No. 703,116. Patented June 24, 1902.

W. S. & C. I. CORBY.

MACHINE FOR WORKING AND SHAPING DOUGH.

(Application filed Mar. 11, 1898.)

(No Model.) 3 Sheets—Sheet 1.

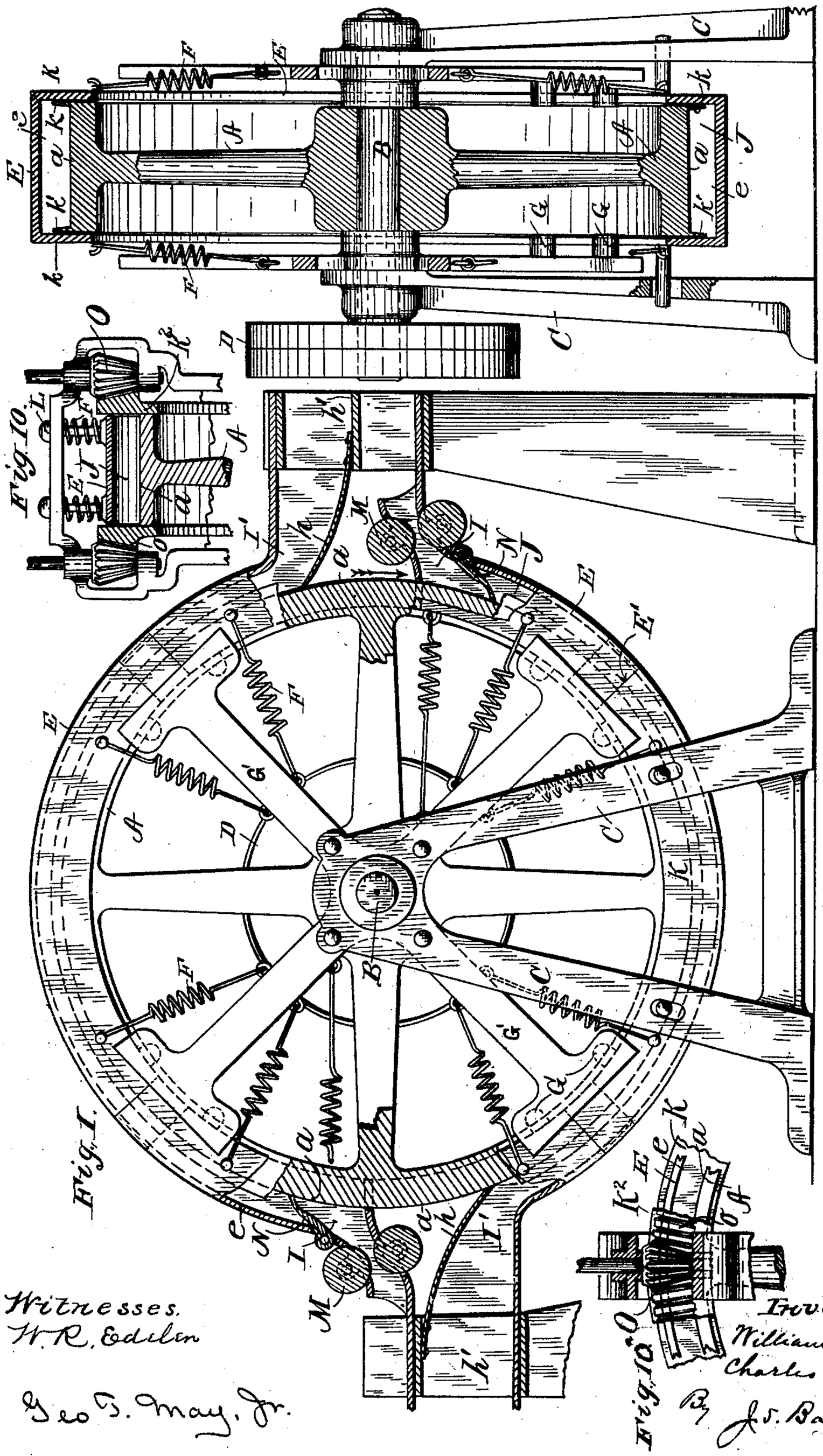

Fig. 2.

Fig. 10.

Fig. 1.

Fig. 3.

Witnesses.
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(No Model.) 3 Sheets—Sheet 2.

Fig. 8.

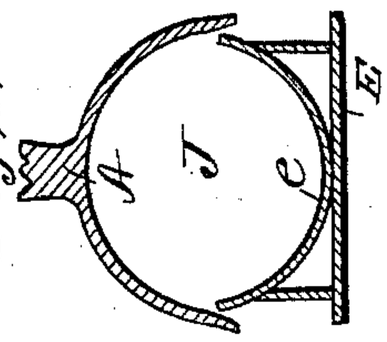

Fig. 9.

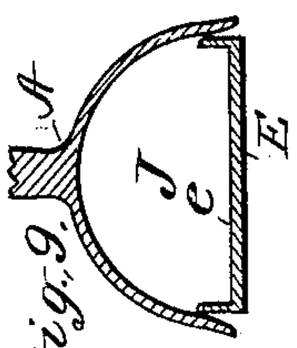

Fig. 7.

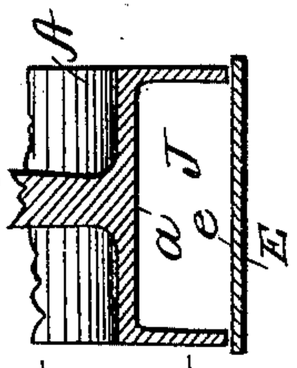

Fig. 6.

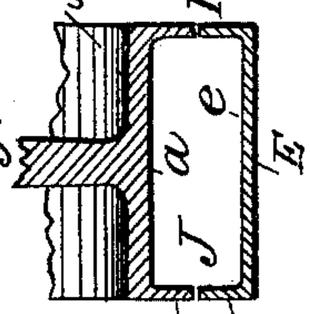

Fig. 4.

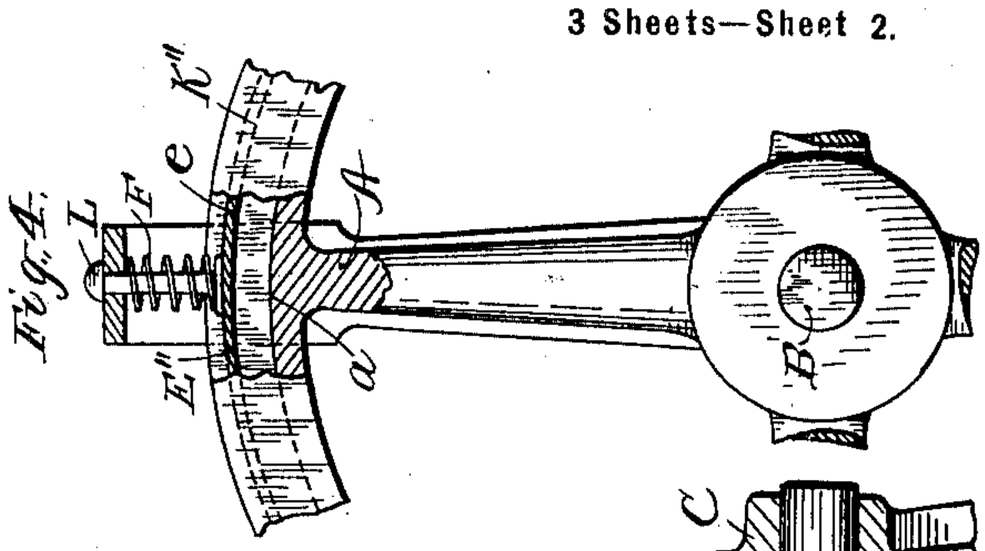

Fig. 5.

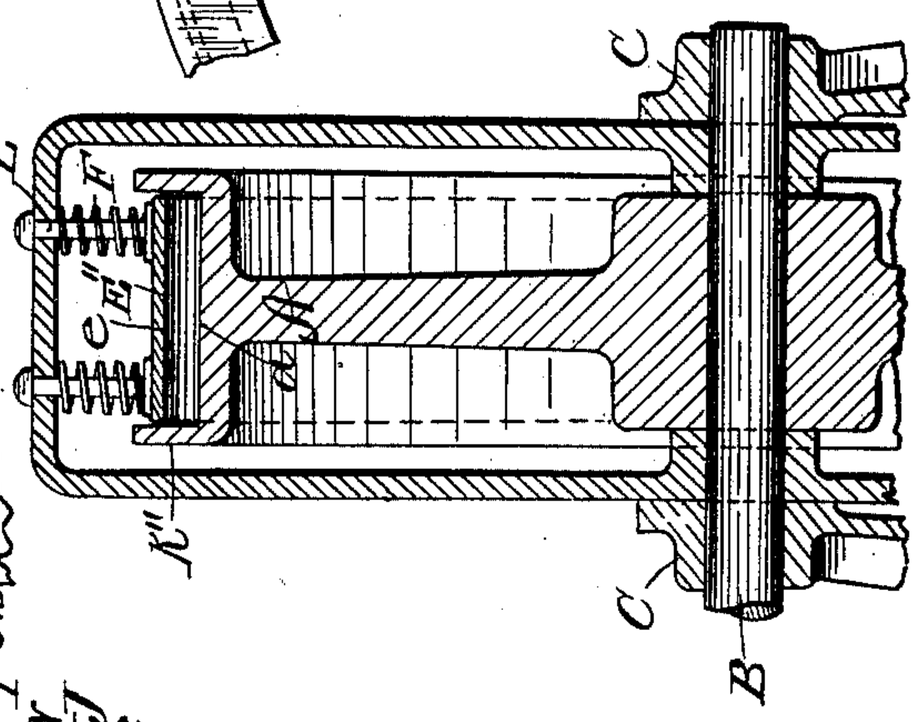

Fig. 3.

Witnesses.
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No. 703,116. Patented June 24, 1902.

W. S. & C. I. CORBY.

MACHINE FOR WORKING AND SHAPING DOUGH.

(Application filed Mar. 11, 1898.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 11.

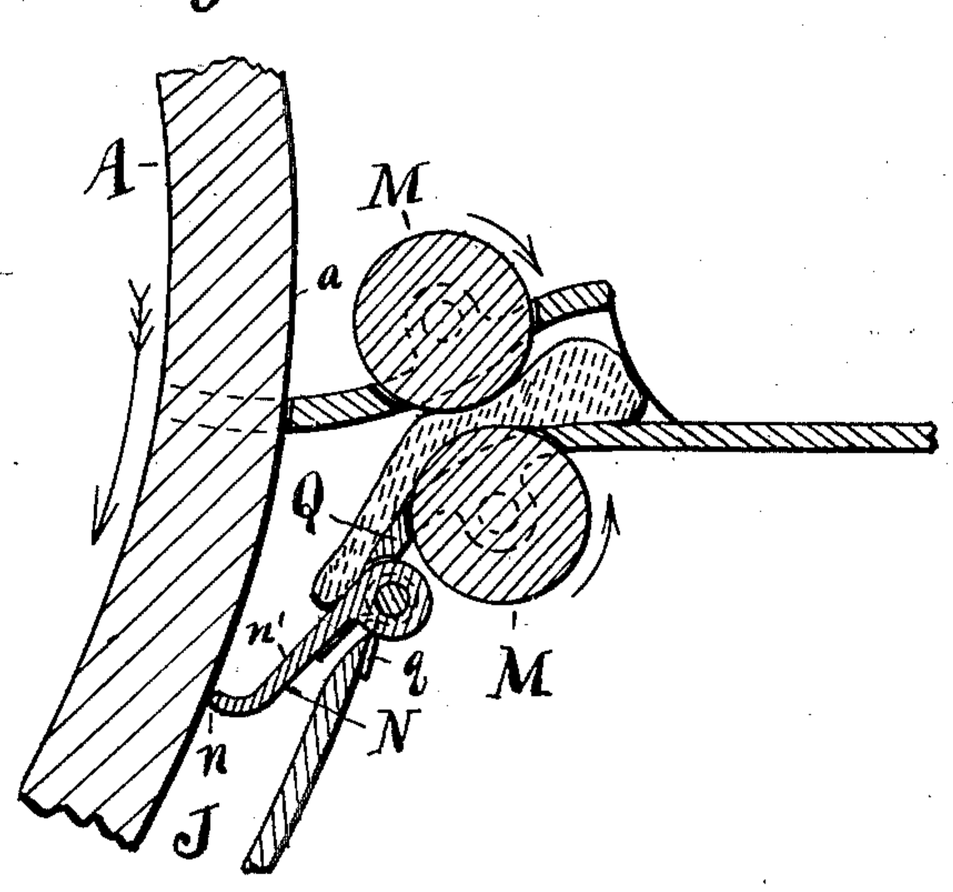


Fig. 12.

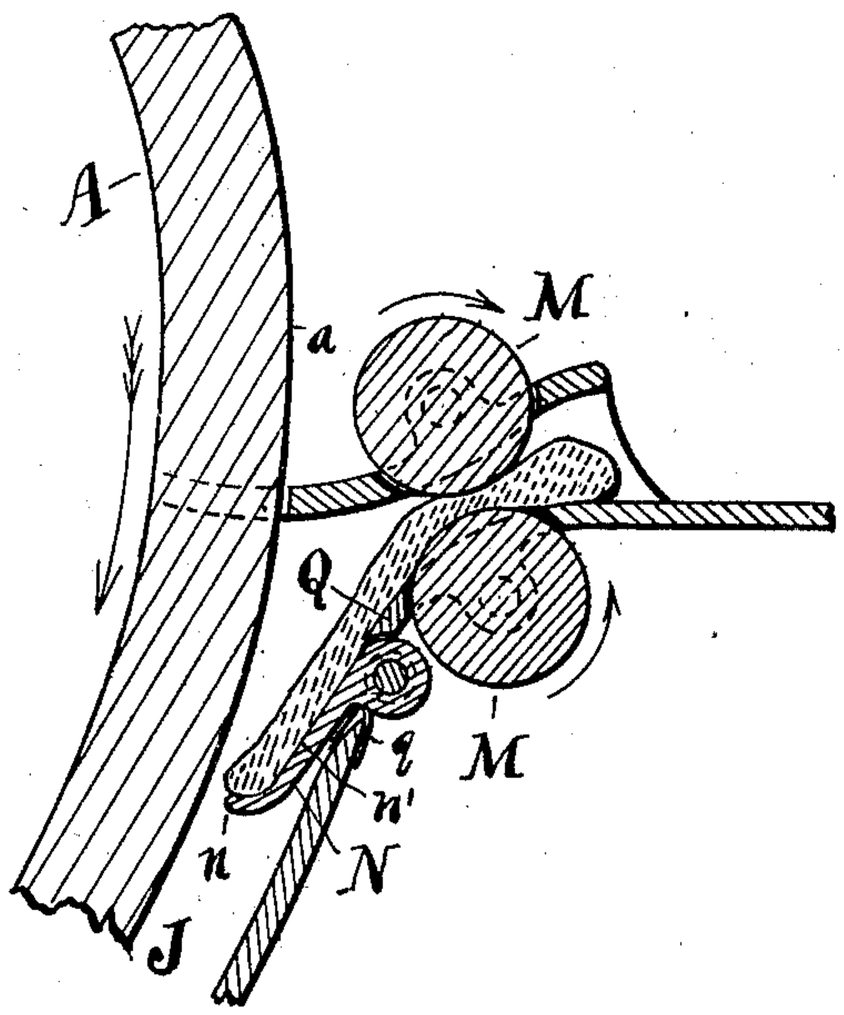


Fig. 13.

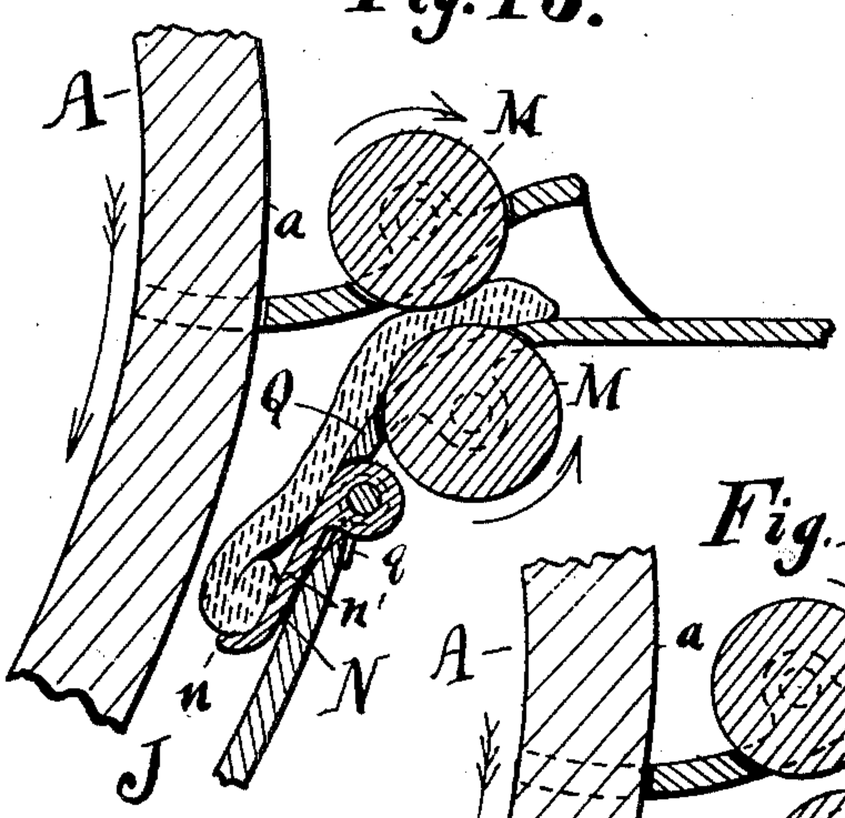


Fig. 14.

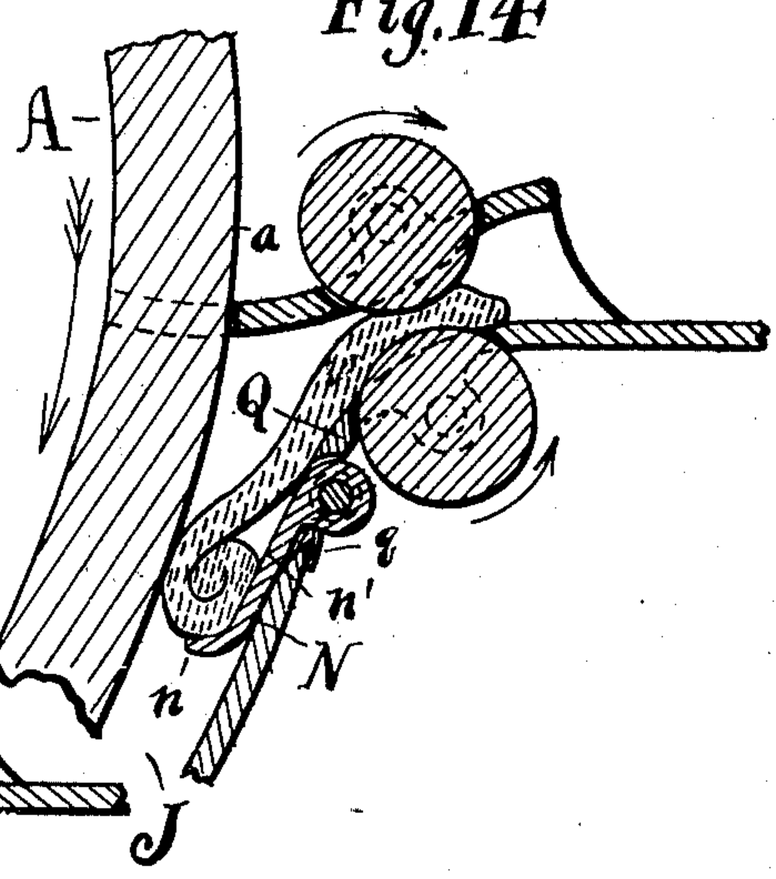
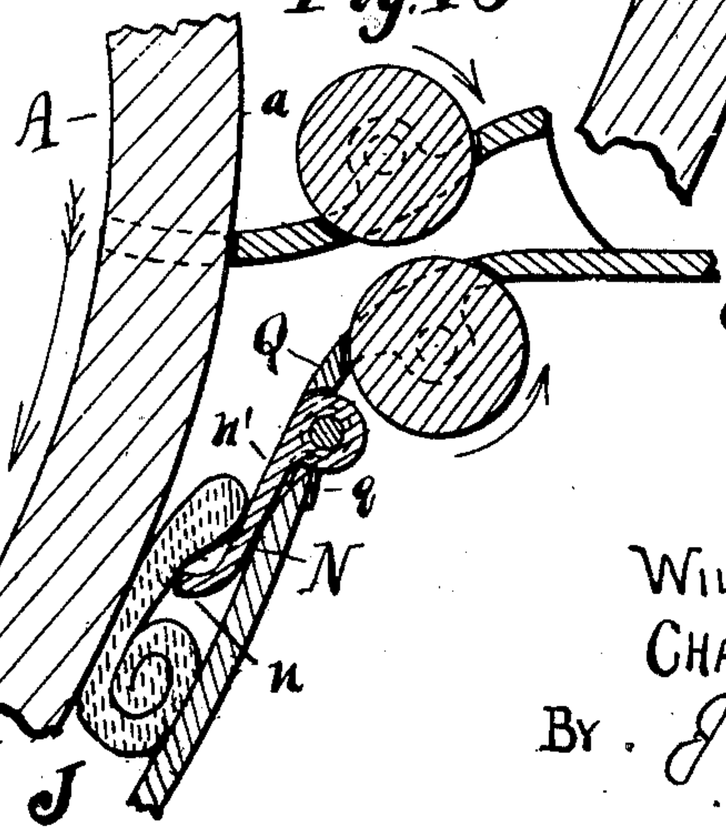


Fig. 15.



WITNESSES.
C. H. Woodward.
Geo. E. Hopkins

WILLIAM S. CORBY
CHARLES I. CORBY, INVENTORS.
BY J. S. Barker ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM S. CORBY AND CHARLES I. CORBY, OF WASHINGTON, DISTRICT OF COLUMBIA.

MACHINE FOR WORKING AND SHAPING DOUGH.

SPECIFICATION forming part of Letters Patent No. 703,116, dated June 24, 1902.

Application filed March 11, 1898. Serial No. 673,470. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM S. CORBY and CHARLES I. CORBY, citizens of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Machines for Working and Shaping Dough, of which the following is a specification.

Our invention has for its object to produce a novel and improved apparatus for working and shaping dough and similar substances; and it consists of the improvements in and the novel combinations of parts in such an apparatus, as will be hereinafter described.

In order that our invention may be the better understood, we have in the accompanying drawings illustrated several forms thereof; but we do not wish to be understood as intending to limit our invention in its useful applications to the specific forms of apparatus which we have delineated for the purpose of illustrating and enabling a better comprehension of our invention and of this specification.

In such drawings, Figure 1 is a side elevation of an apparatus embodying certain of our improvements, parts of the apparatus being broken away and parts in vertical section. Fig. 2 is a central transverse sectional elevation of a machine like that shown in Fig. 1. Fig. 3 is a side elevation, parts being broken away and parts in section, of an apparatus similar to that shown in Fig. 1, except that but a single feed and a single discharge are provided. Figs. 4 and 5 are respectively a sectional elevation and a transverse vertical section of a sufficiently large part of an apparatus embodying other forms of our invention to illustrate such forms. Figs. 6 to 9, inclusive, are detail sectional views to be hereinafter described in detail. Fig. 10 is a cross-sectional view of a part of an apparatus embodying another form of our invention, and Fig. 10^a is a sectional elevation of the same. Figs. 11 to 15 are detail sectional views, drawn on a larger scale than the other views and illustrating the successive steps in the starting of the formation of a dough loaf by means of the apparatus illustrated in the other views.

These improvements relate to a type of apparatus for working and shaping dough in which dough masses are carried through an elongated passage-way and are therein operated upon by a movable part or member of the apparatus which advances them through the passage-way and at the same time by a part or member of the apparatus which opposes the advancing member and operates to resist the free advancement of the masses, the result being that while the masses are bodily carried forward they are at the same time rolled over and over and compressed, being by such operations formed into loaves of substantially cylindrical shape or a shape which is substantially circular in outline if transversely cut at any point. An example of this type of machine is shown in our Patent No. 590,133, dated September 14, 1897. In that patent is shown an apparatus having a horizontally-arranged dough passage-way, wherein the advancing member is an endless belt and the opposing pressure or resistance member is a yieldingly-supported pressure-board. In the embodiment of our invention forming the subject of this present application the passage-way is curved or annular in shape, the advancing member of the apparatus is the face of a wheel or roller, and the resistance or pressure member is a casing or shield mounted adjacent to the movable face of such wheel.

In the drawings, A represents a wheel mounted upon a shaft B, supported in bearings in a suitable framework C. The wheel is preferably of relatively large diameter and has a broad face or periphery *a*. It is driven in any suitable manner, fast and loose belt-pulleys D being represented upon the shaft B for this purpose. A casing E surrounds the wheel. It has an inner face *e*, which is parallel with the face *a* of the wheel when the parts are in their normal positions. The casing is made up of a plurality of sections E′, preferably arranged end to end, with their adjacent ends telescoping one into the other, as represented in Fig. 1. These sections are yielding relative to the wheel A—that is to say, they are so supported that they may move as a mass of dough or other material passes between the faces *a* and *e*, and hence change the cross-sectional area of the passage-way

for the dough. As represented in Figs. 1, 2, and 3, each section is connected with the framework C by one or more springs F, the springs being by preference connected with the sections near their ends, so that there may be independent movements of the opposite ends of each section and arranged inside of the casing that is between it and the axis of the wheel. The springs tend to draw the sections toward the periphery of the wheel; but this is prevented beyond a certain degree by stops or bearings G, against which the sections rest and are held by the springs under normal conditions, such bearings consisting in the form of apparatus being described of lugs or projections carried by the expanded ends or heads of the radiating arms G′, secured to or supported by the framework C. As will be seen, the casing is so supported in the framework as to be movable at two or more points longitudinally thereof toward and from the wheel A in lines which are substantially radial to the circle described by the working face of the wheel. At some point in the circumference of the casing, preferably at one side of the machine in the horizontal plane of the shaft, the casing is broken away or left open, so as to expose the wheel A and form a feed-opening I. One of the sections, as the one next the feed-opening I, is formed with a discharge-opening I′, through which the dough masses may be discharged after they have been thoroughly worked between the wheel and the opposing wall of the casing. A plate *h*, with its edge resting against the face of the wheel, is arranged adjacent to the discharge-opening and acts both as a scraper for the wheel and also as a guide-plate to conduct the dough masses away from the passage-way J and onto a shelf or table *h*′, from which they are removed.

In the form of machine just described the dough masses, which are fed into the passage-way J through the feed-opening I, are caused to travel practically the entire circuit of the casing. The machine could, however, be arranged with two feed and two discharge openings, arranged in pairs opposite to each other, as represented in Fig. 1, in which case the material could be fed into the machine simultaneously from opposite sides, and there would be two practically distinct dough passage-ways, one being above the axis of the shaft B and the other below it. We have discovered that in a machine like that shown in Fig. 1, wherein the dough passage-way extends only about half the circumference of the wheel, we are not only able to nearly double the capacity of the machine, but we also obtain better results, as the dough loaves are not overworked or overcompacted, as is liable to occur when they are carried the entire circumference of the wheel. Our later experiments and tests have demonstrated that the best results for many purposes are obtained when the dough is worked by the machine only sufficiently to form a properly-shaped loaf, and that all working after such result has been attained tends to toughen the skin of the dough loaf and to give the baked loaf a relatively thick, tough, and hard crust. The passage-way is closed on its four longitudinal sides, one of its wider walls consisting of the face *a* of the wheel, which constitutes the advancing member, which operates to force the dough masses through the machine, the other wider wall consisting of the face *e* of the casing-section, which constitutes the resistance or pressure member of the apparatus and which operates to hold the dough masses against the wheel-face and, conjointly with the wheel, causes the rolling action or motion to be imparted to the dough masses, and the narrower side walls K, which are substantially perpendicular to the faces *a* and *e* of the passage-way.

The manner in which the elongated dough passage-way is formed and its shape may be variously modified. Thus in Figs. 4 and 5 the casing E is represented as being composed of a series of plates E″, without side walls or flanges, and the sides K of the passage-way are formed by flanges K″, carried by the rim of the wheel, between which flanges the casing-sections are arranged. In this construction the springs F, instead of being situated between the casing-sections and parts of the frame inside thereof and operating by their contractile force to hold the casing-sections in place, are arranged outside of the casing and hold the casing in place by their expansive force. L represents stop pins or bolts passing through the framework and connected with the casing-sections and operating, as do the brackets G in the construction hereinbefore described, to hold the casing-sections in place and prevent the springs from forcing them too close to the face of the wheel. The preferred construction, however, is that represented in Figs. 1 and 2, wherein the sections of the casing are provided with side flanges *k*, which project inward beyond the edges of the rim or face *a* of the wheel, and so inclose it on the sides. The wheel-rim is also provided along its edges with outward-projecting flanges *k*′, which lie inside of and close to the flanges *k*, the wheel-flanges being of less height than the flanges *k*. It will be seen that in this construction the advancing member of the apparatus has side flanges *k*′, which constitute parts of the sides of the passage-way, and that the resistance member has side flanges *k*, which constitute other parts of the sides of the passage-way, and these parts *k* and *k*′ should be so related to each other in height that when a dough mass is at any point in its travel through the passage-way the side walls K are formed substantially equally of the flanges *k* and *k*′, so that the advancing force or action of one set of flanges is equal to the resisting or retarding force of the other set of flanges. This tends to cause the dough masses to travel through

the passage-way straight—that is to say, without one end advancing faster than the other end or the middle moving forward faster than the ends, or vice versa.

In Fig. 6 there is represented a construction in which the side walls of the passage-way J are formed by flanges k^2 k^3, carried, respectively, by the wheel and the casing, and extending toward each other end to end, instead of one set of flanges lapping past the other, as in the construction last before described.

In Figs. 7 to 9 other forms of the passage-way J are represented; but they need not, it is thought, be described in detail, as they are easily understood, the same reference-letters for corresponding parts being used as are employed in the views already described.

While, as has been heretofore stated, the preferred construction of parts which form the passage-way is one wherein the wheel is formed with integral side flanges which constitute the movable parts of the side walls of the dough passage-way, still certain features of our invention would be preserved should the movable side walls be made separate from the wheel and driven independently thereof, as by means of bevel-wheels which mesh with gear-sections on the outer sides of the movable sides of the passage-way, as indicated in Figs. 10 and 10ª. In these views, K^2 represents annular rims arranged at the sides of the wheel, extending past the edges thereof and of the sections of the casing E. *o* represents external annular gearing on the rims K^2, and O represents bevel-pinions by which the geared rims are driven. We have not attempted in these views to illustrate the details of construction and arrangement of the parts there shown. It will be understood that the shafts on which are mounted the bevel-wheels O are connected by a suitable train of gearing with some driven or driving part of the apparatus, and also that the rims K^2 are so supported that while they are free to turn they are nevertheless held in proper engagement with the pinions O, which move them.

M represents a pair of rolls situated adjacent to the feed-opening and adapted to form a mass of dough, which may be fed to them to an elongated comparatively thin sheet.

N represents a curler, the function and operation of which part will be presently set forth.

If the wheel be driven in the direction of the arrow in Figs. 1 and 3 and a mass of dough be properly fed through the feed-opening I into the passage-way J, it will be engaged upon opposite sides by the two coacting dough working and shaping faces *a* and *e* and will be carried through the passage-way from the feed-opening to the discharge-opening, and at the same time that it is given this progressive movement it will be rolled over and over around an axis extending through the mass and parallel with the faces *a* and *e*. The dough mass thus operated upon emerges at the delivery part of the apparatus in the form of a properly-worked and compact loaf, round in cross-section and having a smooth surface or skin which has not been ruptured by the action of the apparatus from the time it entered the passage-way until it emerges therefrom. To insure the best results, the dough should be fed into the passage-way J in the form of a comparatively thin elongated sheet, and this sheet is coiled or rolled up and compacted until the loaf above described is formed. The rolls M form the dough masses into the sheet form just described; but it is evident that this operation might be performed by hand or otherwise, though we prefer to use the rolls and to arrange them in combination with the wheel and casing. In order to certainly insure the coiling and rolling of the dough masses, it has been found best to thicken their forward ends either before they enter the passage-way J or at the time of their entrance thereinto. This thickening of the forward ends of the dough masses may be performed in various ways, either by machinery or by hand, and in our aforesaid patent and in pending applications for patent we have described how this may be done. In the machine shown in the drawings the curler N, which is pivoted to the casing E near the feed-opening and has its free edge held toward the face of the wheel with a yielding force, as by means of a spring *q*, (represented in Fig. 11,) will engage with the forward edge of the advancing sheet of dough and will retard the same, folding it over, doubling it back, or otherwise thickening it, and such thickened portion of the dough sheet being caught between the two coacting members of the passage-way while the main portion of the mass is being forced forward the rolling or coiling action upon the mass is begun, and this continues throughout the entire extent of the passage-way. The side walls K confine the dough masses at the ends and limit or determine the length of the loaves, as well as shape them at their ends.

Q represents a plate or other suitable support interposed between the feeding-rolls M and the curler. The sheet of dough after leaving the rollers passes over this plate or support, which serves to assist in properly directing the dough and to prevent it from passing in rear of the curler or from taking such other path as would tend to interfere with the proper curling action. When the curling device is of the construction represented in the drawings and is arranged as close to the feeding-rollers as is there indicated, the plate or support Q might be omitted without affecting the operativeness of the device. If, however, it should be situated farther away from the feeding-rollers, the support Q becomes a more important element.

It will be observed, particularly by reference to Figs. 11 to 15, inclusive, that the means for starting the formation of the dough loaf

from the sheet of dough (which operation has come to be technically known as "curling") consists, essentially, of a part n' in the form of a plate, upon which the dough rests and which serves to support the dough sheet while the curling takes place, and a part n, consisting of a rib, lip, or projection, which obstructs the free advance of the dough and effects the curling action. This curling takes place while the rear part of the dough sheet rests upon the support n' and the plate or support Q when that is in use. By means of such a combination and arrangement of parts as that just described the curling of the dough sheet and the starting of the coiling or rolling up of the dough sheet into a loaf is begun before the wheel begins to engage with the dough and advance it past the curler and into the molding-passage, and this coiling operation may be carried forward to a considerable extent before the wheel begins to advance the dough mass.

In Fig. 11 of the drawings the dough mass is represented as having partially passed through between the rollers M, the forward sheeted portion resting upon the supporting parts Q and n', but not yet having advanced sufficiently far to engage with the projection n, which effects the curling. In Fig. 12 the dough has been further sheeted and advanced until its end comes into engagement with the projection n, the weight of the dough upon the supporting-plate n' having forced the curler backward somewhat away from the wheel. In Fig. 13 the curling action is represented as being well started and in Fig. 14 still further advanced, the coiling or rolling up of the dough having so thickened the forward end of the mass that the face a of the moving wheel comes into engagement therewith. In Fig. 15 the dough mass is represented as being carried almost entirely past the curler and into the passage J.

In the drawings we have represented a form of curling device provided with but a single rib, lip, or projection n; but in other applications which we have filed we have shown other forms of curling means employing a plurality of ribs or projections, and it is therefore evident that the number of curling ribs or projections might be varied from that shown without departing from the spirit of our invention.

It will be observed that the means for effecting the curling operation which we have described and illustrated in the figures last referred to are situated below the feed-rollers and also between the feed-rollers and the wheel which advances the dough through the molding passage-way. The result of this arrangement is that the sheet of dough is acted upon by the curling means before it is acted upon by the wheel A and also that the sheet of dough after leaving the sheeting-rollers is advanced to the curling means largely through the agency of gravity.

While the arrangement which we have described and illustrated—that is to say, one in which the curling means are both below the feeding-rollers and between them and the wheel A—is particularly advantageous and tends to the easy, rapid, and positive working of the apparatus, still we do not wish to be understood as intending thereby to limit our invention in its useful applications to the exact angles of disposition and arrangement of parts shown, as these may be changed from what is shown without departing from our invention.

We are aware that numerous forms of machines for molding dough into loaves and embodying a rotating wheel or drum and a pressure-board arranged opposite thereto have heretofore been devised. In all of such machines, however, so far as we are aware, it has been necessary in order to have an operative device to so arrange the feed-opening through which the dough masses are passed to the molding-passage that it shall be opposite to the down-moving part of the wheel or drum. By combining a curler with the wheel and casing and arranging it opposite to the up-moving part of the wheel and adjacent to the feed-opening we can produce a machine which will satisfactorily operate upon the dough masses when the feed-opening is arranged as just set forth, and this is because the curler operates to so thicken the dough mass that the conjoint action of the wheel and the pressure-board thereon is insured, and when this conjoint action is once well established then the dough mass will pass through the passage and be molded; but without the use of a curler the certain conjoint action of the wheel and pressure-board on a dough mass fed to the up-moving side of the wheel is not attainable. By reason of this new result in the use of dough-molding machines of this type we are enabled to nearly double the capacity of the machine by the arrangement illustrated in Fig. 1, where there are two feed and two discharge openings to the molding-passage, one of the feed-openings being opposite to the down-moving side of the machine, as has heretofore been proposed in this type of machines, and the other being opposite to the up-moving side of the wheel and having (necessarily) a curler adjacent thereto.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a machine adapted to work dough, the combination of a wheel having a peripheral working face, a casing opposed to and substantially parallel with the said working face and constituting a pressure-board, the said casing being movable toward and from the said working face of the wheel, the framework in which the wheel is mounted provided with radiating arms G′ having expanded ends or heads which carry stops or bearings G against which the casing normally rests, and

the springs which hold the casing against their bearings with a yielding force, substantially as set forth.

2. In a machine adapted to work dough, the combination of a wheel having a face constituting the advancing member of the dough passage-way, a casing opposed to the wheel and constituting the resistance member of the passage-way, and side walls for the passage-way, such side walls being in part movable and in part stationary, substantially as set forth.

3. In a machine adapted to work dough, the combination of a wheel having a face constituting the advancing member of the dough passage-way, a casing opposed to the wheel and constituting the resistance member of the passage-way, and side walls for the passage-way, such walls being part movable and connected with the wheel, and part stationary, substantially as set forth.

4. In a machine adapted to work dough, the combination of a wheel having a face constituting the advancing member of the dough passage-way, a casing opposed to the wheel and constituting the resistance member of the passage-way, and side walls for the passage-way, such walls consisting of flanges *k'* at the edges of the wheel-face, and flanges *k* carried by the casing, and extending past the flanges *k'*, substantially as set forth.

5. In a machine for working dough, the combination with a pressure-board, which constitutes one wall of a dough-passage, and means for advancing the dough through such passage, constituting the other wall thereof, of means for forming the dough into sheets or thin masses, means for curling such dough masses, and a support for the dough masses over which they pass before they reach the curling means or the advancing means, substantially as set forth.

6. In a machine for working dough, the combination of a wheel having a dough-working face, and a casing opposed thereto and constituting a pressure-board, means for forming the dough masses into sheets, a curler, and means independent of the said wheel for supporting the dough masses between the curler and the dough-sheeting means, substantially as set forth.

7. In a machine for working dough, the combination of a wheel having a peripheral dough-working face, a casing arranged opposite thereto and constituting a pressure-board, and being, at points intermediate its ends, movable toward and from the face of the wheel, rolls for flattening or sheeting masses of dough, and a curler situated below the said rolls, and between them and the face of the wheel whereby the curling action is begun before the wheel engages with the dough mass, substantially as set forth.

8. In a machine for working dough, the combination of a wheel having a peripheral dough-working face, a casing arranged opposite thereto, the casing being supported at points intermediate its length, and being, at such points, movable toward and from the face of the wheel, dough-sheeting rollers, a curler situated below the said rollers, whereby the dough sheets are fed from the rollers to the curler by gravity, and supporting means interposed between the curler and the said rollers for sustaining the dough sheets while the curling is being started, substantially as set forth.

9. In a machine for working dough, the combination of a wheel for advancing the dough, a casing arranged opposite the working face of the wheel, a feed-passage through which the dough masses are fed to the machine, and a curler situated below the said feed-passage and between it and the face of the wheel, whereby the dough masses pass to the curler by gravity and the curling operations begin before the wheel engages with the dough masses, substantially as set forth.

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