

E. A. STRATTON.
MACHINE FOR MAKING PAPER AND LIKE CUPS.
APPLICATION FILED MAR. 5, 1913.

1,074,989.

Patented Oct. 7, 1913.

3 SHEETS—SHEET 1.

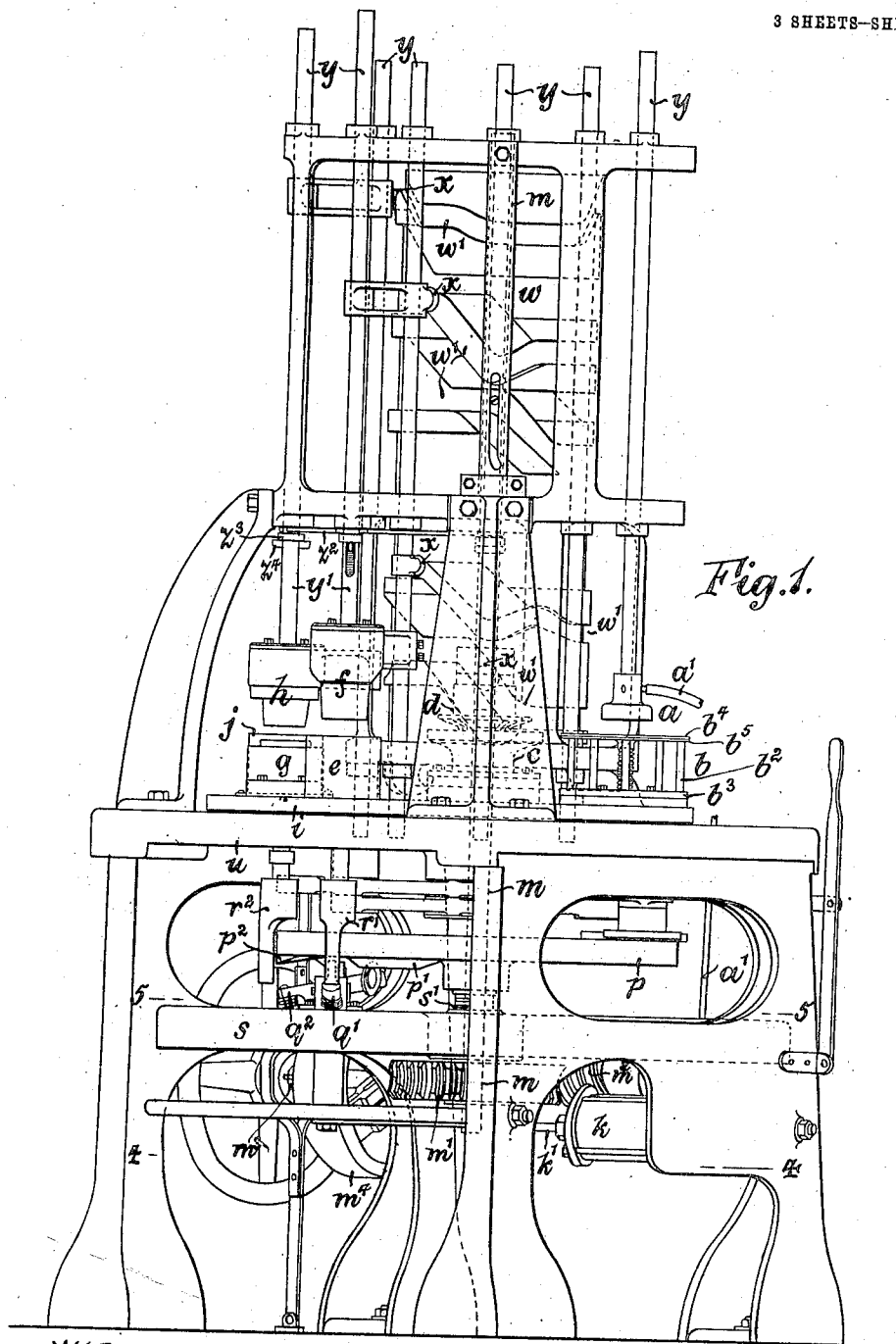


Fig. 1.

WITNESSES;

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3 SHEETS--SHEET 2.



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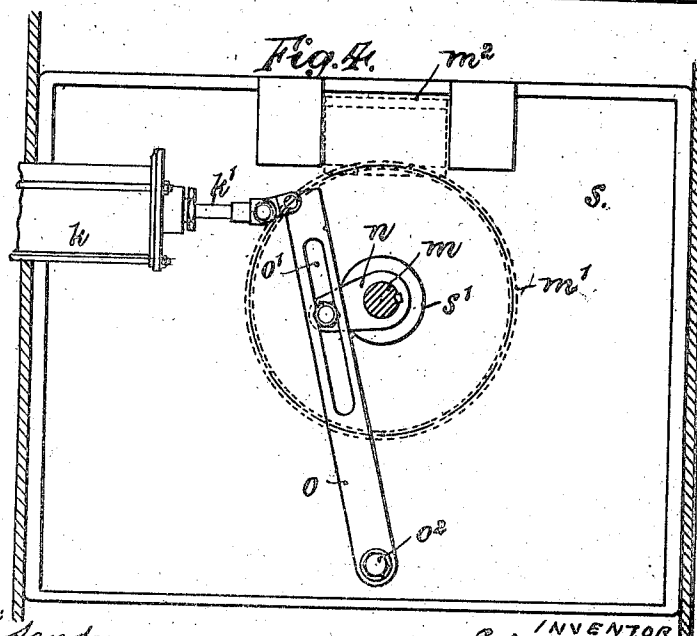
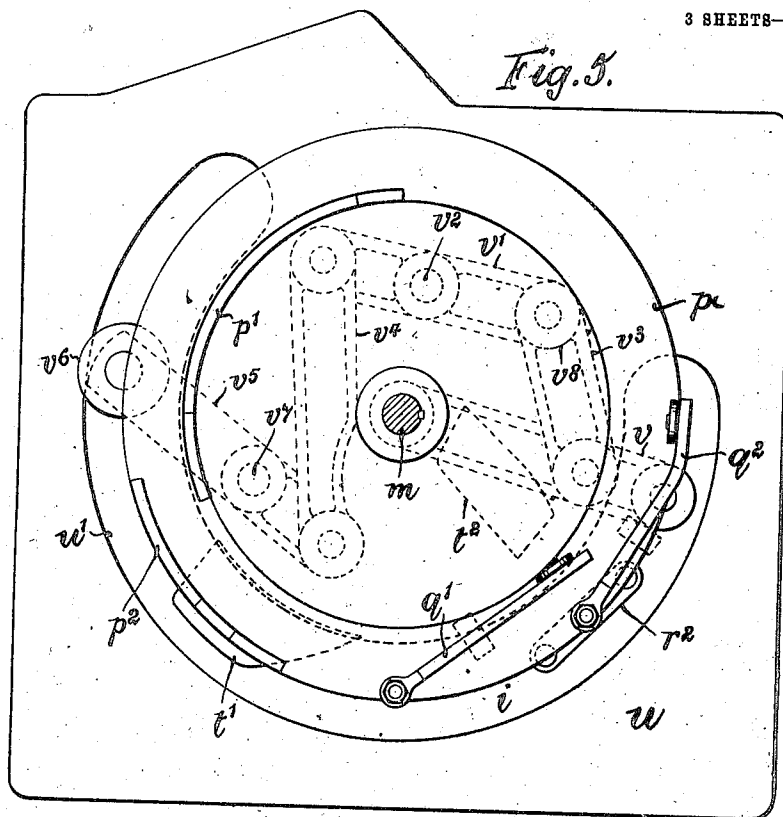
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WITNESSES:
John C. Sanders
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UNITED STATES PATENT OFFICE.

EGBERT ARTHUR STRATTON, OF LONDON, ENGLAND, ASSIGNOR TO MANSELL, HUNT, CATTY & COMPANY LIMITED, OF LONDON, ENGLAND.

MACHINE FOR MAKING PAPER AND LIKE CUPS.

1,074,980

Specification of Letters Patent.

Patented Oct. 7, 1913.

Application filed March 5, 1913. Serial No. 752,161.

To all whom it may concern:

Be it known that I, EGBERT ARTHUR STRATTON, subject of the King of Great Britain, residing at Cressy Road, Hampstead, London, England, have invented new and useful Improvements in Machines for Making Paper and the like Cups, of which the following is a specification.

This invention relates to machines for creasing and plaiting disks of material into cup-shaped form and for turning over the borders thereof, for soufflé cups and analogous articles.

The principal feature of the invention consists in means for turning over the border of a plaited cup so as to stiffen or reinforce the cup and lock the plaits.

Further features of the invention consist in the combination in one machine of the border turning-over mechanism, with cup-plaiting mechanism, such as is described in the specification of my Patent No. 1,012,026.

Referring to the operations whereby the border of a plaited cup is turned over:—
The border of the cup is first splayed outward, and is then turned completely over so that the edge is directed toward the bottom of the cup. The so turned-over border is then again splayed outward, the fold of the previous turn is pinched into a close crease and finally the border is again turned completely over, so that the creased fold of the previous turn is directed more or less toward the bottom of the cup while the actual edge of the material becomes directed away from the bottom.

A machine for creasing and plaiting disks of material into cup-shaped form and for turning over the borders thereof, is illustrated on the accompanying drawings, in which:—

Figure 1 is an elevation of the entire machine. Fig. 2 is a developed sectional elevation of the magazine, the creasing and plaiting tools, the turning over tools and the delivery tube. Fig. 3 is a plan of the magazine. Fig. 4 is an inverted plan of the machine taken along the line 4—4 of Fig. 1. Fig. 5 is an inverted plan of the machine taken along the line 5—5 of Fig. 1.

Referring more particularly to Fig. 2: A disk of paper is lifted by the suction head *a* from the top of a pile in a magazine *b* and dropped on to the creasing and plaiting

socket *c*. The disk is therein creased and plaited by the plaiting plunger *d* in the well known manner. The creased and plaited cup is then lifted by the plaiting plunger *d* and is dropped or pushed off same into a two-part socket *e* formed with a shallow conical border *e*¹. The cup, when forced home into the socket, protrudes with its upper edge slightly beyond the junction of the shallow conical border of the socket with the remainder of the socket which is slightly tapered to fit the cup. A plunger *f* then enters the cup and forces same home into the socket *e*, closing the plaits. The upper portion *f*¹ of this plunger *f* is abruptly conical to fit the shallow conical or beveled border *e*¹ of the socket *e*, whereby the protruding portion of the cup is splayed outward. The plunger *f* then recedes partially from the socket *e* and is accompanied by the cup, owing to a liner *e*² which provides the inner surface of the lower portion of the socket *e* being simultaneously partially ejected from the body of the socket *e*. Then the abruptly conical portion *f*¹ of the plunger *f*, which is mounted as a sleeve on the latter, is displaced over the edge of the liner *e*², whereby the splayed border of the cup is folded over the latter. The plunger *f* is then wholly withdrawn from the socket *e*, while the liner *e*² returns thereto; during the withdrawal, however, the sleeve portion *f*¹ of the plunger *f* still surrounds the turned-over border of the cup, thereby holding the latter on the plunger *f* until above another socket *g*. When above this second socket *g*, the sleeve *f*¹ moves away from the turned-over border of the cup and an ejector head *f*² in the plunger *f* forces the cup off the latter, to fall into the second socket *g*.

The second socket *g* differs from the first in the liner *g*² being stationary and the outer portion *g*¹ displaceable to accompany the plunger-sleeve *h*¹ of its plunger *h*, and in the liner *g*² protruding beyond the remainder *g*¹ of the socket, the border of which latter *g*¹ is a plane surface transverse to the axis of the socket *g* instead of being beveled. The outer or sleeve portion *h*¹ of the plunger *h* has correspondingly a transverse plane end surface.

When the cup is forced home by the plunger *h* into the second socket *g*, its turned-

over border protrudes just above the edge of the stationary liner g^2 and is bent over the latter by a shoulder h^3 on the inner portion h^2 of the plunger h , which then stops. The sleeve portion h^1 of the plunger h , however, continues to move until it has forced the border of the cup outward perpendicular to the axis of the cup. The outer portion g^1 of the socket g is then displaced toward the sleeve portion h^1 of the plunger h and pinches the outstanding border of the cup, thereby sharply creasing the previous turn-over. The sleeve portion h^1 of the plunger h and outer portion g^1 of the socket g then move together toward the base of the socket g , thereby completing the second turn-over. The cup is then carried by and forced off the second plunger h by an ejector head h^4 in the manner described in respect to the first plunger f .

In embodying the above described turning-over mechanism in a complete machine for making plaited cups, the several sockets conveniently are arranged radially around an axis on a table i which is alternately rocked in opposite directions about this axis. The sockets are situated at such angular distances apart that at the extreme ends of the travel of the table each socket is transferred from beneath one plunger to beneath an adjacent plunger or its equivalent.

Taken in the order of the sequence of operations, there are mounted on the rocking table i , the following elements, see Figs. 1 and 2:—The magazine b to hold a pile of disks, which are spring-pressed upward, the top disk being held down by fingers b^1 (Fig. 3) engaging over the edge thereof; the plaiting socket c as described in my prior patent; the first turning-over socket e ; the second turning-over socket g , and a delivery tube j for the finished article to drop into a receptacle. Alternately above one or the next of these lower elements, are the suction head a , the plaiting plunger d , the first turning-over plunger f and the second turning-over plunger h .

The top disk of the pile is first lifted from the magazine by the suction head a , which descends on to same and in which a vacuum is created by a pump k connected to the section head a by a flexible tube a^1 . The suction head a is then raised and holds the disk while the table i is angularly displaced bringing the plaiting socket c beneath the suction-head a . The latter then descends and, on the pump k relieving the vacuum and slightly blowing off the disk, the latter is deposited on the mouth of the plaiting socket c . The table i moves back again carrying the disk to beneath the plaiting plunger d , which then descends and plaits the disk into cup-shape. The plaiting plunger d in rising lifts the cup, owing to the plaits being interlocked with the ribs

of the plunger, and the table i is again displaced to bring the first turning-over socket e beneath the plaiting plunger d . An ejector head d^1 on this latter thrusts off the plaited cup into the first turning-over socket e . The table i then moves back again so that the first turning-over socket e comes beneath its plunger f . After this plunger f has descended and has risen, the table i again moves in the reverse direction, to bring the second turning-over socket g beneath the first turning-over plunger f , which as above explained thrusts off the cup into this second socket g . The table i once more rocks in the contrary direction, whereby the second turning-over socket g comes beneath the second turning-over plunger h . These having carried out their functions, the table i once more moves to bring the delivery tube j beneath the second turning-over plunger h , which casts off the cup to fall through the tube j .

It should be understood that several disks in various stages of being transformed into the finished product are being operated upon at the same time, for each time after the table i is rocked in the one direction a fresh disk is picked up by the suction head a and all of the several plunger-effected operations take place on different disks, and each time after the table i is rocked in the reverse direction an ejection off each plunger takes place.

The several motions are obtained as follows:—A vertical shaft m is arranged at the axis of the table i . The shaft m is continuously rotated through a worm-wheel m^1 , worm m^2 (Fig. 4), worm spindle m^3 , and pulley m^4 . At the lower end of the shaft m is a crank n (Fig. 4), which, riding in a slot o^1 formed in a lever o , to the free end of which the rod k^1 of the pump plunger is connected, operates the pump k . To obtain a slow suction and quicker return stroke of the pump plunger, it is arranged that the path of the crank is nearer the free end of the lever o during the former and nearer the pivot o^2 of the lever o during the latter stroke. Above the crank n , a disk p (Fig. 5) is keyed to the shaft m . On the under surface of this disk p protrude two cams or ramps p^1 , p^2 which periodically force downward the one end of roller-provided levers, q^1 , q^2 , the other ends of which are thereby forced upward and press upward spindles r^1 , r^2 , which carry at their upper ends the liner e^2 of the first turning-over socket e and the outer portion g^1 of the second turning-over socket g , respectively. The levers q^1 , q^2 are pivoted on a plate s of the frame of the machine which is intermediate between the crank and the disk p and which carries a bearing s^1 for the vertical shaft.

On the upper surface of the disk p are two cams t^1 , t^2 which rock the table i . The

table slides above a segmental slot w^1 in a plate v of the frame, through which slot w^1 it is connected to the end of a lever v mounted freely upon the central shaft m . Pivoted beneath the frame-plate v is a rocking lever v^1 . On one side of its pivot v^2 , this lever v^1 is connected by a link v^3 to the lever v connected to the table, and on the other side of its pivot v^2 , the lever v^1 is connected by a link v^4 to a second rocking lever v^5 pivoted beneath the frame-plate. This second lever carries a roller v^6 on the reverse side of its pivot v^7 to its connection to the link v^4 , and the first rocking lever v^1 also carries a roller v^8 upon the pivot which connects it to the link v^3 connected to the table lever v . The above mentioned cams i^1 i^2 respectively, periodically each strike and displace one of these rollers v^6 , v^8 , and thereby rock the table i .

Above the table i the shaft m carries a cam drum w the cam-grooves w^1 of which operate the several compound plungers d , f and h and the suction head a , by means of rollers x , spindles y and sleeves y^1 ; and the edge-cams z of which operate the ejector heads d^1 , f^2 and h^4 by means of rollers z^1 , rocking bars z^2 , collars z^3 , cotters z^4 and spindles z^5 .

It is obvious that the several organs can be in multiple, for instance, each plunger, socket and suction head can be in duplicate. Moreover the borders of the cups may be turned over once only to form what are termed drinking cups.

The several plungers and sockets are interchangeable with others of different sizes without alteration of the timing of the cams.

The magazine is also adaptable to different sizes of disks. It consists of a series of pillars b^2 clamped in radial slots in a base plate b^3 and connected by a ring b^4 which on its inner border is formed with the aforesaid fingers b^1 . This ring can be interchanged with others of different sizes. A spring-pressed lifter b^5 is mounted in the base plate b^3 of the magazine. The plate of the lifter b^5 is radially slotted to permit adjustment of the pillars b^2 .

I claim:—

1. In a machine for turning over the borders of cups formed from plaited disks of material, a turning-over plunger, a turning-over socket, a second turning-over plunger, a second turning-over socket, means for displacing said plungers into and from said sockets and means for effecting relative transverse displacement of said plungers and sockets.

2. In a machine for plaiting disks of material into cup-shaped form and for turning over the borders thereof, a plaiting plunger, a plaiting socket, a turning-over plunger, a turning-over socket, means for displacing said plungers into and from said

sockets and means for effecting relative transverse displacement of said plungers and sockets.

3. In a machine for plaiting disks of material into cup-shaped form, and for turning over the borders thereof, a plaiting plunger, a plaiting socket, a turning-over plunger, a turning-over socket, a second turning-over plunger, a second turning-over socket, means for displacing said plungers into and from said sockets and means for effecting relative transverse displacement of said plungers and sockets.

4. In a machine for turning over the borders of cups formed from plaited disks of material, a two-part plunger, an ejector in said two-part plunger, a two-part socket, a second two-part plunger, an ejector in said second two-part plunger, a second two-part socket, means for displacing said plungers into and from said sockets, means for effecting relative transverse displacement of said plungers and sockets and means for protruding said ejectors.

5. In a machine for plaiting disks of material into cup-shaped form and for turning over the borders thereof, a plaiting plunger, an ejector in said plaiting plunger, a plaiting socket, a two-part plunger, an ejector in said two-part plunger, a two-part socket, means for displacing said plungers into and from said sockets, means for effecting relative transverse displacement of said plungers and sockets and means for protruding said ejectors.

6. In a machine for plaiting disks of material into cup-shaped form and for turning over the borders thereof, a plaiting plunger, an ejector in said plaiting plunger, a plaiting socket, a two-part plunger, an ejector in said two-part plunger, a two-part socket, a second two-part plunger, an ejector in said second two-part plunger, a second two-part socket, means for displacing said plungers into and from said sockets, means for effecting relative transverse displacement of said plungers and sockets and means for protruding said ejectors.

7. In a machine for plaiting disks of material into cup-shaped form and for turning over the borders thereof, a table, a magazine for a pile of disks on said table, a suction head above said magazine, a plaiting socket on said table, a plaiting plunger above said plaiting socket, an ejector in said plaiting plunger, a two-part socket on said table, a two-part plunger above said two-part socket, an ejector in said two-part plunger, a second two-part socket on said table, a second two-part plunger above said second two-part socket, an ejector in said second two-part plunger, means for displacing said suction head on to and from said magazine and said plungers into and from said sockets, means for alternately displacing said table

in opposite directions to transfer said maga-
zine from and to beneath said suction head
and said sockets from and to beneath their
respective plungers and to and from said
5 adjacent plungers and suction head and
means for protruding said ejectors.

In testimony whereof I have signed my

name to this specification in the presence of
two subscribing witnesses.

EGBERT ARTHUR STRATTON.

Witnesses:

H. D. JAMESON,

R. A. SMITH.