

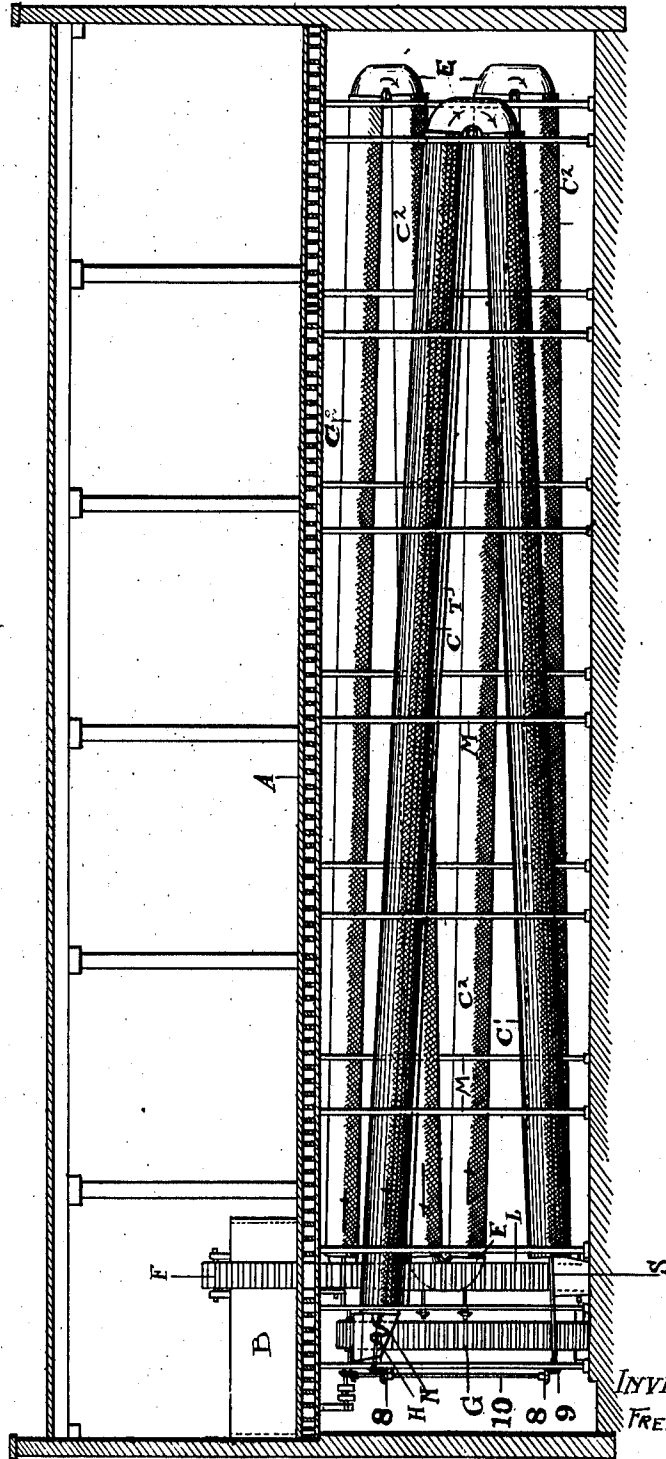
F. BECKER.
 APPARATUS FOR MANUFACTURING MACARONI.
 APPLICATION FILED APR. 12, 1911.

1,004,346.

Patented Sept. 26, 1911.

4 SHEETS-SHEET 1.

FIG. 1.



ATTEST
 C. M. Fisher
 J. C. Munn.

INVENTOR
 FRED BECKER

By Fisher & Munn ATTYS.

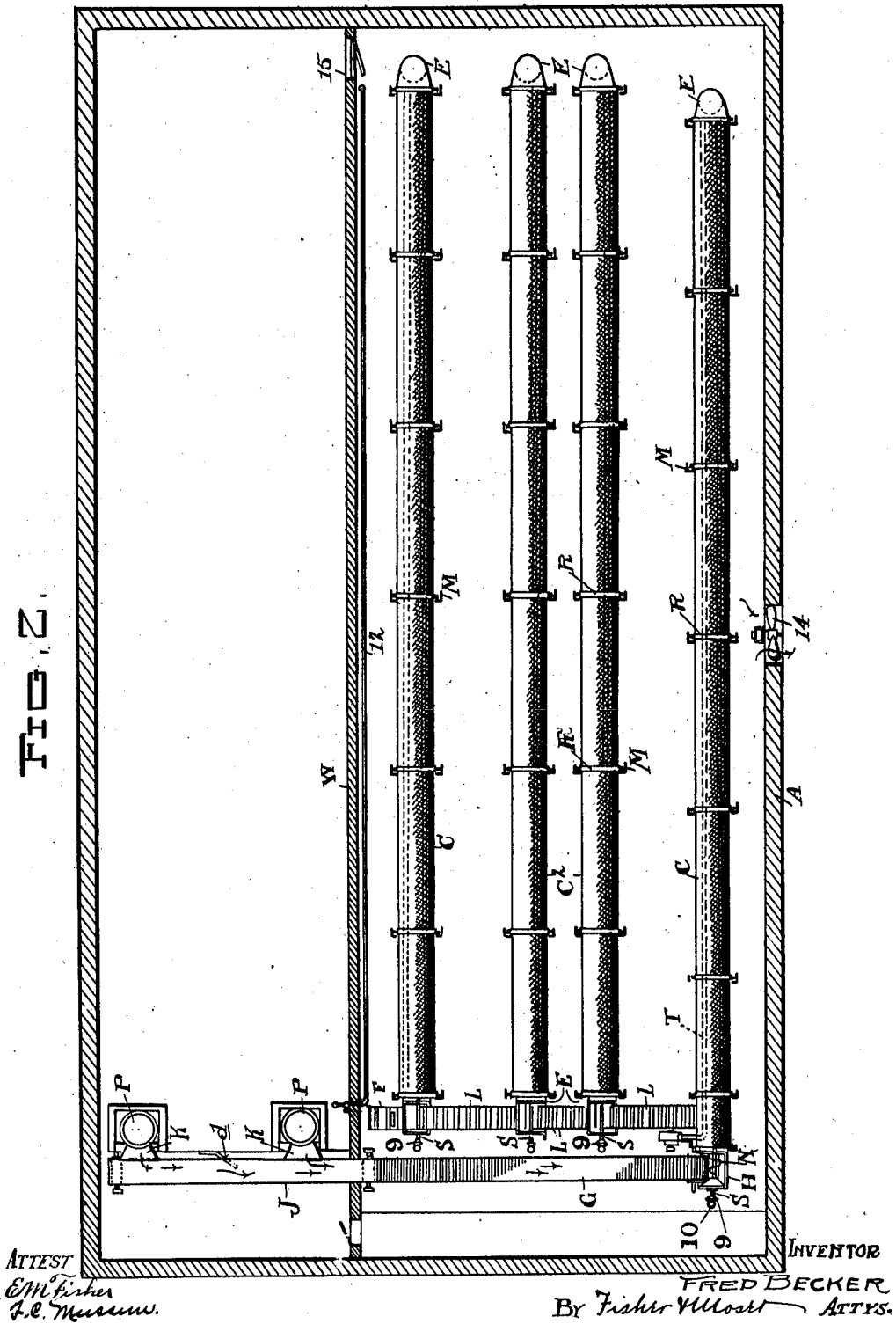
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4 SHEETS—SHEET 2.

FIG. 2.



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4 SHEETS—SHEET 3.

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FIG. 5.

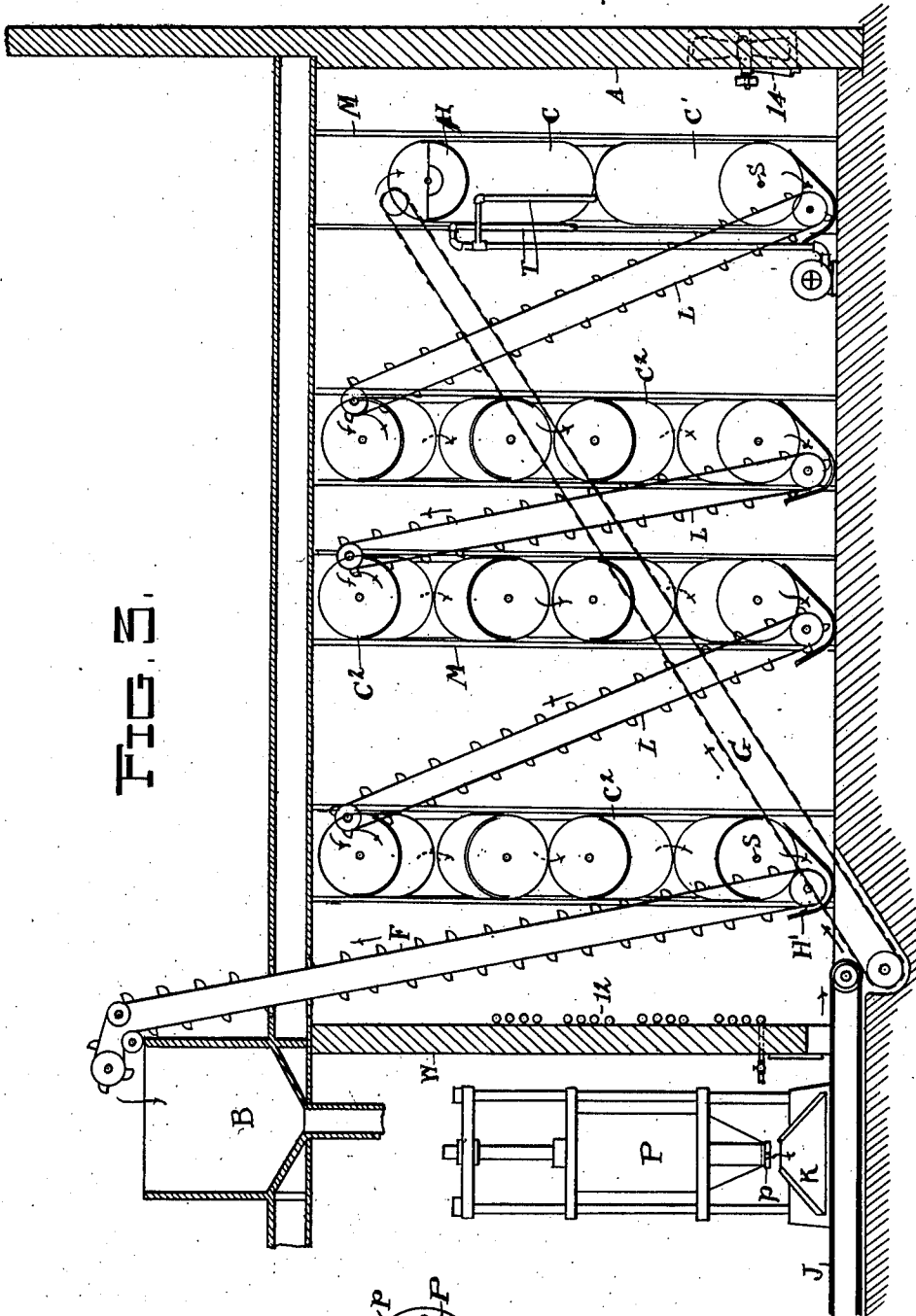
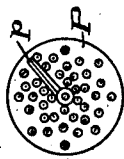


FIG. 7.



ATTEST
 E. M. Fisher
 J. C. Munn.

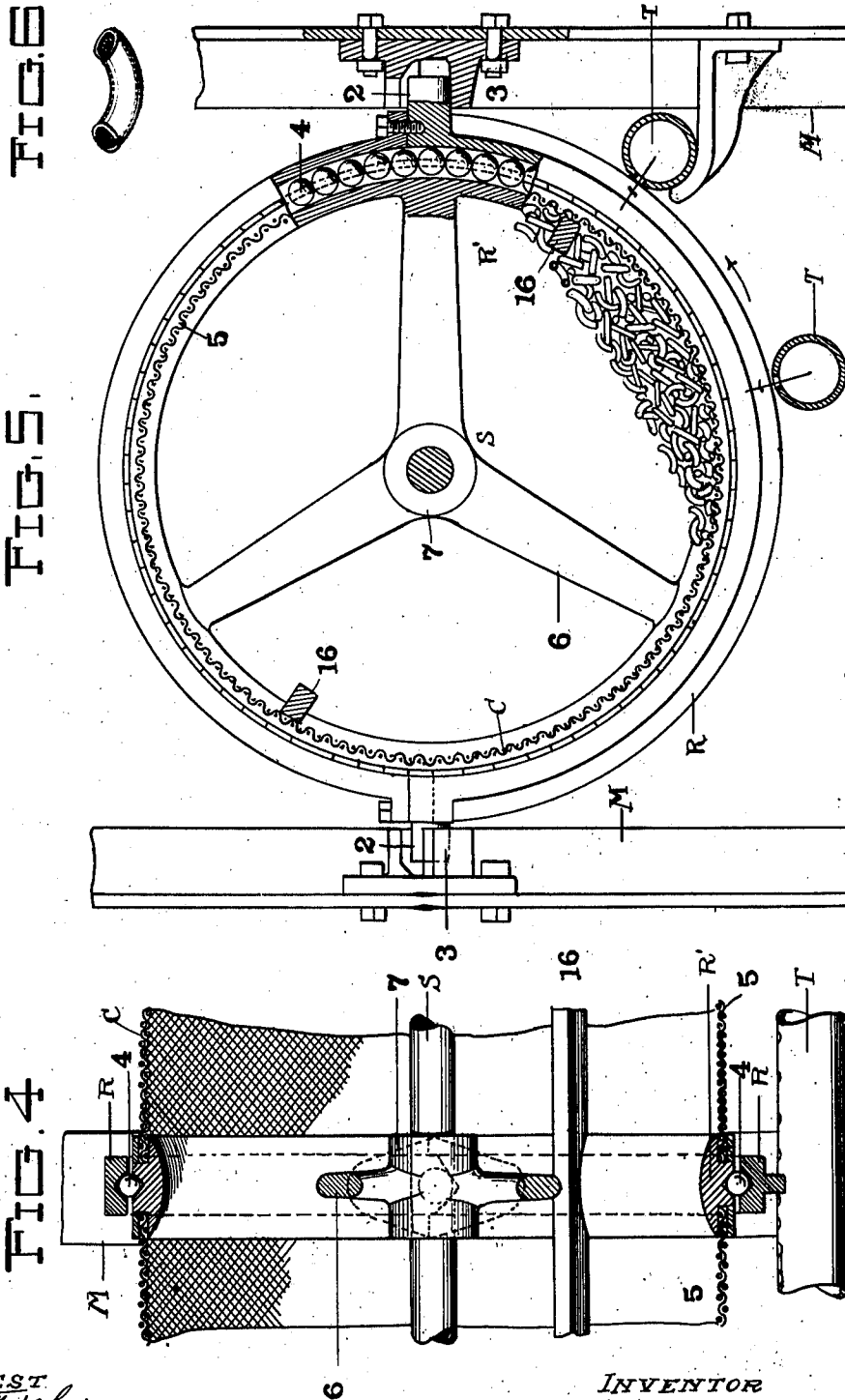
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4 SHEETS—SHEET 4.



ATTEST
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UNITED STATES PATENT OFFICE.

FRED BECKER, OF CLEVELAND, OHIO.

APPARATUS FOR MANUFACTURING MACARONI.

1,004,346.

Specification of Letters Patent.

Patented Sept. 26, 1911.

Application filed April 12, 1911. Serial No. 620,545.

To all whom it may concern:

Be it known that I, FRED BECKER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Apparatus for Manufacturing Macaroni, of which the following is a specification.

My invention relates to a method of and apparatus for manufacturing macaroni, all substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of the apparatus, and Fig. 2 is a plan view with the top removed. Fig. 3 is a front end elevation, largely diagrammatic. Fig. 4 is a considerably enlarged sectional elevation of a portion of one of the drying cylinders taken on the line of one of its bearings, and Fig. 5 is a cross section of a cylinder and its bearing support as shown in Fig. 4. Fig. 6 shows a dried product of the machine. Fig. 7 is a bottom view of the cutter mechanism.

The invention consists of an apparatus rather than a drying room with racks, and the main and essential parts of the apparatus are a series or successively connected open-work drying cylinders indicated by C and C' as to the first two cylinders and by C² respectively for the succeeding sets of cylinders as will be seen further along. As to these I may say now that they are arranged at such inclination one to the other in both the first two as a pair and in the succeeding sets that they will automatically feed or carry the stock being dried forward at a speed or rate which has been predetermined and which is provided for in the respective inclinations at which the cylinders are supported. The stock being in its most moist state at first the first two cylinders, C and C', are given more inclination than those following, and this is necessary because at first the stock is sluggish and slow to travel owing to its moisture and weight but farther along it travels more readily and hence does not need so much inclination in the cylinders to facilitate its travel. The stock is designed to be kept on the move from start to finish and hence traverses one cylinder after the other successively to the end where it is delivered ready for packing and the market. The supply of the fresh stock comes to cylinder C from feed hopper H and is delivered to

said hopper as we shall presently see, while the finished product passes out of the delivery end of the last of the series of cylinders into the receiving hopper H' from where it is carried up by endless carrier F into the bin B. The total line of travel from hopper H to hopper H' is necessarily of considerable length and requires about eight to ten hours, or to be nearer to the exact time, say about nine hours. Speed of rotation of the cylinders, their inclination and their length are factors in determining the duration of exposure, and incidentally the degree of heat or temperature maintained. Ordinarily a temperature of 100 degrees F. in the drying room is sufficient but which is supplemented as to the first two cylinders by special air blasts through pipes or tubes T which blasts are preferably warm though not necessarily.

Referring to Fig. 5 particularly, it will be seen that said blasts T are arranged outside of the drying cylinder and in relation to the rising side of the cylinder where there always is an accumulation of the macaroni. The said blasts are enabled to do their most effective work in this position or relation because there is no waste of the blast in the open or where the stock is thin or scattered but is delivered bodily against the mass at the surface of the cylinder where it is most effective. In the rotation of the cylinders, which is say ten revolutions per minute, there is a natural tendency in the stock to work toward the rising side of the cylinders, Fig. 5, and hence I place the said air supply tubes on that side to deliver the air directly to the surface of the stock. In respect to length of cylinders I suggest fifty to seventy five feet as the best, and an inclination of one foot to fifty or sixty feet length works very well. Ordinarily the cylinders are twenty to twenty-five inches across and are made of a suitable wire mesh so as to perfectly expose the stock to the drying action while it is agitated and turned over and over in its travel. In this connection it may now be observed that said cylinders are arranged in sets side by side relatively as seen in end view Fig. 3, and the cylinders C and C' are at the right in said view and the other sets have four cylinders each, all said cylinders in each set being connected by elbows E. Between sets I employ endless lifts L having buckets or their equivalent to receive the stock from the

discharge end of one set of cylinders and deliver it into the upper or receiving end of the other set. These lifts or conveyers are kept constantly and uniformly at work by any suitable means while the apparatus is in operation. To begin with the stock is delivered to the upper or receiving end of cylinder C by conveyor or belt G, and the said belt is supplied by another belt J horizontally disposed beneath the feed spouts K which receives the stock from the macaroni press or presses P. These presses give the macaroni its tubular form, and it is cut into short lengths as seen in Fig. 6 by a rotatable cutter P usually arranged at the bottom of the press, and shown in Fig. 7. From these cutters the macaroni drops onto the chute K and thence onto the endless carrier J, Fig. 2, and is delivered thereby onto conveyor G. Of course all the several conveyers are wide enough to avoid falling off of the stock at their otherwise unguarded sides. There being two presses feeding onto conveyor J I have found it best to provide an inclined deflector *d* between the presses in position to crowd the macaroni from the first press outward on the belt to make room thereon for the stock from the next press.

The apparatus as thus described is provided with a walled inclosure A and an inside housing for the cylinders narrowed by the lengthwise wall W as shown herein. However the matter of inclosure will always depend more or less on the installation in other particulars and I may adopt a building or room already erected and fix it over to suit my needs. Economy of heat and space however suggest a fairly close apartment for the drying cylinders. The said cylinders being of considerable length I provide bearings therefor at regular intervals from end to end, say one every eight to ten feet. These bearings are shown in Figs. 4 and 5, and are related to angle iron posts or uprights M at either side forming part of a fixed and rigid frame-work and having rings R provided at opposite sides with trunnions 2 supported in bearings 3 on said posts. The said rings are made in two semi-circular parts bolted separately together and each ring has a ball race and carries anti-friction balls 4 which are engaged and confined by the inside rings or belts R' constituting parts of the cylinder and having the wire mesh or screen 5 secured in the opposite edges thereof. The said inner ring or band is formed with radial supporting arms 6 from the hub 7 thereof, and a shaft S runs through all said hubs the entire length of the cylinders and serves as a medium for applying power for the rotation of the cylinders. As to these means, they may be of any suitable kind and construction, but at the present time I connect up with bevel gears 8 and 9 and drive shaft 10,

Fig. 1, and with any suitable source of power.

The several cylinders being arranged to revolve independently of each other, the end connecting elbows E are necessarily separate parts supported by any suitable means to hold the right relations to said cylinders. Usually the receiving end of the elbow is open on top which affords access from without if for any reason it should become clogged, and the shafts S go through the said elbows at the front end of the cylinders.

The requisite heat of say 100 degrees F. for the drier chamber may be supplied by any suitable means, but in the present case I show steam pipes 12 along the wall W for this purpose, and an exhaust fan 14 is located at the side and bottom of the chamber by means of which the steam laden air is drawn off and fresh air from a clean source is taken in through inlet 15.

The present method of drying has many advantages over the old method besides those of economy and cleanliness and among these is the greatly improved quality of the goods. Thus, by handling the stock after the method herein set forth I can not only make the stock much thinner than was practical to handle formerly but it is given a polished or glassy appearance not possible before and which makes it exceedingly attractive to the eye. Then again there is absolute uniformity in the goods and no portion of it is tainted by reason of having laid too long in one position or from other cause, and each and every particle or piece is dried exactly like all the others.

Owing to the great length of the cylinders, say sixty feet, as compared with the small width of eighteen to twenty inches and the fact that the entire length is of wire except the few bearing rings R', there is need that the supports for the cylinders be more or less flexible or yielding and hence the bearings R have pivot trunnions on which they can turn more or less and thus accommodate the somewhat sinuous rotation of the cylinders. It will be understood that the shaft S has no bearings of its own and that it is designed to convey rotation to the cylinder and therefore is rigid with the successive ring hubs 7. It will also be observed in this connection that there are lift blades or bars 16 oppositely disposed in the cylinders and which are deemed sufficient to promote the agitation of the stock along with the fact of rotation and inclination of the cylinders.

The fine surface polish or finish of the macaroni is particularly conspicuous as compared with the rough scale surface on the old kind, and the fact that it is cut into uniform lengths and requires no breaking when it comes to cooking is a labor saving economy. Furthermore by reason of it be-

ing thinner than the old macaroni shortens the time of cooking by about one-half and saves fuel accordingly. These and other advantages result directly from this improved method of making macaroni and places the apparatus claimed in an exclusive class so far as I know or believe. That is, I do not know that any one ever before even tried the experiment of drying macaroni in or by means of a machine which takes the macaroni from the presses and automatically carries the same forward from its given moist and plastic state to a perfectly dried state and dries it as it travels without being handled or manipulated by hand from the beginning to the end of operations.

The macaroni being wet and plastic when first delivered into hopper H there is a decided tendency for it to compact and choke the feed at this point. I therefore prefer to employ an initial feeding device within hopper H, such as a screw conveyer N or its equivalent, see Fig. 1.

Referring now more especially to the method contained herein of drying macaroni and in order to understand the same as it enters and improves the art, it should be understood that in the manufacture of macaroni by the only other method known prior to my present invention it was necessary to expose the macaroni in pans on suitable shelves or racks for a continuous period of five to eight days. This had to be done under continuous and sustained drying conditions in a relatively high and uniform temperature, and during this long time the drying pans were necessarily under constant vigilance and stirred at frequent intervals to prevent portions of the macaroni from souring and to promote uniform drying, especially in damp weather. This slow process of drying of course required a large building or drying house if a large business was conducted, and since all the stirring had to be done by the hands and the drying rooms naturally attracted swarms of flies in summer, the operation was and is exceedingly obnoxious from a sanitary point of view. In addition the process was exceedingly expensive in the maintenance of housing room, drying racks and pans and the large pay roll for help to handle and care for the stock. By my new and original method I can do several hundred per cent. more work within a mere fraction of the total area or space formerly required and by means which totally eliminate personal handling of the stock and under conditions which are absolutely healthful and above reproach in respect to cleanliness. A considerably lower temperature can be used than formerly because the stock is under constant agitation or tumbling in the cylinders, whereas before it lay upon drying

pans with paper beneath and over the top to prevent uneven drying and consequent bending of the macaroni sticks. The said drying room is a separate and inclosed space from which outside air is excluded except as a means of ventilation to keep the air pure and dry. All the drying cylinders are located in this room and the stock is delivered thereto from the macaroni press by means of endless conveyers. It follows that the entire operation is mechanical even to the filling of the packages for market, not shown, and the operation does not cease from press to sealed package. Furthermore, the entire time from press to package does not usually exceed ten hours.

In the drying operation as herein set forth a new and original step in the process consists in rolling or tumbling the macaroni over and over again continually from beginning to end of the drying process, and the wire mesh of the cylinders is just close enough to prevent the stock from falling through. In fact the constant rolling of the macaroni and the consequent rubbing or abrasion of the bits or pieces against each other as they rise and tumble *en masse* in the cylinders is necessary to obtain the highly polished and attractive surface which characterizes the product as turned out by my process compared with the product of the old process hereinbefore described and in which the surface is rough and unattractive. Furthermore, this highly finished product is possible only with short pieces of macaroni cut to curvature in the pieces as, manifestly, it would be impracticable to handle stick macaroni in this way and short straight pieces would stick together. Rather the pieces of macaroni must be of such character that from the time they enter the cylinders till they are discharged they will be individually free and adapted to intermix and roll and tumble in perfect freedom. My process therefore is limited to use with macaroni which has been cut into short bits or pieces about an inch in length and which are slightly curved between their ends and which hold this shape permanently.

What I claim is:

1. A drying apparatus for macaroni comprising a series of separate cylinders inclined at different angles and constructed with open mesh walls, and air blast tubes arranged parallel with and adjacent to the cylinder inclined at the greatest angle.

2. In a drying apparatus as described, an open-mesh cylinder divided into sections and having inner band wheels uniting the same and a drive shaft centrally through said cylinder upon which said band wheels are mounted, and a rotatably-suspended bearing member to rotatably support said cylinders at said band wheels.

3. In macaroni drying apparatus, an open work flexible cylinder formed in a plurality of sections lengthwise and supporting means for said cylinder comprising 5 wheels at intervals with annular bands to which the ends of said sections are affixed, in combination with outside annular bearings for said band wheels and a shaft fixed centrally in said wheels and supported 10 thereby.

4. In macaroni drying apparatus, a wire mesh drying cylinder formed in sections lengthwise and supports therefor comprising wheels having circular bands connect- 15 ing said sections, stationary rings formed in separable sections and provided with anti-friction rollers supporting said wheels, and a drive shaft rigidly connecting said wheels.

20 5. In apparatus for drying macaroni, a flexible drying cylinder consisting of a series of sections and wheels at intervals between its ends having rims uniting said sections, in combination with a fixed frame 25 and rings having trunnions pivotally mounted in said frame and ball bearings between said rings and said wheels, thereby adapt-

ing said supports to the more or less sinusoidal movements of said cylinder.

6. The method of drying macaroni as it 30 comes from the forming press save that it has been cut into short pieces as described, the same consisting in subjecting the macaroni to a rolling action *en masse* under drying 35 conditions and causing the pieces to intermix with each other and abrade and polish the exposed surfaces.

7. The method of making macaroni consisting, first, in reducing the macaroni tubes in the condition in which they issue from 40 the forming press to short curved pieces as described, then exposing the same to drying influences *en masse* and at the same time maintaining agitation accompanied by tumbling of the stock over and over upon itself 45 in a continuous operation until the macaroni is perfectly dried and polished.

In testimony whereof I affix my signature in presence of two witnesses.

FRED BECKER.

Witnesses:

E. M. FISHER,
F. C. MUSSUN.