Sept. 15, 1925. 1,553,505

P. F. BUCHANAN

CUP MAKING MACHINE

Filed July 16, 1923 2 Sheets-Sheet 1

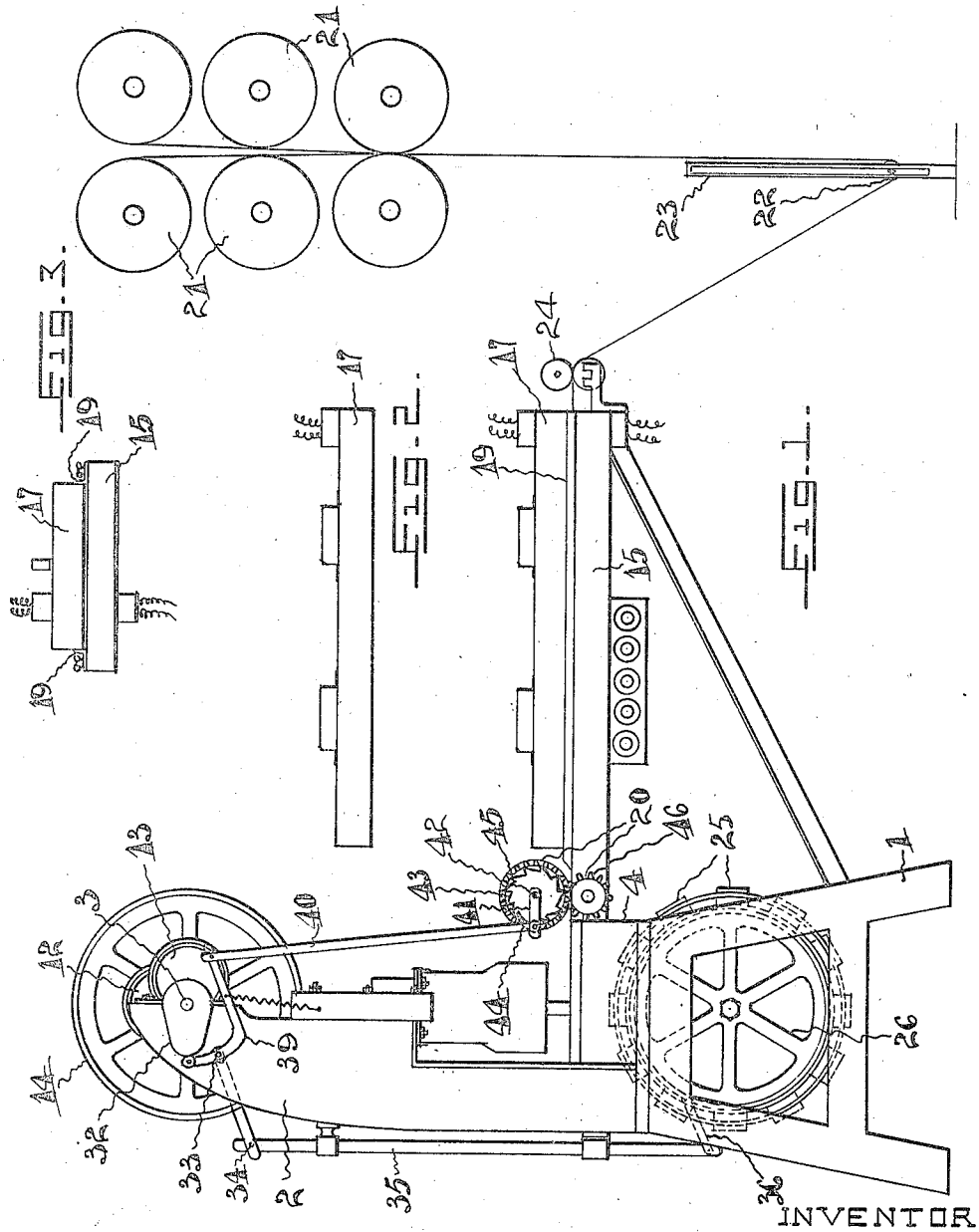


Fig. 3.

Fig. 2.

Fig. 1.

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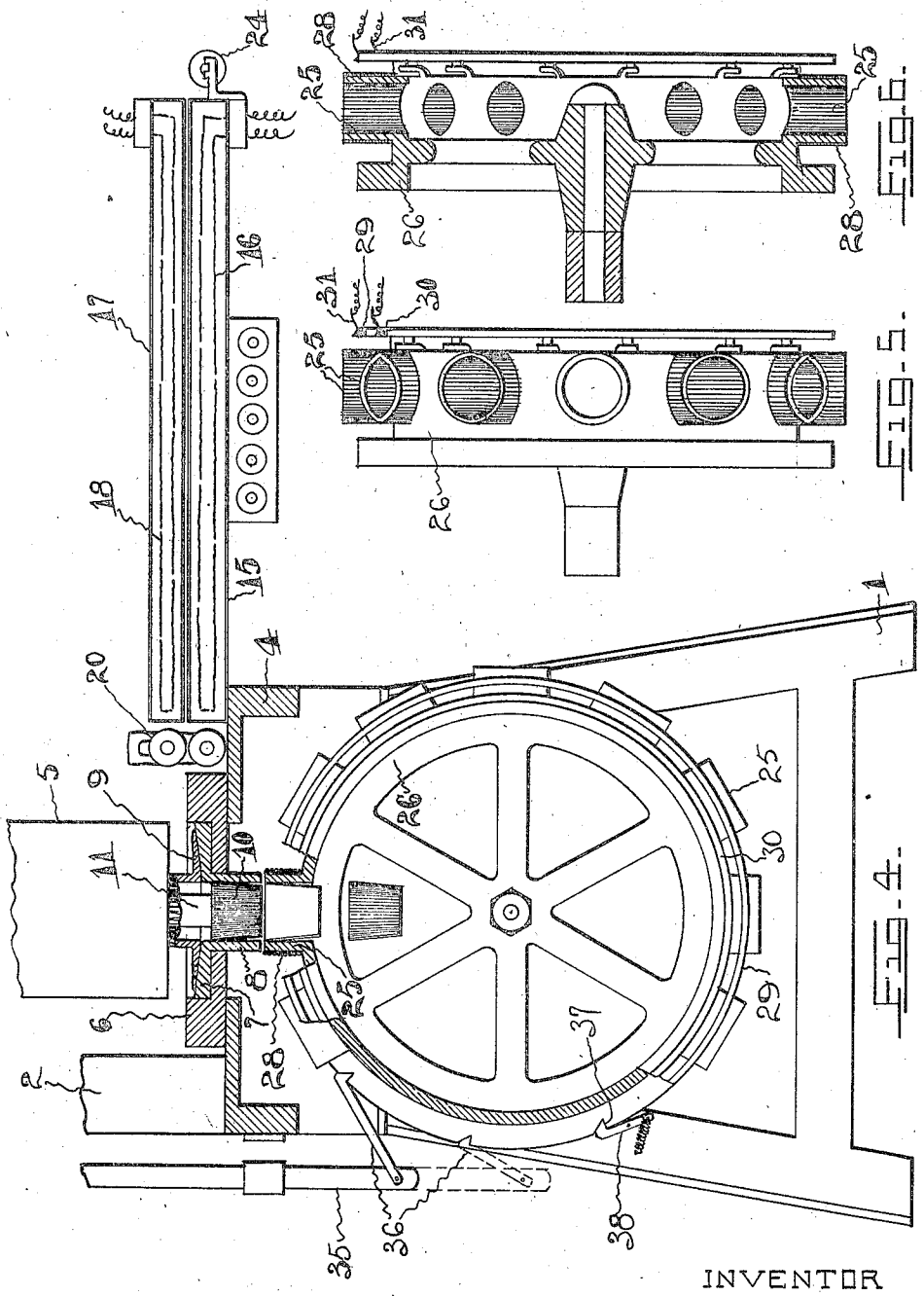


Fig. 6.

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

PETER F. BUCHANAN, OF LONDON, ONTARIO, CANADA.

CUP-MAKING MACHINE.

Application filed July 16, 1923. Serial No. 651,849.

To all whom it may concern:

Be it known that I, PETER F. BUCHANAN, a subject of the King of Great Britain, residing in the city of London, in the county of Middlesex, Province of Ontario, Canada, have invented certain new and useful Improvements in Cup-Making Machines, of which the following is a specification.

This invention relates to machines for making paper cups such for example as shown in my co-pending application No. 615843 filed Jan. 30th, 1923. In such machines the cup blanks are cut from a plurality of superimposed strips of paper and pressed to a cup form by suitable forming dies, finally passing out through a tubular forming die.

In such machines I have found that if waxed paper be employed in the manufacture of the cups that the paper requires to be heated before the dies operate upon it. I have found further, that if heated before passing to the dies, it tends to warp and buckle. It is also found that if the cups are formed from heated waxed paper that they cannot be immediately nested and packed in tubes for sale but must be cooled.

So also if moistened paper be used instead of wax paper the cups formed require to be dried and held in shape while drying.

My object therefore is to devise means for properly heating the waxed paper before it passes to the dies and for satisfactorily flattening it and holding it in flattened condition as it passes to the dies and also to provide means whereby the finished cups may be held in shape after passing from the dies for a sufficient length of time for them to cool down or to be dried out, as the case may be, before they are finally discharged for packing.

I attain my object by means of the constructions hereinafter described and illustrated in the accompanying drawings in which

Fig. 1 is a side elevation of a cup-making machine constructed in accordance with my invention;

Fig. 2 a side elevation of the upper paper heating and smoothing element;

Fig. 3 an end elevation of the paper heating and smoothing elements;

Fig. 4 a side elevation, partly in section, on an enlarged scale, of the lower part of the apparatus;

Fig. 5 a plan view of the rotary wheel which conveys the finished cups from the forming dies; and

Fig. 6 a cross section of the wheel.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

1 is the base of the machine suitably shaped to support the different parts. On this base is supported the standard 2 at the upper end of which is journalled the cam shaft 3. The table 4 is also supported on the base.

The arrangement of the forming dies is old in the art, but a brief description of the same will be given herein. 5 is a movable cutting die suitably guided on the standard 2, and this cutting die co-operates with the stationary cutting die 6, which is supported on the table 4. This die is recessed to receive the annular flange 7 of the tubular stationary forming die 8. With this flange 7 of the stationary die cooperates the movable holding and forming die 9. With the tubular stationary forming die 8 co-operates the movable die 10 carried by the plunger 11. The movable parts are all suitably supported on the standard 2 and are operated from the cam shaft 3, which is provided with eccentrics 12 and 13 for that purpose. The shaft is also provided with a pulley 14 or other means whereby it may be rotated.

The precise construction of the dies and their mode of operation is, however, immaterial for the purposes of the present invention, which mainly concerns itself with the feed of the paper to the dies and the disposal of the finished cups after they pass from the tubular die 8.

Supported from the base 1 is a stationary paper heating and smoothing element 15. This is arranged to be heated, preferably by means of an electric heating element 16 contained within it and which is conventionally shown in Fig. 4. Supported in co-operative position relative to the stationary heating and smoothing element is the movable heating and smoothing element 17, which also is provided with means whereby it may be heated, such, for example, as the electric heating element 18 conventionally shown in Fig. 4. This movable heating and smoothing element is preferably guided between flanged guides 19 secured to the element 15 by means of thumb screws as indicated particularly in Fig. 3. The paper is drawn between these elements through the medium of

the feed rolls 20 actuated as hereinafter described.

The paper is drawn from a plurality of supply rolls 21 suitably supported, the paper passing from these rolls preferably round a guide roller 22 mounted to slide in a slotted guide 23. From this guide roller 22 the paper passes between the guide rolls 24 and between the adjacent plane surfaces of the heating and smoothing elements 15 and 17.

If waxed paper be employed, the wax is melted as the paper passes between the heated surfaces and is thereby rendered soft and pliable and at the same time the paper is smoothed and held flat between these surfaces so that the tendency of heated wax paper to buckle and warp is overcome. The paper thus passes to the dies in the best possible condition for the latter to perform their functions of cutting out from the strips of paper the disks forming the cup blanks and forming these blanks into the finished cups.

To receive the finished cups, I provide a plurality of pockets 25 which are so arranged that they may successively be brought into co-operative position with the tubular die 8 to receive the cups ejected therefrom. In the preferable arrangement these are formed on the periphery of a wheel 26 mounted on a horizontal shaft 27. The pockets are preferably tubular so that cups may be pressed through them as hereinafter described, but this construction is not essential if ejecting means be provided whereby the cups may be ejected from the side of the pocket through which they enter.

This wheel is arranged to be rotated in synchronism with the feed rolls 20 as hereinafter described and in synchronism with the movements of the forming dies, the die 10 descending to the position shown in Fig. 4 and ejecting a cup or cups at such time as a pocket 25 is in a position to receive the ejected cup or cups.

From ths construction it follows that the cup or cups which are ejected from the tubular die in the heated condition are cooled as the wheel rotates, so that by the time the wheel has completed a revolution and brought the particular pocket again into alinement with the tubular die, the ejection of the next cup or cups from the tubular die forces the cup already in the pocket out of the pocket as indicated in Fig. 4.

If moistened paper be used instead of waxed paper for the formation of cups, the members 15 and 17 will not be heated and it may be desirable to remove the upper heating element. In this case, however, the wheel 26 with its pockets 25 has to perform the function of drying the finished cups. For this purpose I provide means for heating the pockets 25. For this purpose I provide each pocket with an independent electric heating element 28. These elements are all connected with the circular contact plates 29 and 30 suitably supported on and insulated from the wheel. Power is fed to these plates through the medium of brushes 31 from any suitable source of supply.

The wheel 26 and the feed rolls 20 are operated by the following mechanism. On the cam shaft 3 is secured a cam 32, which is adapted to engage one end of a bent rock arm 39 secured to a shaft 33 journalled in the standard 2. One arm of this bent rock arm is connected by means of a pin and slot connection 34 with a slide rod 35 suitably guided on the standard 2. The lower end of this rod carries a pivoted dog 36 which is adapted to engage the ratchet wheel 37 formed on or connected with the wheel 26. A spring actuated retaining dog 38 is also provided to retain the wheel 26 as moved by the pivoted dog 36. Another arm of the bent rock arm 39 is connected by means of a pivoted connecting rod 40 with an arm 41 pivoted on the spindle 42 of a ratchet wheel 43. This arm 41 carries a dog 44 adapted to co-operate with the ratchet wheel. It will be seen that the ratchet wheel 43 will be operated synchronously with the wheel 26.

The ratchet wheel is connected with a gear wheel 45 secured to the spindle of the upper feed roll 20, which also meshes with the gear wheel 46 secured to the spindle of the lower feed roll 20, so that both rolls are driven. Any other means, however, than that described may be provided for actuating the wheel 27 and the feed rolls 20.

From the above description it will be seen that I have devised mechanism which will satisfactorily attain the object of my invention as set out in the preamble of this specification and that the paper fed will be suitably heated and smoothed before passing to the dies and the finished cups thereafter cooled, and that when the machine is operating on moistened paper, the finished cups may be satisfactorily dried.

It should be understood that by the term "paper" in this specification and claims, I mean not only any material commonly known as paper, but also any substitutes therefor and any material which can be satisfactorily handled by the machine.

What I claim as my invention is:—

1. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; and means for heating the paper as it is fed to the dies.

2. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; and means for heating and pressing the paper as it is fed to the dies.

3. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; a heated surface over which the paper passes to the dies; and

means for holding the paper in contact with said surface.

4. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; and two heated surfaces between which the paper passes to the dies, said surfaces being yieldingly pressed towards one another.

5. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; a plane heated surface over which the paper passes to the dies; and means for holding the paper in contact with said surface.

6. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; and two plane heated surfaces between which the paper passes to the dies, said surfaces being yieldingly pressed towards one another.

7. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; a stationary plane, heated surface over which the paper passes to the dies; and a movable plane heated surface adapted to rest on top of the paper on the aforesaid stationary surface and mounted so as to be vertically movable.

8. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies, said dies including a tubular forming die and a plunger adapted to eject formed cups through said tubular die; a rotatably mounted wheel provided with a plurality of peripheral pockets adapted to be brought into alinement with the tubular die to receive cups ejected therefrom; and means for heating said pockets.

9. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies, said dies including a tubular forming die and a plunger adapted to eject formed cups through said tubular die; a rotatably mounted wheel provided with a plurality of peripheral pockets adapted brought into alinement with the tubular die to receive cups ejected therefrom; an electric heating element applied to each pocket; and concentric contact rings on said wheel to which the heating elements are connected.

10. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; a plane surface over which the paper passes to the dies; and means for holding the paper in contact with the said surface.

11. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; and two plane surfaces between which the paper passes to the dies, said surfaces being yieldingly pressed towards one another.

12. In a cup forming machine the combination of forming dies; means for feeding a web of paper to the dies; a stationary heated surface over which the paper passes to the dies; and a movable heated surface adapted to rest on top of the paper on the aforesaid stationary surface and mounted so as to be vertically movable.

13. In a cup forming machine, the combination with cup forming mechanism, of means for feeding a plurality of strips of paper thereto and a plurality of heating units between which the strips of paper are passed.

14. In a cup forming machine, the combination with mechanism for shearing cup blanks, of feeding mechanism for feeding a strip of paper to said shearing mechanism comprising a feed table having a heating unit thereon under which the strip of paper is adapted to pass.

15. In a cup forming machine, the combination with cup forming mechanism, of mechanism for feeding strips of paper to said forming mechanism, and heating means between which the strips of paper are passed during the feeding movements thereof.

16. In a cup forming machine, the combination with cup forming mechanism, of mechanism for feeding strips of paper thereto comprising a feed table, a heating unit on said feed table under which the strips are adapted to pass, and heating means beneath said table.

17. In a paper cup forming machine, the combination with cup forming mechanism, of mechanism for feeding strips of paper to said forming mechanism, and a plurality of electrically heated units defining a heated path through which said strips of paper travel.

Signed at Toronto Can. this 6th day of July 1923.

PETER F. BUCHANAN.