J. CHESNEY.

PAPER SHELL MACHINE.

APPLICATION FILED FEB. 24, 1908.

914,384. Patented Mar. 9, 1909.

2 SHEETS—SHEET 1.

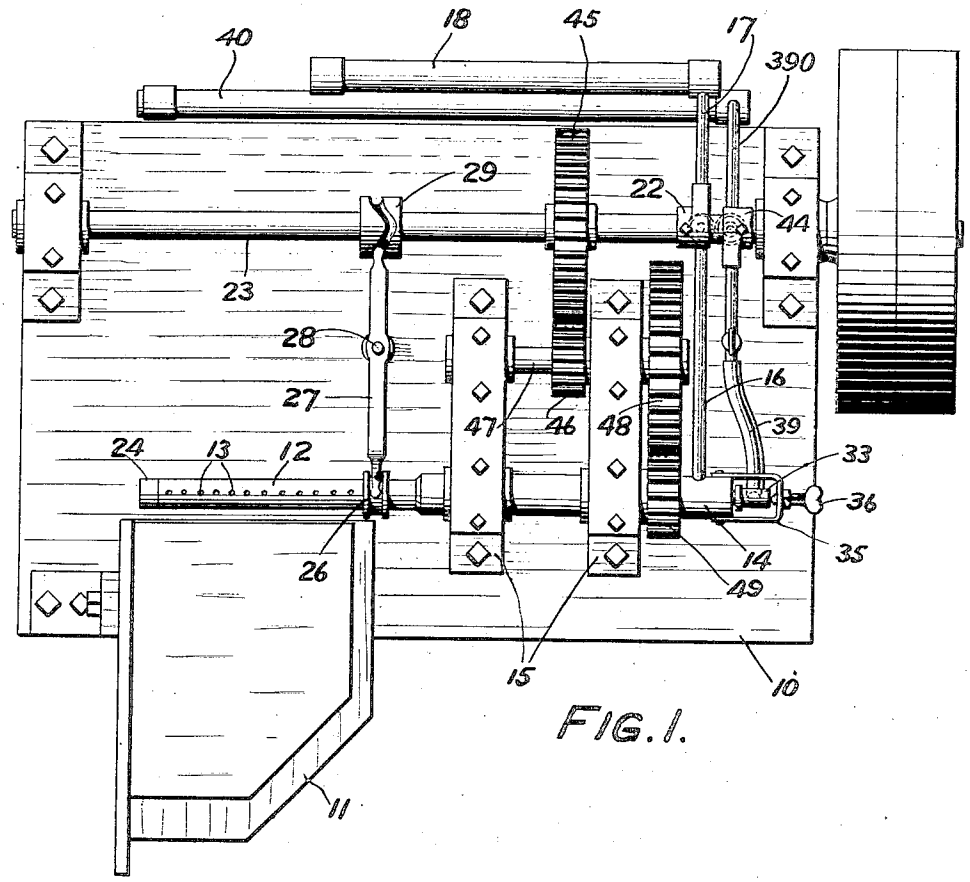


FIG. 1.

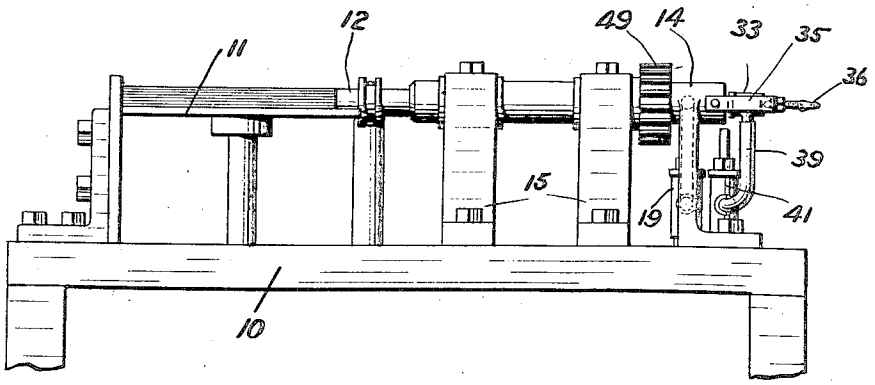


FIG. 2.

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2 SHEETS—SHEET 2.

FIG. 3.

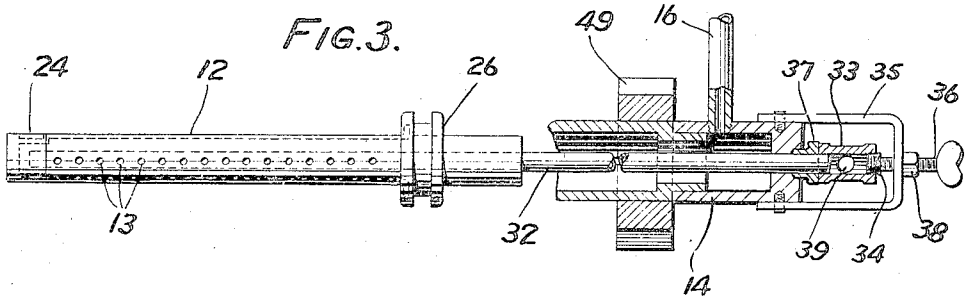


FIG. 4.

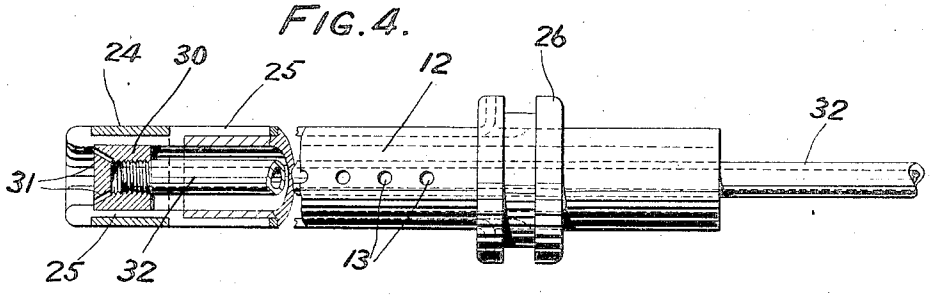


FIG. 5.

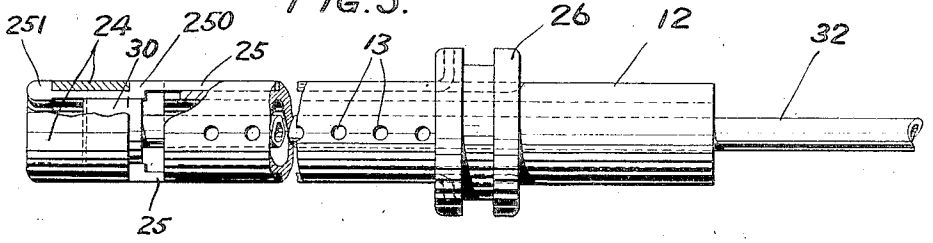


FIG. 6.

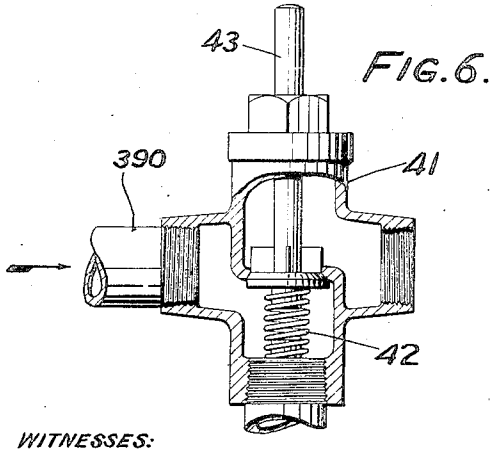
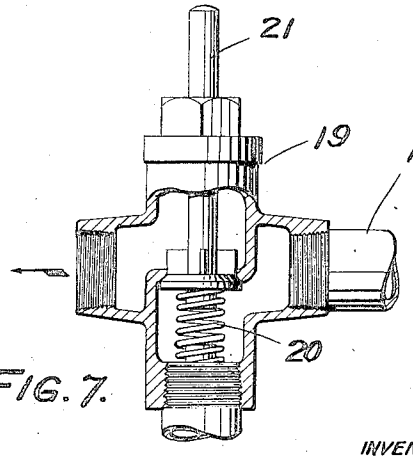


FIG. 7.



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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.

PAPER-SHELL MACHINE.

No. 914,384. Specification of Letters Patent. Patented March 9, 1909.

Application filed February 24, 1908. Serial No. 417,468.

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 Paper-Shell Machines, 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 object of the invention is to provide improved means for pneumatically ejecting from a shell-forming mandrel the shell formed thereon.

In the drawings: Figure 1 is a plan view of the part of the machine embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a view, partly cut away, of the mandrel, the pressure cylinder and exhaust cylinder, and ejecting tube, the exhaust cylinder and pressure cylinder being shown sectionally and the mandrel being shown in plan. Fig. 4 is a longitudinal view, partly cut away and partly in section, of the mandrel and the pressure tube for ejecting the finished shell. Fig. 5 is a view similar to Fig. 4, with the head of the mandrel retracted. Figs. 6 and 7 are vertical sectional views of the valves controlling respectively, the admission of air to the ejecting tube and the exhaust to the mandrel.

10 is the frame of the machine.

11 is the table containing the sheets of paper that are to be successively fed to the hollow mandrel 12. The mandrel 12 is provided with perforations 13 so that when the air is exhausted from the mandrel, atmospheric pressure will act upon the paper to hold it securely in position upon the mandrel as it is wound thereon in the latter's rotation. The rear part of the mandrel, which is imperforate and detachably secured to the front perforated part, turns in bearings in the support 15 bolted to the machine frame. The rear end of the mandrel enters and turns in the forward end of a stationary exhaust cylinder 14. The cylinder 14 is connected by means of pipes 16 and 17 to an exhaust chamber 18, suitable suction devices (not shown) being applied to the exhaust chamber 18 to rarefy the air therein. Interposed between pipes 16 and 17 is a valve 19 (see Fig. 7) normally held by spring 20 against its seat to close communication between the pipes 16 and 17. The stem 21 of the valve is operated at the proper time by a cam 22 on the main driving shaft 23. When the valve 19 is thus operated, the air in the mandrel 12 and cylinder 14 is sucked into the suction chamber 18 through the pipes 16 and 17.

The mandrel 12 is provided at its forward end with a longitudinally retractable head 24 carried by bars 25 which extend longitudinally of the mandrel and are secured to a grooved sleeve or collar 26 encircling the mandrel 12.

The sliding bars 25 are preferably entered in longitudinal grooves formed in the wall of the mandrel body, the grooves and bars being of the same cross sectional dimensions, so that the bars lie flush with the periphery of the mandrel, the mandrel body thus presenting a continuous and unbroken periphery.

The head 24 is provided with similar longitudinal grooves in its inner wall to receive the front ends of the bars 25. Each bar 25 is offset at 250 at the rear of its head engaging part, said offset entering a notch in the forward end of the mandrel body. The mandrel head is similarly notched at its front end to receive outwardly extending projections 251, on the front ends of the bars 25. To apply the mandrel head to the bars, the front ends of the latter are pressed toward each other (the bars being sufficiently flexible to permit this) and the head is slipped over the same into the position shown in the drawings, whereupon the bars are allowed to spring outwardly, whereby the mandrel head is confined between the projections 251 and offset 250. Preliminarily to the ejection of the finished shell from the mandrel, and for purposes hereinafter set forth, the collar 26 is moved forwardly along the mandrel from the position shown in Fig. 4 to the position shown in Fig. 5 thereby advancing the head of the mandrel beyond the body of the mandrel. This movement of the mandrel head is affected by means of a lever 27 pivoted between its ends at 28 to the machine frame and engaging at one of its ends a groove in the collar 26 and at its other end a cam groove in a cam 29 secured to and turning with the driving shaft 23.

Fitting within the head 24, but loose with respect thereto, is a cap 30, the head of the cap being provided with perforations 31 and the interior of the cap being threaded to receive the threaded end of the ejecting tube

32. The ejecting tube 32 extends within and longitudinally of the mandrel, and at its rear end extends through the rear end of the exhaust cylinder 14 and enters a small pressure cylinder 33. The rear end of the pressure cylinder 33 is threaded interiorly to receive the threaded plug 34. 35 is a yoke secured to the exhaust cylinder 33. A thumb screw 36 extends through the yoke 35 and bears against the closing plug 34. By screwing up the thumb screw 36, the cylinder 33 is pressed against a stuffing box 37 secured to the rear wall of the cylinder 14 and through which the rear end of the ejecting tube extends. A nut 38 on the threaded rod 36 is tightened against the yoke 35.

Air under pressure is admitted by means of pipes 39 and 390 from the pressure chamber 40 to the pressure cylinder 33 and ejecting tube 32, thereby applying air under pressure to the closed end of the paper shell formed on the mandrel for the purpose of ejecting the same therefrom, as is more particularly hereinafter described. Interposed between pipes 39 and 390 is a valve 41 normally held by the spring 42 against its seat to close communication between pipes 38 and 39. The stem 43 of the valve is operated at the proper time by a cam 44 on the main driving shaft 23.

The mandrel is rotated by the usual means, namely by a gear 45, on the main driving shaft 23, that engages a gear 46 on an intermediate shaft 47 turning in bearings in the supports 15; a second gear 48 on the intermediate shaft 47 engaging a gear 49 secured to the mandrel.

The operation of the machine is as follows: By means of the chain of gearing between the driving shaft 23 and the mandrel 12, the latter is rotated, and during its rotation a sheet of paper is transferred from table 11 to the mandrel by means not shown, and wound about the periphery of the mandrel, the paper being held tightly against the mandrel by exhausting the air therefrom by cam 22 operating the valve 19 to open communication between the exhaust 18 and the mandrel, as hereinbefore described. During the said operation or immediately at its conclusion, the forward edge of the paper projecting beyond the head of the mandrel is crimped or folded to close in the end of the paper tube and form the shell, this being affected by means not shown. When the shell is thus completed, the cam 22 passes out of engagement with the valve stem 21 and the spring 20 moves the valve to close communication between the exhaust chamber 18 and the mandrel. The paper shell is now free to be ejected from the mandrel, but prior to its ejection from the mandrel the head of the mandrel is retracted from the body of the mandrel by the action of cam 29 and lever 27 as hereinbefore described, this being done for the purpose of loosening the shell from the mandrel to facilitate its ejection. After the head is thus retracted from the mandrel, the cam 44 engages the valve stem 43 to operate the valve 41 for the purpose of admitting air under pressure from the pressure cylinder to the ejecting tube 32. This compressed air passes out of the perforations 31 and acts upon the closed end of the paper shell and blows it off the mandrel, immediately after which the cam 44 is retracted from the valve stem 43, whereupon the spring 42 moves the valves 41 in position to close communication between the pressure chamber and the ejecting tube. This completes the operation.

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

1. In a paper shell machine, the combination with the hollow perforated forming mandrel, of an ejecting tube extending into the mandrel, means to exhaust air from the mandrel, and means to admit air under pressure to the ejecting tube.

2. In a paper shell machine, the combination with the hollow perforated forming mandrel, of an ejecting tube extending into the mandrel, a perforated cap closing the forward ends of the mandrel and ejecting tube, means to exhaust air from the mandrel, and means to admit air under pressure to the ejecting tube.

3. In a paper shell machine, the combination with the forming mandrel comprising a body and a longitudinally retractable head in advance of and forming a continuation of the body, of means to retract the mandrel head preliminarily to ejecting the shell from the mandrel.

4. In a paper shell machine, the combination with the hollow perforated forming mandrel comprising a body and a longitudinally retractable head, of an ejecting tube extending into the mandrel, means to exhaust air from the mandrel, means to admit air under pressure to the ejecting tube, and means to retract the mandrel head.

5. In a paper shell machine, the combination with the forming mandrel comprising a body and a longitudinally retractable head, of an ejecting tube extending into the mandrel, a cap closing the forward end of the mandrel and ejecting tube and having perforations communicating with said tube, means to exhaust air from the mandrel, means to retract the mandrel head from the mandrel body, and means to admit air under pressure to the ejecting tube.

6. In a paper shell machine, the combination with the hollow perforated forming mandrel, an ejecting tube extending from the front part of the mandrel through and beyond the rear end thereof, an exhaust chamber, pipe connections therefrom to the mandrel, a pressure chamber, pipe connections therefrom to the ejecting tube, valves inter-

posed in said pipe connections, a driving shaft, means operated thereby to actuate said valves, and driving connections from the driving shaft to the mandrel to rotate the latter.

7. In a paper shell machine, the combination with the hollow perforated forming mandrel, a cylinder in which the rear end of said mandrel turns, an exhaust chamber, pipe connections therefrom to said cylinder, an ejecting tube extending from the front part of the mandrel through and beyond the rear end thereof and through and beyond the rear wall of said cylinder, a second cylinder at and communicating with the rear end of the ejecting tube, a pressure chamber, pipe connections therefrom to the second cylinder, valves interposed in said pipe connections, a driving shaft, means operated thereby to actuate said valves, and driving connections from the driving shaft to the mandrel.

8. In a paper shell machine, the combination with the forming mandrel comprising a longitudinally grooved body and a longitudinally grooved and longitudinally retractable head, of bars slidable in grooves in the mandrel body and fixedly secured in the grooves of the mandrel head, and means to slide said bars in the grooves of the body to retract the head.

9. In a paper shell machine, the combination with the forming mandrel comprising a body having longitudinal grooves on its outer wall and an independent head having longitudinal grooves in its inner wall, and contiguous notches at its front end, of bars extending into said grooves and notches, and movable longitudinally in the grooves of the mandrel body.

10. In a paper shell machine, the combination with the forming mandrel comprising a body and a longitudinally retractable head, of bars slidable in grooves in the mandrel body and engaging the mandrel head, a sleeve slidable on said mandrel body and to which said bars are attached, a main driving shaft, and connections therefrom operating the sleeve intermittently.

11. In a paper shell machine, the combination with the forming mandrel comprising a body and a longitudinally retractable head, of bars slidable in grooves in the mandrel body and engaging the mandrel head, a sleeve slidable on said mandrel body and to which said bars are attached, a main driving shaft, a cam thereon, and a lever pivoted between its ends, whose opposite ends engage grooves in the cam and sleeve respectively.

12. In a paper shell machine, the combination with the forming mandrel comprising a body and a longitudinally movable head, of means to move the head forwardly with respect to the body to loosen the shell from the mandrel to facilitate its ejection, and means for subsequently ejecting the shell.

13. In a paper shell machine, the combination with the forming mandrel composed of a body and an independently movable head, of means to move the head to loosen the shell formed on the mandrel, and means to thereafter admit air under pressure to the movable head, thereby ejecting the shell from the mandrel.

14. In a paper shell machine, the combination with the forming mandrel, of an ejecting tube extending from the forward end of the mandrel through its rear end, a pressure cylinder at the rear end of the ejecting tube, an exhaust cylinder at the rear end of the mandrel, a yoke secured to the exhaust cylinder, and a screw, engaging the yoke, whose forward end closes the rear end of the pressure cylinder.

15. In a paper shell machine, the combination with the forming mandrel, of an ejecting tube extending from the forward end of the mandrel through its rear end, a pressure cylinder at the rear end of the ejecting tube, an exhaust cylinder at the rear end of the mandrel, a yoke secured to the exhaust cylinder, a stuffing box between the rear end of the exhaust cylinder and the forward end of the pressure cylinder through which the ejecting tube extends, a screw engaging the yoke and having a head closing the end of the pressure cylinder, and a nut on the screw tightening against the yoke.

In testimony of which invention, I have hereunto set my hand, at Paulsboro, on this 3rd day of February, 1908.

JOHN CHESNEY.

Witnesses:
WILLIAM J. ADAMSON,
CHAS. M. GWILLIAM.

Correction in Letters Patent No. 914,384.

It is hereby certified that in Letters Patent No. 914,384, granted March 9, 1909, upon the application of John Chesney, of Paulsboro, New Jersey, for an improvement in "Paper-Shell Machines," an error appears in the printed specification requiring correction, as follows: In the heading of the specification the serial number "417,468" should read *417,463;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of April, A. D., 1909.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.