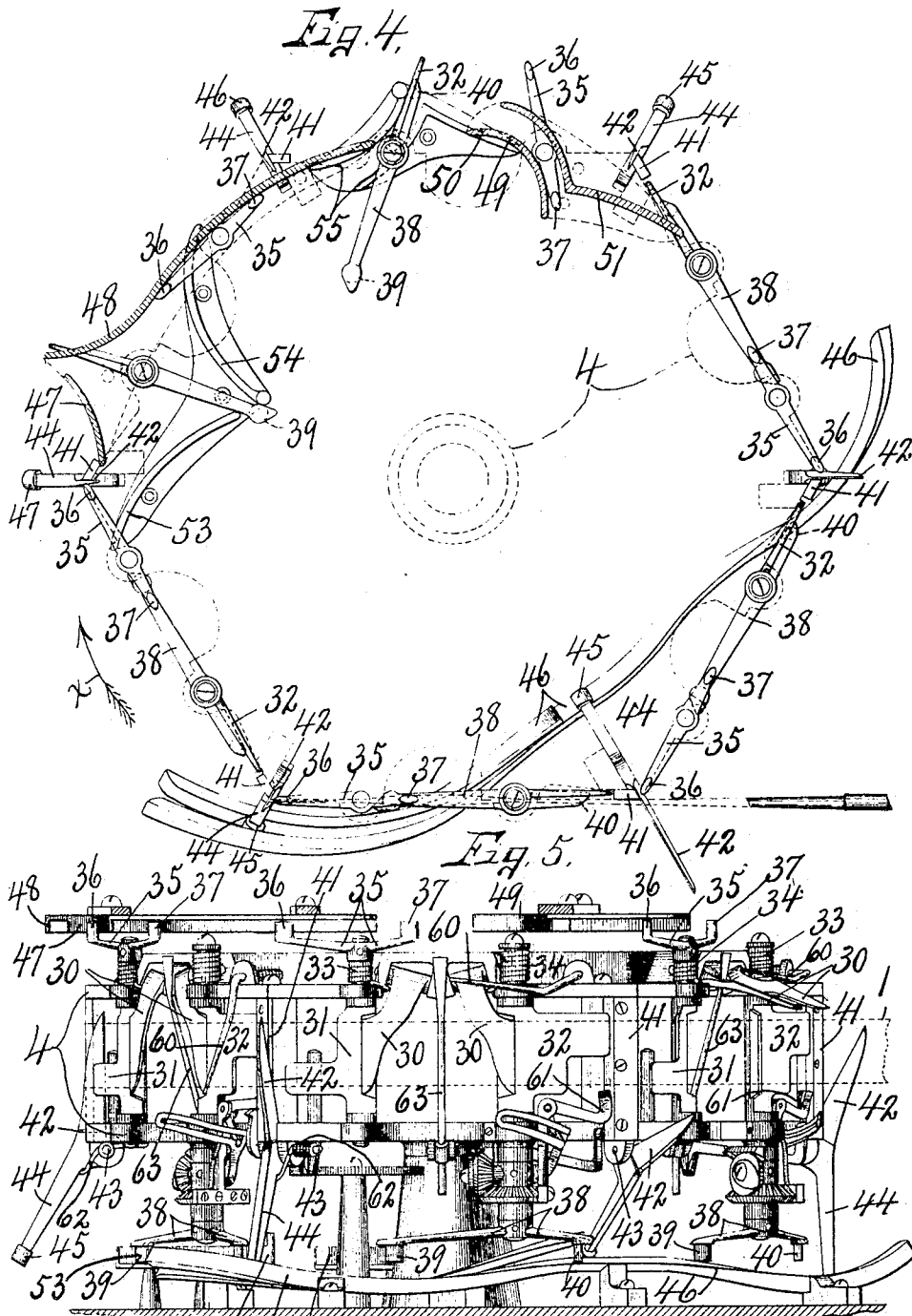
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3 SHEETS—SHEET 2.



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PATENTED FEB. 7, 1905.

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3 SHEETS—SHEET 3.

*Fig. 6.*

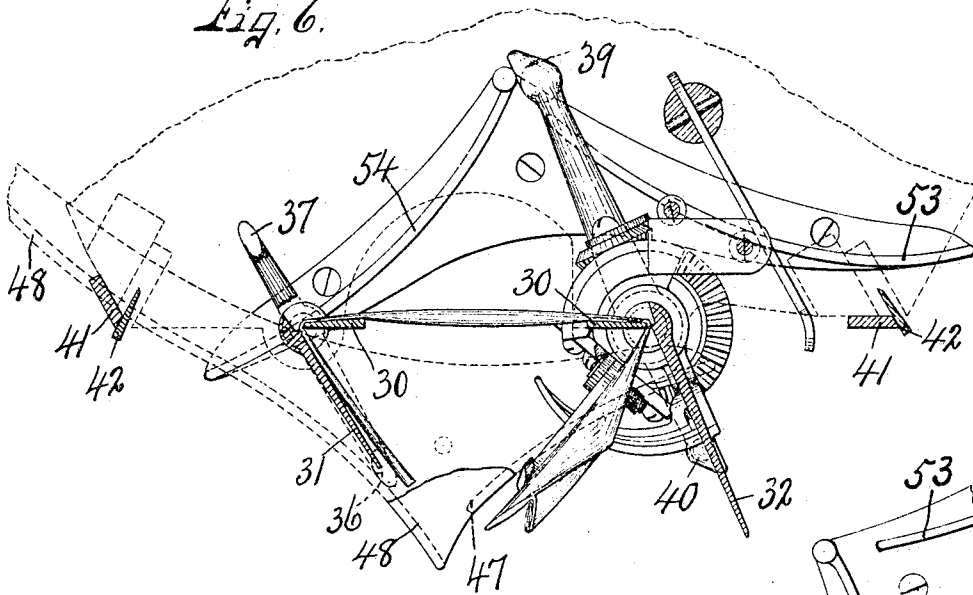


*Fig. 7.*

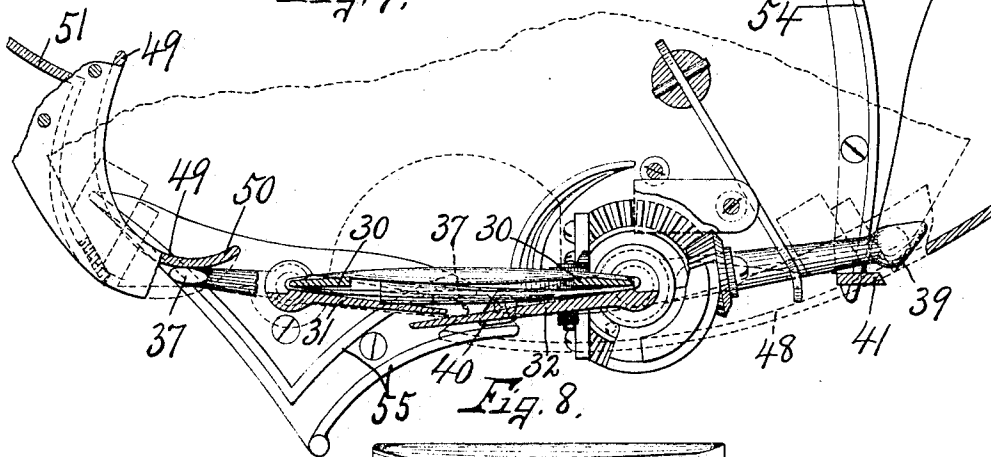
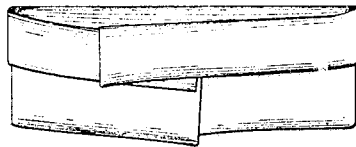


*Fig. 8.*



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# UNITED STATES PATENT OFFICE.

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TO GEORGE W. HOADLEY, OF NEW YORK, N. Y., AND GEORGE H.  
WEBB, OF PROVIDENCE, RHODE ISLAND.

## MACHINE FOR FILLING AND FOLDING POWDER-PACKETS.

SPECIFICATION forming part of Letters Patent No. 782,176, dated February 7, 1905.

Application filed October 27, 1903. Serial No. 178,685.

*To all whom it may concern:*

Be it known that I, FRANK ALEXANDER ROBINSON, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Machines for Filling and Folding Powder-Packets, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in machines for filling and folding powder-packets of the class set forth in my Patents Nos. 702,482 and 702,591, issued June 17, 1902, respectively, and also Patent No. 716,281, issued December 16, 1902.

The present invention relates more particularly to the folding-gates and cutters and their respective operating mechanisms and also to the means for feeding the powder into the fold of the paper as the latter is being drawn through the forming device.

The general object of these improvements is to render the machine more positive and reliable in its action and to relieve the rotary head from undue and irregular strains.

The paper which is used in putting up these powders is necessarily very light, and its tenacity is affected by the humidity of the air, and it has been discovered that in drawing the same through the forming device, in which the paper necessarily fits closely, and therefore is under considerable tension, the paper when excessively dry or excessively moist would frequently break between the forming device and the rotary head, and it has been found that this was largely due to the unsteady and jerky motion of the rotary head, and this difficulty was also aggravated by reason of the fact that the powder would spread lengthwise in the packet, so as to interfere with the proper folding of the grippers and folding-gates.

The purpose of the present invention, therefore, is to obviate these difficulties by confining the powder in limited spaces in the paper while being drawn through the forming device and distributing the strain upon the ro-

tary head which is utilized to draw the paper through the forming device, so as to relieve it from the unsteady action previously mentioned.

In the drawings, Figure 1 is a side elevation of a machine for filling and folding powder-packets embodying the various improvements hereinafter described, the main hopper and portions of the feeding-tube being broken away to disclose the interior mechanism. Fig. 2 is an enlarged sectional view through the powder-feeding nozzle, showing the spiral feed and its adjusting means. Fig. 3 is a sectional view taken on lines 3-3, Fig. 2. Fig. 4 is a top plan of the detached folding and cutting devices and their operating cams or tracks, the rotary head being shown in dotted lines and the upper track or cams for operating one of the folding-gates being shown in section. Fig. 5 is an enlarged side elevation of the rotary head and tracks or cams for operating the folding-gates and cutters. Figs. 6 and 7 are still further enlarged detail views showing one set of folding-gates and their operating cams or tracks, the gates being shown as partially closed and the packet as partially folded in Fig. 6, while in Fig. 7 the gates are completely closed for completing the folding of the packet. Fig. 8 is a detail view of the complete packet inclosing the powder.

Similar reference characters indicate corresponding parts in all the views.

The paper 1 is usually purchased in the form of a roll which is mounted upon a reel 2, from which it is usually drawn through a forming device 3 by a rotating head 4, the latter being driven from a rotating shaft 5 through the medium of intermeshing gears 6. While the paper is being drawn through the forming device 3, in which the longitudinal edges are folded one upon the other, the powder is fed intermittently in suitable quantities through a nozzle 7, in which is movable a spiral feeding device 8. This nozzle is provided with a bottom 9, having a series of substantially semicircular concentric openings 10, through which the powder is forced by

the screw 8, the partitions between the openings being very thin, so as not to obstruct the passage of the powder and still prevent its being discharged in bulk into the fold of the paper. The lower helix of the spiral feed travels in close proximity to the upper surface of the bottom wall 9, so that as the powder is fed downwardly it is pressed through the openings 10, which are arranged to admit a definite quantity of the powder. This screw feed is revolved intermittently one complete revolution at a time, and the space between the helices determines the quantity of powder which is forced through the openings 10; but these helices are adjustable vertically by a screw-spindle 11 and nuts 12, each helix being provided with a nut, so that the rotation of the spindle expands or contracts the spiral, so as to vary the distance between the helices according to the amount of powder desired to be fed into the paper, said spindle 11 being provided with a handpiece 13 at its upper end, whereby it may be rotated and the helices adjusted while the machine is in operation.

The spiral 8 is mounted upon a tubular shaft 14, within which the spindle 11 is movable and rotates with the tube, said tube being driven from an upright shaft 15 through the medium of the gears 16, connecting the upper end of said shaft to the upper end of the tube 14, and the gears 16 are of such relative size that one-sixth of a revolution of the shaft 15 rotates the shaft 14 one complete revolution. The upright shaft 15 is driven from the main shaft 5 through the medium of mutilated gears 17 of such construction that the shaft 15 is rotated one-sixth revolution of each complete revolution of the main shaft 5, and it therefore follows that at each intermittent movement of the shaft 15 the screw 8 is rotated one complete revolution, as previously stated.

The powder is placed in a hopper 18, in which are located rotary feeding and agitating arms 19 and 20, which serve to feed the powder through a screen 21 in the bottom of the hopper, from which it is conveyed to the nozzle 7 by a screw feeding device 22. These feeding and agitating devices in the hopper are actuated by an upright shaft 23 through the medium of two sets of gears 24 and 25, one set, 24, for the feeding-arms 19 and 20 and the other for the screw feed. This upright shaft 23 is driven continuously from the main shaft 5 through the medium of the intermeshing gears 26, and it therefore follows that the feeding-arms 19 and 20 and also the feed 22 are rotated continuously.

The forming device 3 consists of a piece of sheet metal bent into the desired form and mounted in a fixed position with reference to the rotary head 4, with its delivery end in alinement with one of the side faces of said rotary head, as best seen in Figs. 1 and 4.

The rotary head 4 is here shown as consisting of a hexagonal frame which is mounted upon a rotating shaft 27, carrying one of the gears 6, and this latter gear is of such relation to the other gear 6 upon the shaft 5 that one complete rotation of the main shaft revolves the head 4 one-sixth of a revolution; but this rotary motion of the head is continuous, and it is now apparent that as each face or side of the head is presented at a fixed point in its rotation the screw 8 feeds a definite quantity of the powder into the paper, and the nozzle 7 is located a definite distance from the head, so that as the paper is drawn through the forming device by the head the portions containing the powder are registered with substantially the central portion of each side of the rotating head. Each of the sides of the head is provided with a pair of vertically-rocking grippers 30 and with an additional pair of horizontal swinging gates 31 and 32, the grippers 30 being actuated by a suitable track or cam not necessary to herein illustrate or describe, but which causes the grippers to engage the folded strip of paper and impinge the same against the side of the head, so that as the latter is rotated the strip of the paper is drawn through and from the forming device and across the outer faces of the folding-gates 31 and 32, as seen in Fig. 1. These grippers 30 and their operating mechanism form no part of my present invention, and it is sufficient to say that as each of the side faces of the rotary head is brought into alinement with the delivery end of the forming device the grippers are brought into action to engage the folded strip and hold the same against the side of the head until after the gates 31 and 32 have folded the ends of the packet over and upon each other, as best seen in Figs. 6 and 7. Referring now to Figs. 4 and 5, it will be seen that when the sides of the rotary head are brought into alinement with the delivery end of the forming device the gates 31 and 32 are in their extended or unfolded position between the corners or angles of the sides, said gates being journaled at their lower and upper ends in the bottom and top walls, respectively, of the head and are held in their extended position by springs 33 and 34, as best seen in Fig. 5.

The spindles of the gate 31 extend upwardly above the head and are provided with levers 35, having upwardly-projecting studs 36 and 37 at opposite sides of the swinging axis of the gate, while the axial spindle of the gate 32 projects below the bottom of the head and is provided with a similar but longer lever 38, having depending studs or shoulders 39 and 40 at opposite sides of the swinging axis of the gate 32. These levers 35 and 38 extend in the same general direction as the gates to which they are attached—that is, the lever 35 is directly over and parallel with the gate 31, and the lever 38 is directly under and parallel

with the gate 32. The operation of each of these sets of gates for each side of the head is identical, and therefore it will be necessary to describe only one set as it passes from its initial position in alinement with the delivery end of the forming device through one complete revolution of the head; but before doing so it will be necessary to describe the mechanism for severing the individual wrappers from the continuous strip as it is drawn from the forming device. For this purpose each of the sides of the head is provided with an upright shearing-blade 41, having its shearing edge in close proximity to the angle of the sides, and each side is also provided with a vertically-rocking cutting-blade 42, which is movable radially with reference to the axis of the revolution of the head and is located at the angle of the sides, each of said rocking blades being hinged or pivoted at 43 to the bottom of the head and is provided with a depending arm 44, having a roller 45 at its lower end which engages and rides upon the fixed track or cam 46. The cutting edge of each of the blades 42 shears with its blade 41 and when in its open position projects outwardly and upwardly from the head, as seen in Figs. 1, 4, and 5. As previously stated, the depending arms of the blades 42 ride upon the track 46, which is arranged so as to throw the blade to its extreme outer position, so that the point will ride under the paper strip when passing by the delivery end of the forming device 3. This track or cam 46 is best seen in Figs. 4 and 5, in which it will be seen that the opposite ends of the cam or track extend beyond the vertical plane of the corners or angles of the rotary head where the cutting-blades are located and that the intermediate portion extends a considerable distance within said vertical plane, while the general direction of extension of the cam or track is at an angle with the delivery end of the forming device, or rather with the side of the head which is alined therewith and between said forming device and axis of the rotary head, so that the high point of the track or cam is nearly in a radial line between the delivery end of the former and axis of the rotary head, whereby the cutter-blade is rocked outwardly and downwardly to its extreme position to pass under the paper as one of the side faces is brought into alinement with the delivery end of the forming device, the remaining portion of the cam or track extending in the direction of the rotary head being arranged to operate the cutter-blade toward the axis of the head to shear with the blade 41, and thereby sever the paper packet from the main strip, which operation, however, is not effected until after one set of grippers have firmly engaged the strip and drawn it forwardly, so that the next set of grippers are brought into operation—that is, the paper is not cut until after the second set is firmly gripped upon the paper.

Returning now to the description of the operation of one set of folding-gates assuming that they are extended to the position seen in Fig. 4 in alinement with the delivery end of the forming device and that the head is rotating in the direction indicated by arrow *a*, it will be seen that these folding-gates and their operating-levers remain in this extended position during a trifle more than one-sixth of a revolution of the head, during which the cutter-blade 42 at the right hand of the side is operated to sever the packet from the continuous strip. As the head continues to rotate the advance shoulder or lug 36 of the lever 35 engages the outer face of a fixed cam 47, by which the gate 31 is partially closed, and the end of the packet is thereby partially folded, Fig. 6. The further movement of the head causes the shoulder 36 to engage the inner face of a cam 48, by which the inward movement of the gate and consequent fold of the paper upon the main body is continued, so that the lever 35 and gate 31 attached thereto is rotated substantially nearly a half-revolution, thereby causing the lever to change ends to bring the shoulder 37 in advance of the shoulder 36. As the head continues to revolve, the shoulder 37 is brought into engagement with another fixed cam 49, the adjacent end 50 of which is curved rather abruptly to cause the gate 31 to press with considerable force against the folded end of the packet, and the further movement of the head in the same direction causes the shoulder 37 to engage an additional cam 51, which is simply for the purpose of preventing the sudden return of the gate 31 and its operating-lever to its normal position by the spring 33, so that by the time the shoulder 37 reaches the end of the cam 51 the gate has assumed its starting position.

The folding movement of the gate 31 just described is accomplished through substantially one-third of the revolution of the head—that is, the cams or tracks 47, 48, 49, and 51 cover a distance equal to substantially one-third of the arc of movement of the folding-blade 31, which remains in its extended or normal position during the other two-thirds of the revolution of the head—and it will be observed by reference to Fig. 4 that this gate is in its normal position during substantially one-third of the revolution of the head before and after passing the delivery end of the forming device.

The complete operation of the gate 31 has now been described, and although the operation of the gate 32 is effected simultaneously and by similar means it will be necessary to consider this operation in connection with that of the gate 31, and starting from the same position with the gate 32 extended and in alinement with the delivery end of the forming device the advance shoulder 39 of the lever 38 first comes in contact with the inner face of a

track or cam 53, by which the lever 38 is rocked to fold the gate 32 inwardly a limited distance, or to substantially the position seen in Fig. 6, and the continued movement of the head causes said shoulder to engage a cam or track 54, which continues to rock the lever 38 and to force the gate 32 inwardly to its extreme inner position, as seen in Fig. 7, thereby folding the adjacent end of the packet over and upon the previously-folded opposite end. It is thus seen that the cams 53 and 54 rotate the lever 38 through substantially half a revolution, thereby causing the gate 32 and adjacent end of the packet to be moved through a similar arc, so that the lever is caused to change ends, thereby bringing the shoulder 40 in advance of the shoulder 39, and as the head 4 continues to move the shoulder 40 is brought into engagement with a fixed cam 55, which permits the gate and its operating-lever to gradually return to their normal positions by means of the spring 34. Just before this folding operation of the gates begins the paper strip is creased diagonally across its outer face by a creaser-arm 60, so that one end of the packet may be more easily elevated above and brought into interlocking engagement with the other end by a vertically-rocking grip-arm 61, which is brought into action at the proper time during the folding operation. This creasing and end-locking mechanism forms no part of my present invention, and it is therefore believed to be unnecessary to further describe the same. As soon as the folding operation is complete and the folding-gates have returned to their normal unfolded position the grippers 30, upon which the packet has been folded, are elevated by suitable means, (not shown,) and the packet is removed therefrom by a finger 63, the grippers 30 and fingers and their operating mechanisms being also extraneous to my present invention.

Although the cutting-blades 42 are positively opened and closed by the track 46 before the folding operation begins they are preferably held in their closed position after leaving the track and during the folding operation by springs 62, Fig. 5.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine for filling and folding powder-packets, the combination with a rotary head and means thereon to hold the packets, of means to rotate the head, an end-folding gate on the head, a lever on the gate, a fixed cam engaged by one arm of the lever to fold the gate, and an additional fixed cam engaged by the other arm of the lever to open the gate while the head is rotating.

2. In a machine for filling and folding powder-packets, the combination with a rotary head and means thereon to engage and draw the paper thereto, of means to rotate the head

shear-blades on the head, one blade being fixed on the head and the other movable and shearing with the fixed blade to cut the paper, and means actuating the movable blade while the head is rotating.

3. In a machine for filling and folding powder-packets, the combination with a rotary head and means thereon to engage and draw the paper thereto, of means to rotate the head, a cutting-blade on the head movable toward the axis of said head to cut the paper, and means to actuate the blade while the head is rotating.

4. In a machine for filling and folding powder-packets, the combination with a rotary head and means thereon to engage and draw the paper thereto, of means to rotate the head, a shearing-blade fixed to the head, a movable blade on the head and shearing with the former blade, and means to actuate the movable blade as the head is rotated.

5. In a machine for filling and folding powder-packets, the combination with a forming device and means to draw the paper through said device, of a powder-feeding mechanism comprising a nozzle having concentric openings in its bottom, and a screw feed having its lower helix moving across the openings in proximity to the bottom, and means to actuate the screw feed intermittingly.

6. In a machine for filling and folding powder-packets, the combination with a forming device and means to draw the paper through said device, of a powder-feeding mechanism comprising a nozzle having a bottom with substantially semicircular concentric openings, a screw feed in the nozzle, and means to actuate the screw intermittingly.

7. In a machine for filling and folding powder-packets, the combination with a forming device to fold the packet longitudinally and a rotary head having grippers to engage and draw the packet through the forming device, means to rotate said head, a filling device, a fixed cam, shearing devices on the head and successively brought into action by the cam to sever the packets, an end-folding gate on each side of the head in advance of each shearing device, each gate having a pair of arms extending in opposite directions from its swinging axis, cams arranged in advance of the arms of each gate successively for folding said gates, and additional cams arranged in advance of the gate-folding cams and engaging the other arm of each gate to control the unfolding of said gates.

8. In a machine for filling and folding powder-packets, the combination of a rotary head, means to rotate said head, a gripping device and a shearing device both mounted on the head to hold and cut the packets respectively, end-folding gates hinged to the head at opposite sides of the gripping device to fold the ends of the packet, each gate having arms pro-

jecting in opposite directions from its swing-  
ing axis and acting on separate cams to con-  
trol the operation of its gate, a fixed cam en-  
gaged by and operating the shearing device,  
5 and additional cams arranged in advance of  
the shear-operating cam, one of the additional  
cams being engaged by one of said arms to  
fold the gate and the other additional cam be-

ing engaged by the other arm to unfold the  
gate.

In witness whereof I have hereunto set my  
hand this 22d day of October, 1903. 10

FRANK ALEXANDER ROBINSON.

Witnesses:

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MILDRED M. NOTT.