

J. CHESNEY.
MACHINE FOR MAKING PAPER SHELLS.
APPLICATION FILED DEC. 11, 1906.

931,269.

Patented Aug. 17, 1909.

4,8 SHEETS—SHEET 1.

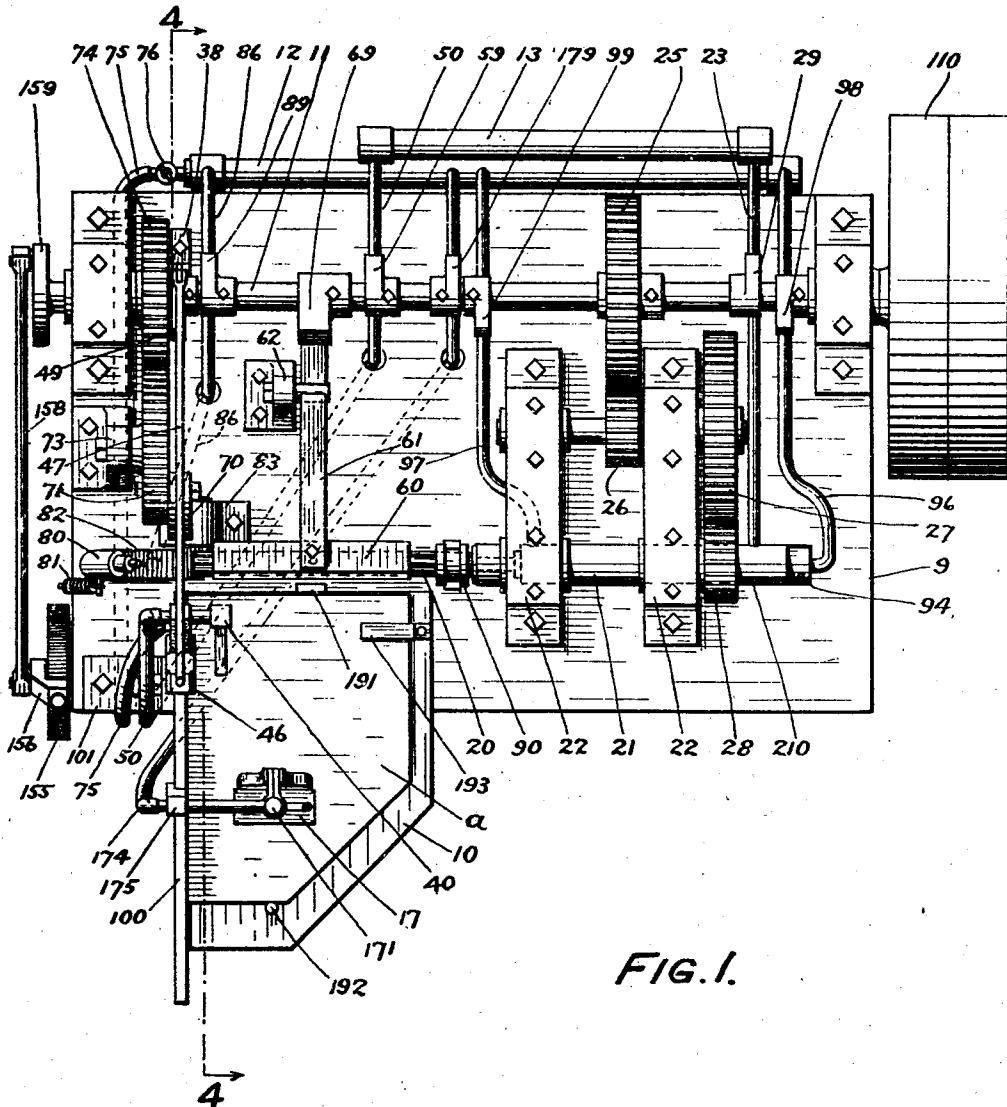


FIG. 1.

WITNESSES:

Robt. R. Kitchel.

M. M. Hamilton

INVENTOR

John Chesney
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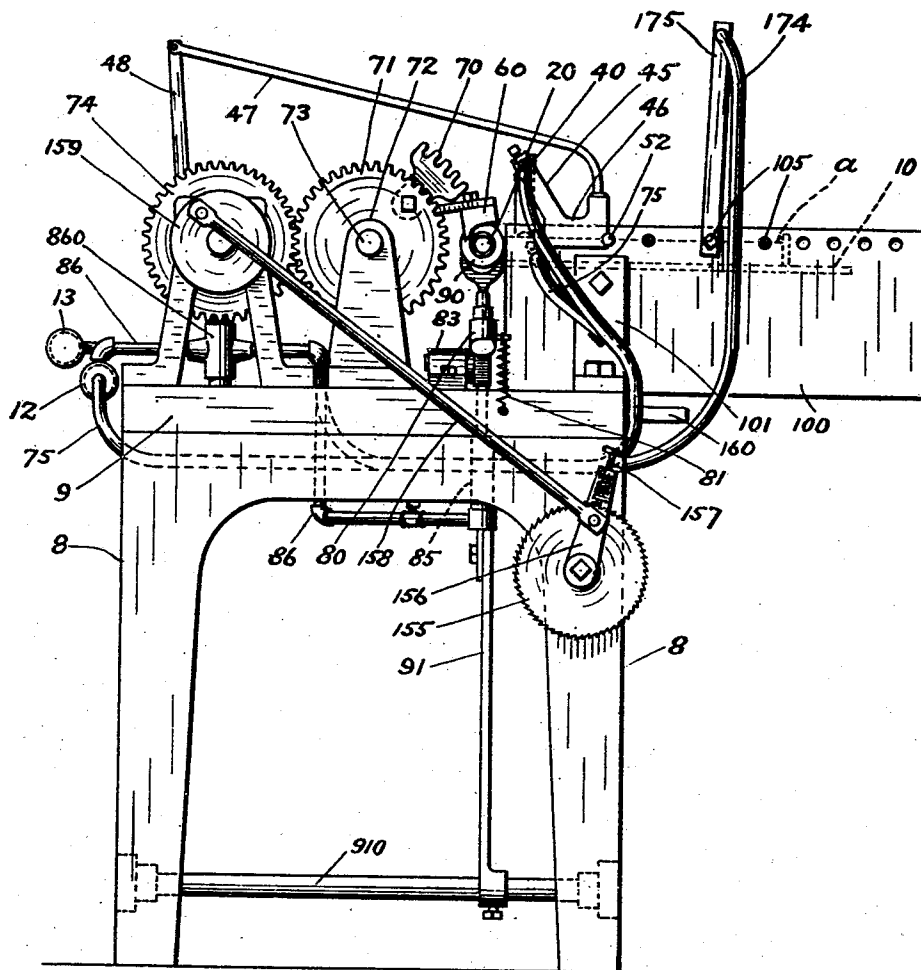


FIG. 2.

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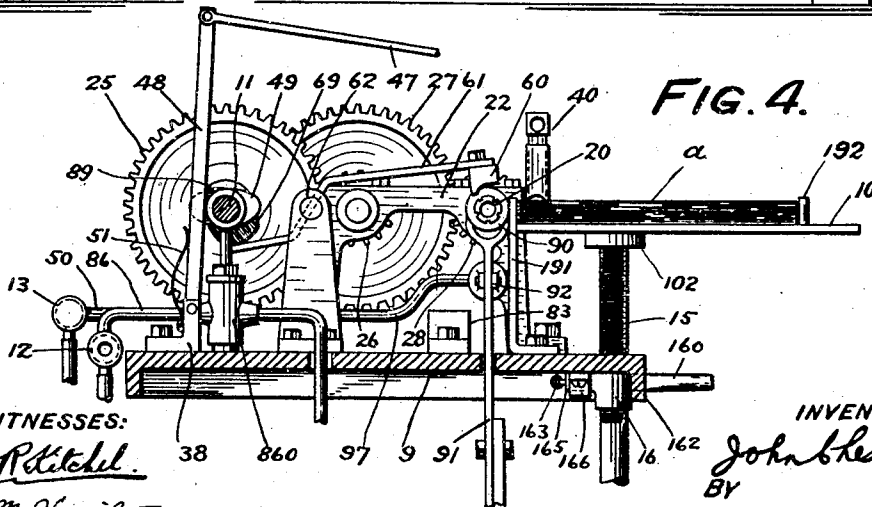
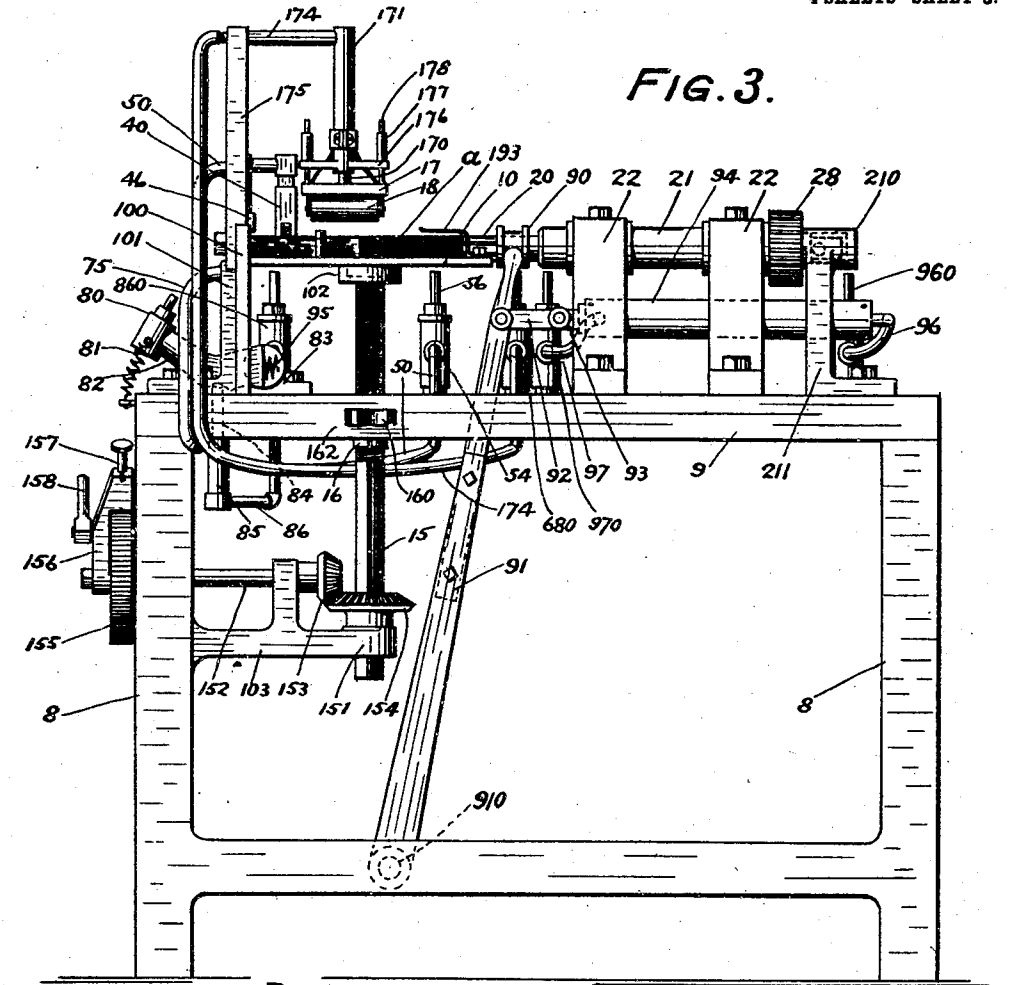
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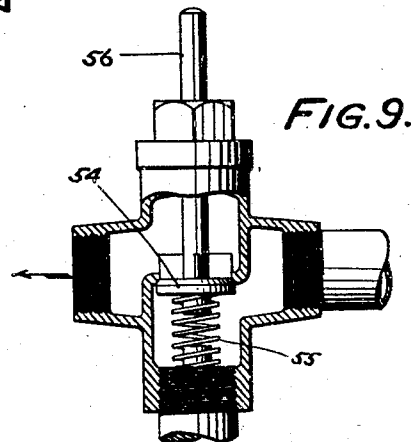
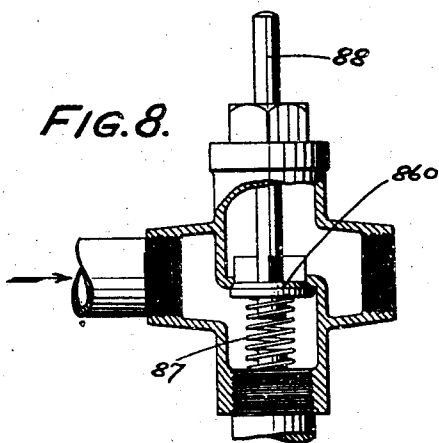
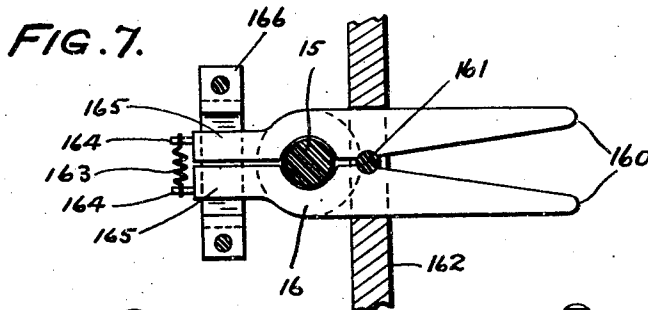
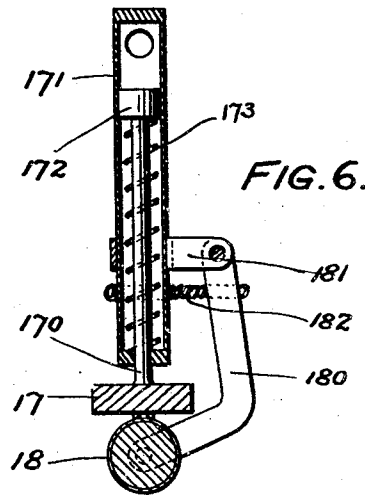
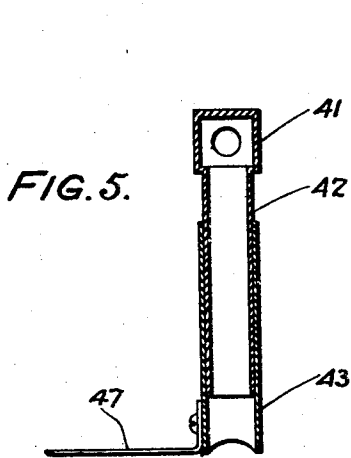
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4 SHEETS—SHEET 4.



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R. H. Kitchel
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UNITED STATES PATENT OFFICE.

JOHN CHESNEY, OF PAULSBORO, NEW JERSEY, ASSIGNOR TO THE E. I. DU PONT DE NEMOURS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF NEW JERSEY.

MACHINE FOR MAKING PAPER SHELLS.

No. 931,269.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed December 11, 1906. Serial No. 347,380.

To all whom it may concern:

Be it known that I, JOHN CHESNEY, a citizen of the United States, residing at Paulsboro, county of Gloucester, and State of New Jersey, have invented a new and useful Improvement in Machines for Making Paper Shells, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

The invention relates to that class of machines for making paper shells for holding explosives in which the paper sheets are fed to a rotating mandrel and wrapped thereon to form a tube, the end of which is folded and closed and which is then slipped off the mandrel.

The object of the invention is to make the machine entirely self acting, to improve the action of the various parts, and to provide new features performing new functions and contributing to the successful and certain action of the machine.

In the drawings: Figure 1 is a plan view of the machine. Fig. 2 is a side elevation. Fig. 3 is a front elevation with certain parts omitted for the purpose of more clearly showing the construction of the remaining parts. Fig. 4 is a section on the line 4-4 of Fig. 1. Fig. 5 is an enlarged detail sectional view of the pneumatic picker. Fig. 6 is an enlarged detail view of the stamp. Fig. 7 is an enlarged detail plan view of the split nut for supporting the threaded shaft on which the paper table is supported. Figs. 8 and 9 are detail sectional views of the pressure and exhaust valves respectively.

8 is the frame of the machine and 9 the top plate of the frame; 10 is the vertically movable table holding the sheets of paper *a*. The stationary side-plate 100 of the table 10 is bolted to the angle-bar 101, which is bolted to the top plate 9 of the frame.

20 is the mandrel to which the sheets of paper are successively fed and about which the paper is wound to form the paper tubes.

40 is a pneumatic picker and feeder for picking up the paper sheets and feeding them to the mandrel.

60 is the guide piece for guiding the sheet around the mandrel.

70 is the folder for folding in one end of the tube after it is formed on the mandrel.

80 is the header or puncher that depresses the center of the folded head of the tube and completes the head-forming operation.

90 is the ejector that pushes the finished tube from the mandrel.

The first step in the operation is to apply suction to the picker and feeder 40, thus lifting the rear end of the top sheet, and move the picker and feeder back toward the mandrel, thus carrying the rear edge of the sheet over the mandrel, which lays hold of the sheet and winds it around the mandrel to form a tube.

The picker 40, shown in detail in Fig. 5, comprises the hollow head 41, connected to and supported by the exhaust pipe 50, the hollow shank 42 depending from the head 41, and the mouth piece 43 surrounding and sliding on the shank 42. The exhaust pipe 50 extends through and is supported by an arm 45 on the slide 46, and communicates with the exhaust chamber 13. The slide 46 is movable back and forth on side-plate 100 as a guide.

Secured to the slide 46 is a bar 47 whose rear end is attached to a lever 48 pivoted on a bracket 38 on the top plate 9. A spring 51, secured to the bracket 38 and bearing against the lever 48, normally holds the slide 46 in its forward position against a stop 52 secured to the side-plate 100. A cam 49, on the main driving-shaft 11, moves the lever 48 back against the tension of the spring 51 and moves the slide 46 toward the mandrel. 110 is the driving pulley for the main shaft.

Interposed in the pipe 50 is a valve 54, (see Fig. 9) normally held, by the spring 55, against its seat to close communication between the exhaust chamber 13 and the picker and feeder 40; but the stem 56 of the valve is operated at the proper time by a cam 59 on the main driving shaft 11. When the valve 54 is thus operated, the air is sucked inwardly through the shank 42, the mouth piece 43 sliding upwardly on the shank and lifting the top sheet above the pile below it.

The suction being maintained, the picker and feeder is moved backwardly toward the mandrel by the described action of cam 49. This brings the rear edge of the sheet over and against the upper face of the rotating mandrel 20. The cam 59 then passes beyond the valve-stem 56, and the valve closes,

shutting off communication between the exhaust cylinder 13 and the picker and feeder 40, and releasing the sheet fed to the mandrel. The cam 49 subsequently passes beyond the lever 48, which is moved forwardly by means of the spring 51, returning the picker and feeder 40 to its original position.

A holder 47, consisting of a plate secured to the mouth-piece 43, and extending forwardly on a level with the lower edge of the mouth-piece, continues to engage the forward end of the pile when the picker and feeder is moved to its farthest position back, and prevents the mouth-piece of the picker and feeder from catching in the top sheet or sheets of the paper as it moves forwardly.

After the sheet is carried back to the mandrel and released from the picker and feeder as before described, the guide-piece 60 is moved down, the same guiding the edge of the sheet around the mandrel and holding the sheet in contact with the mandrel during the rolling operation. The guide-piece is supported on a lever 61, which is pivoted between its ends on a standard 62 and is raised out of action by a cam 69 on the main shaft (see Fig. 4) and drops into action by its own weight.

The mandrel 20, which is of a well known construction, being hollow and orificed, is detachably secured to a hollow shaft 21, turning in bearings in the standards 22, 22, and also in a recessed end-head 210 on the standard 211. The head 210 is connected, by a pipe 23, with the exhaust chamber 13, and this pipe is opened and closed by a valve (not shown but similar to valve 54) operated by a cam 29 on the main shaft. This valve is opened before each rolling operation to exhaust air from the mandrel and is closed after the sheet is rolled into a tube and before the ejector is operated.

The shaft 21 is driven from the main driving shaft 11 by a chain of gears 25, 26, 27, 28. The gear 25 on the shaft 11 drives the gear 26; and the gear 27, which is on the shaft of gear 26, drives the gear 28 on the mandrel shaft. The shaft of gears 26 and 27 turns in bearings in the standards 22, 22.

After the sheet is wound in tube form, the folder 70 is brought into operation, said folder (shown best in Fig. 2) acting upon the end of the tube projecting beyond the end of the mandrel and folding in this part of the tube against the head of the mandrel, thus closing this end of the tube. The folder is of known construction, consisting of a plate provided with several fingers, which act successively upon the projecting paper to form a corresponding number of overlapping folds. The folder is secured to a gear 71, pivoted on a bracket 73, and the gear 71 is driven from a gear 74 on the main shaft 11.

After the folder has operated, the header 80 is operated. The header consists simply of a punching-head secured to the head of a lever 82 pivotally secured in a bearing 83 on the top plate of the frame. The lever is swung upwardly and inwardly to cause the plunger to impinge against the central part of the folded end of the tube, pressing the same inwardly within the recessed end of the mandrel and causing the folds to be permanently set, thus completing the formation of the bottom of the shell. The lever 82 is thus operated by a plunger 84 working in a pressure cylinder 85, which is connected, by a pipe 86, with the pressure chamber 12. Admission of the pressure fluid to the cylinder 85 is controlled by a valve 860 (see Fig. 8) normally held on its seat by a spring 87, the stem 88 of the valve being operated by a cam 89 on the main shaft. The header is returned by means of a spring 81 connecting the head of the lever and a projection on the end of the frame. After the shell is thus completed, it is ejected from the mandrel by means of the ejector 90, which consists of a grooved collar closely fitting the mandrel and which is projected toward the outer end of the mandrel at the proper time, causing the inner or open end of the tube to be engaged thereby and forced off the mandrel. The collar is operated by means of a swinging lever 91, pivoted on the shaft 910, whose forked upper end engages the groove in the collar. The lever 91 is operated by a link 92 connecting the lever 91 and the piston rod 93 of a piston in the cylinder 94. The respective ends of the cylinder are connected, by means of pipes 96 and 97, with the pressure cylinder 11. On these pipes are control valves 960 and 970. (similar to valve 860) operated respectively by cams 98 and 99 on the main shaft. At each end of the cylinder 94 is a small exhaust port to the atmosphere to reduce the pressure therein after the control valve at that end of the cylinder is closed and to permit the pressure fluid admitted at the other end of the cylinder to be effective. To limit the outward movement of the lever 91, lever 82, at its pivoted end, is recessed and a buffer-spring 95 secured to the front wall of the recess in line of movement of the lever 91.

To enable the sheets on the table to be separated, if there is any tendency for them to stick together, a blow pipe 75 is provided, said pipe extending from the pressure cylinder 12 along the side of the machine and through the side plate 100 to a point alongside the upper sheets of the pile. Admission of air through the pipe is controlled by the hand valve 76.

The table is supported on the top of an upright screw shaft 15, whose flanged upper end fits rotatably within a cap 102 on the

under side of the table. The screw-shaft extends through a two-part nut 16 supported on the top plate 9 of the frame as hereinafter described.

5 The bottom of the shaft turns in a bearing 151 on a bracket 103 on the frame. A horizontal shaft 152 drives the screw-shaft through bevel gears 153 and 154, the latter being splined on the screw-shaft. On the shaft 152 is a ratchet wheel 155. Pivoted on the shaft 152 is a pawl-lever 156 carrying a spring-pressed pawl 157 and operated by a connecting rod 158 from a crank disk 159 secured to the main shaft.

15 In the operation of the machine, after the recession of the picker and feeder 40, the pawl 157 turns the ratchet 155 a distance of one tooth, thus imparting a partial turn to the screw-shaft. This causes the screw-shaft to have a slight upward movement due to its engagement with the fixed nut 16. The parts are so proportioned that the extent of the upward movement of the screw-shaft just equals the thickness of a sheet of paper. 20 The top of the pile is thus maintained on a constant level.

When one pile of paper is exhausted and another pile is put in place, the two parts of the nut 16 are separated, permitting the 30 shaft to drop. This is effected by pushing toward each other the arms 160 secured to the two parts of the nut and pivoted on the pin 161 (see Fig. 7). These arms project forwardly through a cut-away part of the flange 162 of the top-plate 9. The two parts 35 of the nut are held together by means of a spring 163 connecting lugs 164 on the rear extensions 165 of the two parts of the nut. The nut is also supported in position by a 40 clamp 166 secured to the top plate 9 and engaging the extensions 165.

To print each sheet of paper before it is fed to the mandrel, the following device, (shown in detail in Fig. 6) is provided. 45 is a stamp-block on a plunger-rod 170 extending within a cylinder 171. 172 is the plunger head fitting within the cylinder. 173 is a spring tending to hold the plunger and stamp-block raised. The cylinder 171 50 is secured to and communicates with a pipe 174 connected with the pressure cylinder 12. The pipe 174 extends through a bracket 175, which is secured to the side-plate 100 by means of a set screw extending through one of the several orifices 105 in the side-plate. Passage of pressure fluid 55 through the pipe 174 is controlled by a valve 680 (similar to valve 860) operated by a cam 179 on the main shaft. When air 60 is admitted through the pipe 174 to the cylinder 171, it forces the face of the stamp-block 17 against the surface of the top sheet and prints thereon.

To ink the printing face of the stamp-

65 block, I provide a roller-pad 18 journaled in the lower ends of levers 180 pivoted on an arm 181 on the cylinder 171. Springs 182, connecting the cylinder and the levers, tend to hold the roller under the stamp-block, but when the plunger-rod 170 is depressed, the roller 18, being held from downward movement, swings outwardly, and 70 clears the stamp-block. When the plunger is retracted, the springs 182 return the roller to its normal position. 75

Projecting from the cylinder 171 are arms 176 carrying guides 177 through which extend rods 178 secured to the stamp-block 17.

To prevent the paper on the table from creeping backwardly, there is provided the 80 holding-plate 191 secured to the top-plate 9, which extends up to a point that enables the top sheet to be fed over it to the mandrel. 192 is a stop secured to the table and extending in front of the pile and preventing 85 the paper from slipping forwardly. 193 is a holder at the side of the paper, the same consisting of an angle plate secured to the table and extending up alongside, and also overhanging the pile. 90

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In a machine for making paper shells, the combination with the picker for selecting 95 sheets of paper, the mandrel for rolling the sheets into tubes, and the ejector sleeved on the mandrel for ejecting the shells from the mandrel, of a pressure chamber, an exhaust chamber, a pipe connecting the pressure 100 chamber with the ejector, a pipe connecting the exhaust chamber with the picker, valves in said pipes, the driving shaft, and cams actuated successively by the driving shaft and actuating the valves respectively. 105

2. In a machine for making paper shells, the combination with a table for supporting a pile of paper, of a pressure chamber, an exhaust chamber, a stamp for printing upon the paper, a pipe connecting the pressure 110 chamber and stamp, a picker to select the sheets from the pile, a pipe connecting the exhaust chamber and the picker, the mandrel, the folder, the header, a pipe connecting the pressure chamber and header, valves 115 on said pipes, the ejector, a pipe connecting the ejector and pressure chamber, the driving shaft, and mechanism controlled by the driving shaft and actuating said picker, folder and valves respectively. 120

3. In a shell making machine, the combination with the mandrel on which the shell is formed, of an ejector sleeved on the mandrel and longitudinally slidable thereon, a pressure cylinder, a piston therein connected 125 with the ejector, an air-pressure chamber, pipes connecting the air-pressure chamber with opposite ends of the pressure cylinder.

der respectively, valves controlling said pipes respectively, a driving shaft, and mechanism controlled thereby to operate said valves successively, thereby causing said ejector to

5 successively advance and recede.

4. In a machine for making paper shells, the combination with the paper table, of the hollow mandrel, a picker to transfer the paper to the mandrel, the ejector sleeved on
10 and longitudinally slidable upon the mandrel, an air pressure chamber, an air exhaust chamber, pipes respectively connecting the picker and mandrel with the exhaust chamber, a pressure cylinder, a piston there-
15 in connected with the ejector, a pipe connecting the pressure chamber with the ejector, valves on the several pipes, the driving shaft, and mechanism controlled thereby to operate the several valves.

20 5. In a machine for making paper shells, the combination with the paper table, of the hollow mandrel, a picker to transfer the paper to the mandrel, the ejector sleeved on and longitudinally slidable upon the man-
25 drel, an air pressure chamber, an air exhaust chamber, pipes respectively connecting the picker and mandrel with the exhaust chamber, a pressure cylinder, and a piston therein connected with the ejector, pipes connecting
30 opposite ends respectively of the pressure

cylinder with the supply chamber, valves on the several pipes, the driving shaft, and mechanism controlled thereby to operate the several valves.

6. In a shell making machine, the com- 35
bination with the main driving shaft, a secondary shaft and driving connections between the two shafts, of a hollow mandrel on which the shell is formed, a picker to transfer the paper to the mandrel, a header 40
for closing the ends of the shells, a pressure cylinder and piston actuating the header, an ejector sleeved on the mandrel, pressure cylinder and piston actuating the ejector, an air pressure chamber, an air exhaust 45
chamber, pipes respectively connecting the picker and mandrel with the exhaust chamber, pipes respectively connecting the two cylinders with the supply chamber, valves on the several pipes, and mechanism con- 50
trolled by the secondary shaft to actuate the several valves.

In testimony of which invention, I have hereunto set my hand, at Paulsboro, N. J., on this 26th day of November, 1906.

JOHN CHESNEY.

Witnesses:

ERNEST REDFIELD,
THOS. W. BACCHUS.