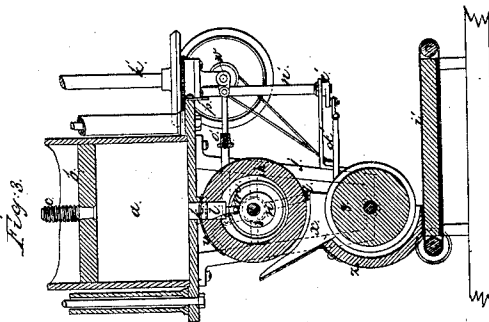
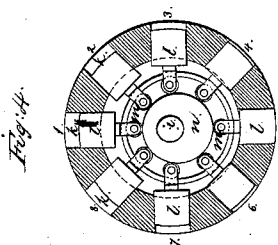
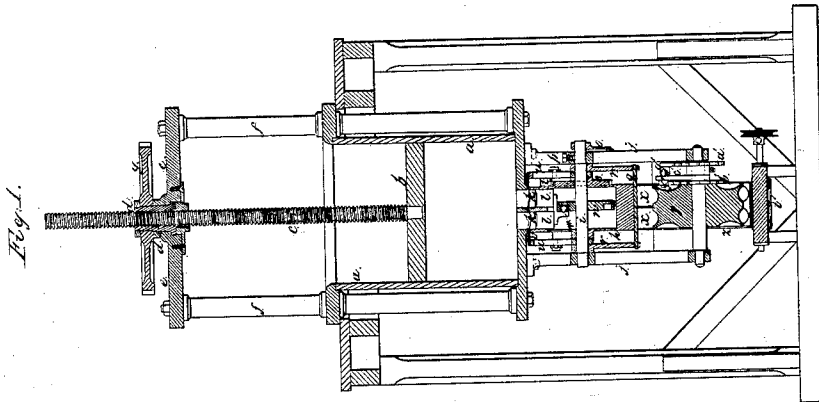
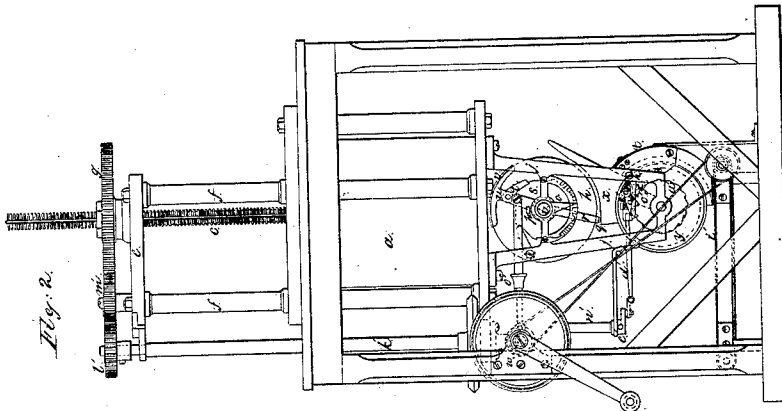


H. Berdan,

Bread Machine,

N^o 23,548.

Patented Apr. 12, 1859.



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UNITED STATES PATENT OFFICE.

HIRAM BERDAN, OF NEW YORK, N. Y.

BREAD-CUTTER.

Specification of Letters Patent No. 23,548, dated April 12, 1859.

To all whom it may concern:

Be it known that I, HIRAM BERDAN, of New York, in the county of New York and State of New York, have invented a new and useful Loaf-Cutter for Dividing or Cutting up Dough into Parts of Equal Weight; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a sectional front elevation of the loaf cutter. Fig. 2 is a side elevation, and Fig. 3 is a sectional side view of the lower parts. Fig. 4 is a sectional view of the cavity cylinder on a larger scale.

Similar letters referring to similar parts on each.

My invention consists in the employment of a large cylinder *a* placed vertically, with its upper end level with one floor of the building so that dough can be emptied into it from above. This cylinder is provided with a piston *b* attached to the end of a screw *c*. This screw is operated by means of a nut *d* in a heavy cross head or cap-plate *e* resting on the columns *f*, these columns being firmly bolted to the frame in which the cylinder *a* is held. The nut *d* is turned by means of the large gear wheel *g* while the screw is held from turning by a feather or key attached to the under side of the cross head *e* and working in a spline or groove in the screw. So that by the revolution of the nut the piston can be raised or lowered. Below the bottom plate of the large cylinder *a* is placed a smaller cylinder *h* with its axis horizontal and rotating on a stationary shaft *i* having its bearings in the frames *j* bolted to the bottom plate of the cylinder *a*. This smaller cylinder *h* which I term the cavity cylinder is perforated with holes *k* coinciding in size and position with holes through the bottom plate of the cylinder *a*. In these holes *k* are fitted plugs or pistons *l* having rollers *m* running in a groove in the side of the eccentric *n*, which eccentric is firmly keyed to the stationary shaft. Now it is obvious that if the shaft and its eccentric remain stationary and the cylinder be made to revolve, that the plugs or pistons *l* will gradually approach the periphery of the cavity cylinder or recede into it leaving cavities in the cylinder of a depth equal to the throw of the eccentric. Now it is also obvi-

ous by reference to Fig. 4 (which represents a section of this cavity cylinder drawn on a larger scale, having its surface pierced with eight cavities equidistant from each other, and all having pistons connected with the same eccentric *n*) that as the cylinder is made to revolve, each of the pistons will in succession assume the positions indicated by the numbers 1, 2, 3, 4, 5, 6, 7, and 8, and that if the extreme throw of the eccentric be turned directly downward the cavities will be deepest as they approach the top, so that by turning the center shaft with its eccentric backward or forward the cavities may be increased or diminished in depth at the top or the place where they receive their charge of dough. To accomplish this there is an arm *o* keyed to one end of the stationary shaft and projecting downward to a quadrant which is marked to indicate the depth of the upper cavities.

The set screw *p* is for the purpose of securing the shaft in position after it is set. The scraper *q* attached to the center shaft by the arms *r* touches the surface of the cylinder at the line where the plugs or pistons *l* coincide with the surface of the cylinder, and is for the purpose of scraping off the loaves. On one end of the cavity cylinder is a ratchet wheel *s* of eight teeth or one tooth to each row of cavities. This ratchet wheel is operated by means of the pawl *t* on one of the arms *u*, which arms carry a curved knife *v* having two holes in it of the same size as the cavities; now suppose the knife is placed so that the holes in the bottom plate of the large cylinder *a*, in the knife and the cavities all coincide, if the dough be then forced down by the piston *b* it will fill the cavities and the knife being moved back will cut off the dough and continuing its motion until the knife holes coincide with the next row of holes in the cavity cylinder, the pawl will then drop behind a new tooth on its ratchet wheel and on the return stroke will carry forward a new set of cavities to be filled. Thus on each revolution of the crank shaft *w* to which is attached the connecting rod to operate the knife, there are a set of holes placed in position to receive the dough from the large cylinder, the knife then separates the dough in the cylinder *a* from that in the cavities and a new set of holes are brought into position and while as the cavity cylinder continues its revolution the loaves are

forced out by the plugs or pistons and falling into the hopper *x* they pass into what I term the rounding up or polishing roller. This roller *y* has its axis parallel to the axis of the cavity cylinder and is partially surrounded by a shield or casing *z* which casing has grooves of a nearly semicircular form and coinciding with similar grooves in the roller *y*. This roller *y* has not got a continuous rotary motion, but has a forward and backward motion the forward motion being at each stroke one eighth of a revolution while the backward motion is only one sixteenth of a revolution; to accomplish this I have two ratchet wheels *a'* and *b'* attached to the roller having their teeth set in opposite directions; these ratchet wheels are operated by an arm *c'* moved by the connecting rod *d'* and crank *e'*. This arm carries two pawls *f'* and *g'* set in opposite directions to suit the teeth of the ratchet wheels—one of these pawls *g'* is provided with a pin in the side of it, and during a portion of its back stroke and while the pawl *f'* is pushing forward its ratchet wheel the pin rides up onto a shield or guard *h'* which lifts the pawl from the wheel and on the return stroke it falls into the next tooth instead of dropping into the one immediately below it and imparts to this ratchet wheel only one half the motion due to the full throw of the crank *e'*. This gives the vibratory motion required to roll up the loaves in a similar manner to bakers rolling by hand. As the loaves fall from this polishing or rounding up roller, they are received on an endless apron *i'* passing along a table from which they are taken by the workmen and put into form for baking. Now the machinery necessary to give motion to all these devices consists of a horizontal shaft *w* having a crank on its end to give motion to the cavity cylinder. On this shaft is a bevel wheel gearing into a bevel wheel of the same size on an upright shaft *k'* passing to the top of the machine and giving motion to the large gear wheel on the nut, by means of the pinion *l'* and the intermediate wheel *m'*.

At the bottom of the upright shaft is a spur wheel gearing into a similar wheel on the vertical crank shaft *n'* which gives motion to the rounding up roller. Now it must be obvious that by varying the proportion of the gearing at the top of the upright shaft *k'*, that is changing the pinion *l'* and the intermediate wheel *m'*, the amount of motion of the piston to each stroke of the connecting rod to the cavity cylinder will be altered. The connecting rod *o'* is made with a fork on one end so that it can be lifted from off the crank pin and having hung it to the hook *p'* the piston can be raised or lowered without moving the cavity cylinder. In order to understand clearly the manner of using my machine it must be borne in mind

that the depth of the cavities can be altered and the feed of the piston downward can be altered, now it must be evident to every mechanic that if the piston during each stroke displaces an amount of dough equal in bulk to the sum of the cubic contents of the cavities to receive the dough, the cavities being all equal in size or bulk the loaves discharged will be of equal size. Suppose therefore that ten thousand ounces of dough be put into the cylinder and that the piston be forced down upon the dough without moving the cavity cylinder until it has compressed the dough into a space of ten thousand cubic inches, and that the cavity cylinder is then put into motion, presenting at each stroke of the connecting rod two cavities each of ten cubic inches and that the motion of the piston be at a speed to displace twenty cubic inches at each stroke, it is very obvious that the whole bulk of dough will be cut up into (ten thousand divided by ten) one thousand equal parts and each part will contain ten cubic inches and of necessity weigh ten ounces.

Now the objects to be gained, and what particularly recommends my invention as one of great utility, is in the first place that it does away with the expensive, uncertain and laborious process of dividing dough into loaves by the ordinary process of scaling, which involves the necessity of much handling and great inaccuracy in the weight of the loaves. Now in my machine all the loaves must be of one uniform weight and the rapidity with which it can be worked, viz. at the rate of ten barrels of flour in twenty minutes, does away with any risk of the dough proving too much, or becoming too light or sour, during the scaling process. In the second place the rolling or polishing arrangement described above gives the loaves to the workmen in a form and condition requiring very little manual labor to fit them for the oven.

Another striking feature of my invention consists in the applicability to the manufacture of crackers for it is only a question of size, its adaptation to the scaling or dividing of dough into loaves for bread, or the dividing it into pieces for crackers; while the superiority of crackers made by this process is very great, because the dough is cut up into pieces of the required size without being laminated as by the ordinary process of rolling and cutting with cutters.

The great objection to all machine made crackers arises from the fact that they are formed of distinct layers of dough, not united at the edges of the crackers and consequently the heat of baking is apt to split them and render them unfit for market, while hand made crackers have a perfect skin or crust preventing them from splitting. Now my machine forces the dough

in mass into the cavities, and then passing the pieces into the polishing or rolling cylinder the crackers fall upon the table in balls, which being flattened, punched and stamped, will be to all appearance the same as hand made crackers and equally as good.

To describe more fully the manner of working my machine and to enable any one skilled in mechanics to construct it and put it in operation—I will state that it has been found by experiment that equal weights of proven and unproven dough can be compressed by a force of from five to twenty lbs. to the square inch into the space of one and one half cubic inches to the ounce. Hence knowing the exact diameter of the large cylinder a scale or rod can be constructed, marked with the pounds and wheel rod will indicate to what depth the piston must descend before the cavity cylinder is put into operation. Then setting the eccentric on the shaft in the cavity cylinder in such a position as will make the top cavities the proper depth to hold the required weight of dough, and marking each position on the quadrant thus 16, 17, 18, &c., ozs. and having a change of pinions to fit on the upright shaft, to give the proper speed to the piston it is ready for use. Suppose for instance it is required to scale off a batch of dough into twenty ounce loaves—the arm is moved on the quadrant until it is at the place marked twenty. A pinion and intermediate wheel marked twenty are also put in place on top of the machine. Then having weighed the batch of dough in mass, it is thrown into the cylinder, the piston is run down until it compresses the dough in the cylinder to the bulk indicated on the gage rod suited to the weight, and then the cavity cylinders being thrown into operation the loaves will pass out as above described.

Now it must be evident to every ingenious mechanic, that the form of my machine may be varied, as for instance the cavity cylinder may be replaced by a plate having a reciprocating motion with cavities adjusted in depth by inclined planes, and also that the piston may be forced down by means of rack and pinions operated by gearing or worm wheels and worms and that motion

may be given to the gearing by a ratchet wheel, the speed of the piston being governed by the number of teeth in ratchet wheel used at each stroke of the connecting rod. And yet with all these changes the theory of the working of the machine will remain the same.

Now I do not claim the separate devices used in my machine as new, most of them if not all being in common use for other purposes and familiar to every mechanic. But I think it must be evident from the foregoing description of my machine and the manner of working it that the theory of its operation and the novelty of the invention apart from the peculiar rolling apparatus, is the scaling or dividing of dough into parts of equal weight, by forcing it into adjustable cavities by any device whereby the large mass of dough shall be condensed between each stroke of the cutting off knife exactly as much as the cubic capacity of the cavities placed to receive it—Therefore

What I claim as new and desire to secure by Letters Patent is—

1. The arrangement of certain devices viz. the adjustable cavities or their equivalents in combination with the cutting off knife or its equivalent, and the large cylinder and piston or their equivalents and the so connecting the several parts, that the amount of dough displaced by the piston shall be exactly equal to the cubic contents of the cavities presented for filling between each stroke of the cutting off knife substantially as and for the purpose specified.

2. I also claim the devices for rounding up the loaves as they fall from the cavities, consisting of the grooved roller and shield or their equivalents the roller having a vibratory motion in the manner and for the purpose specified—in combination with the preceding arrangement of devices claimed substantially as and for the purpose specified.

HIRAM BERDAN.

Witnesses:

H. A. V. FOSS,
COLEMAN PELTUS.