No. 661,999. Patented Nov. 20, 1900.

C. KESSLER.

AUTOMATIC BREAD MAKING MACHINE.

(Application filed Dec. 5, 1899.)

(No Model.) 11 Sheets—Sheet 1.

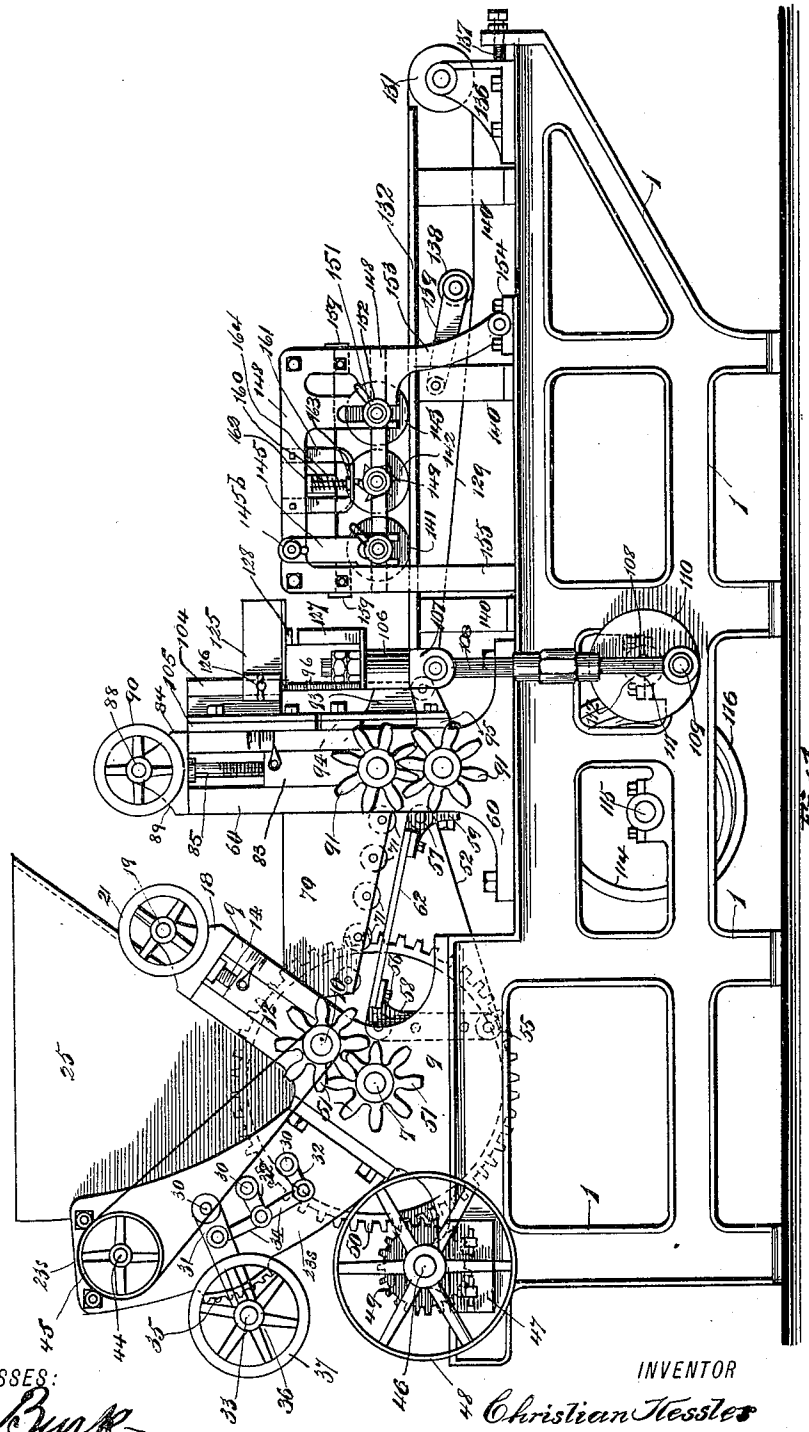


Fig. 1.

WITNESSES:

Chas. Burk

Callie E. Hunter

INVENTOR

Christian Kessler

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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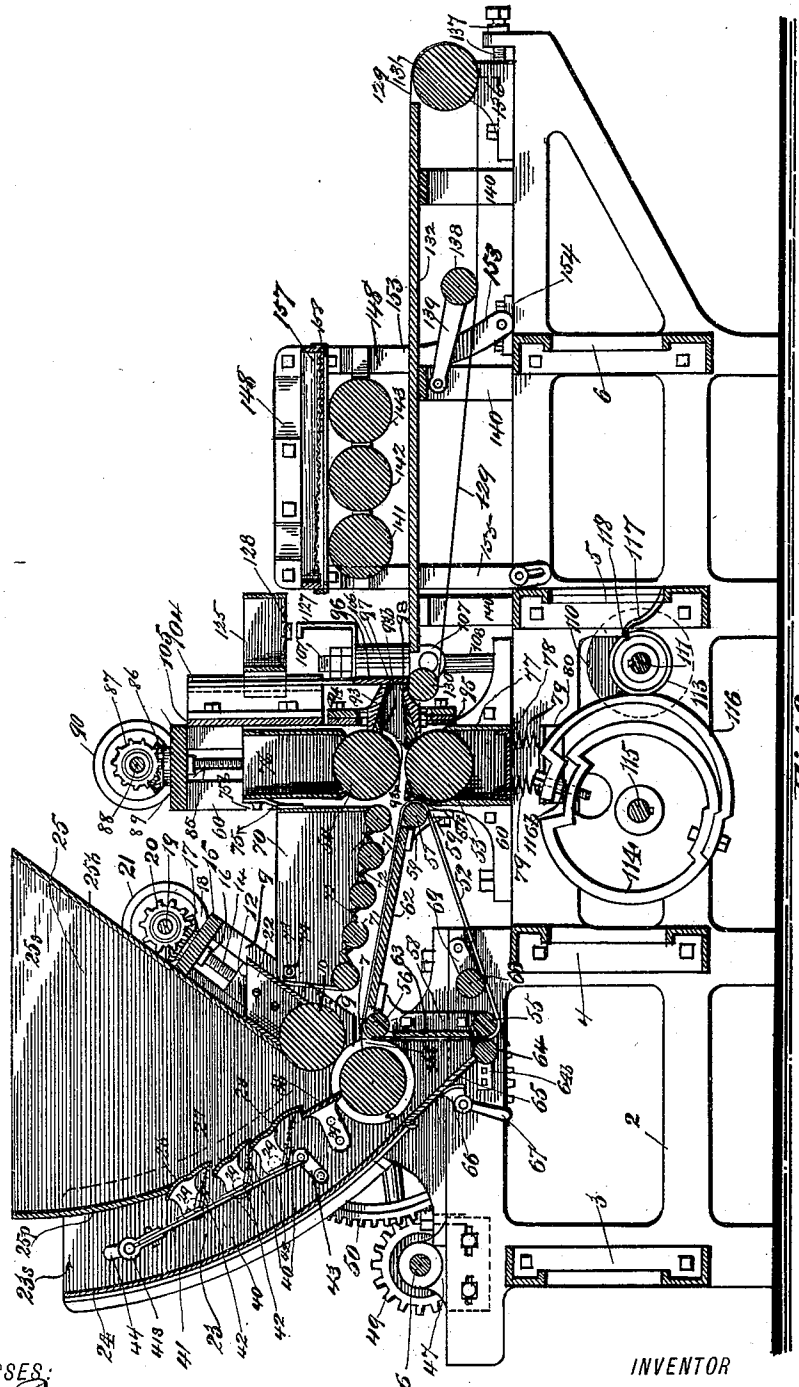


Fig 2

WITNESSES:
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Colin E. Finney

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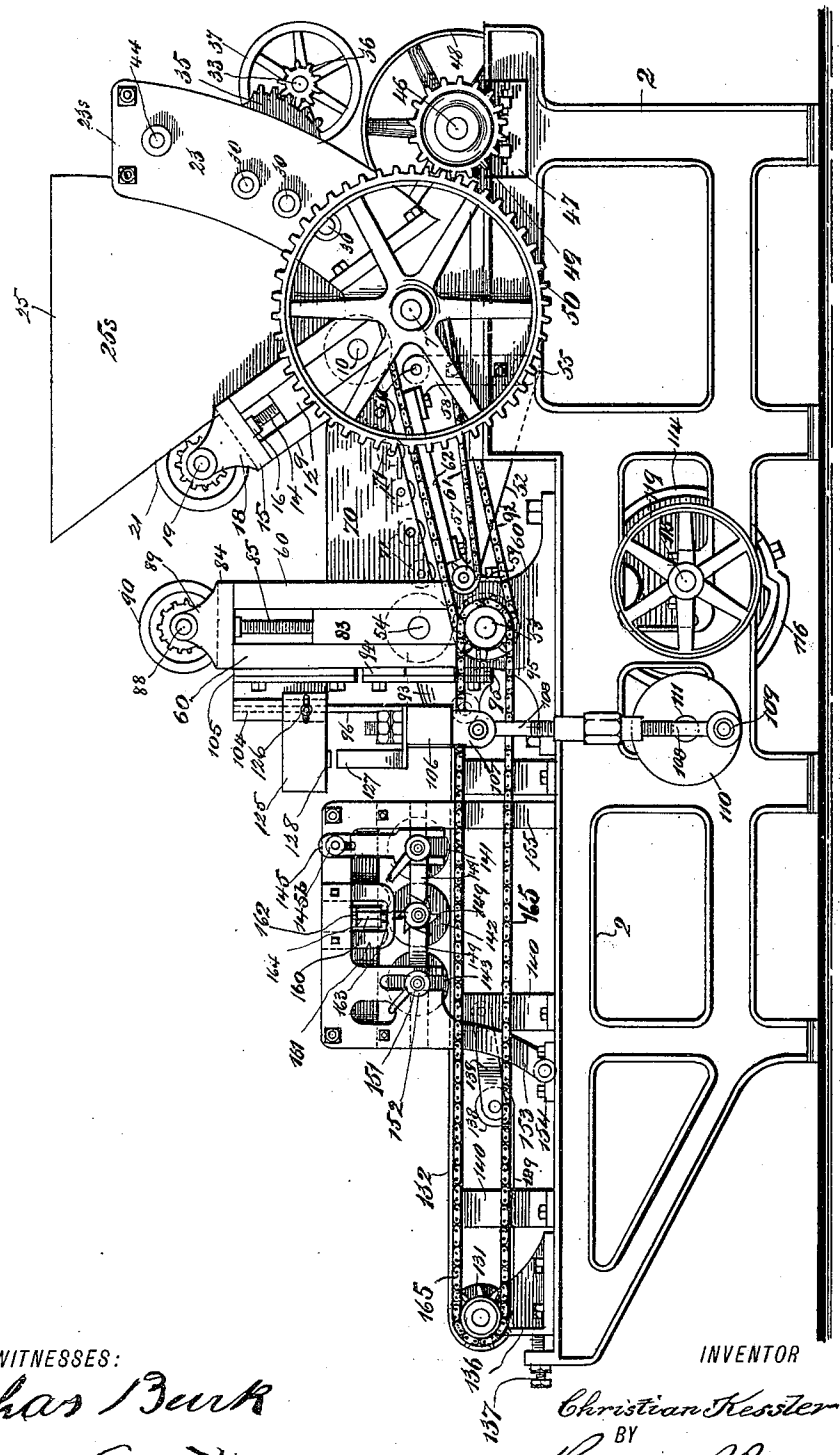


Fig 3

WITNESSES:

Chas. Burk

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INVENTOR

Christian Kessler

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Thompson & Lee

ATTORNEY.

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No. 661,999. Patented Nov. 20, 1900.

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AUTOMATIC BREAD MAKING MACHINE.

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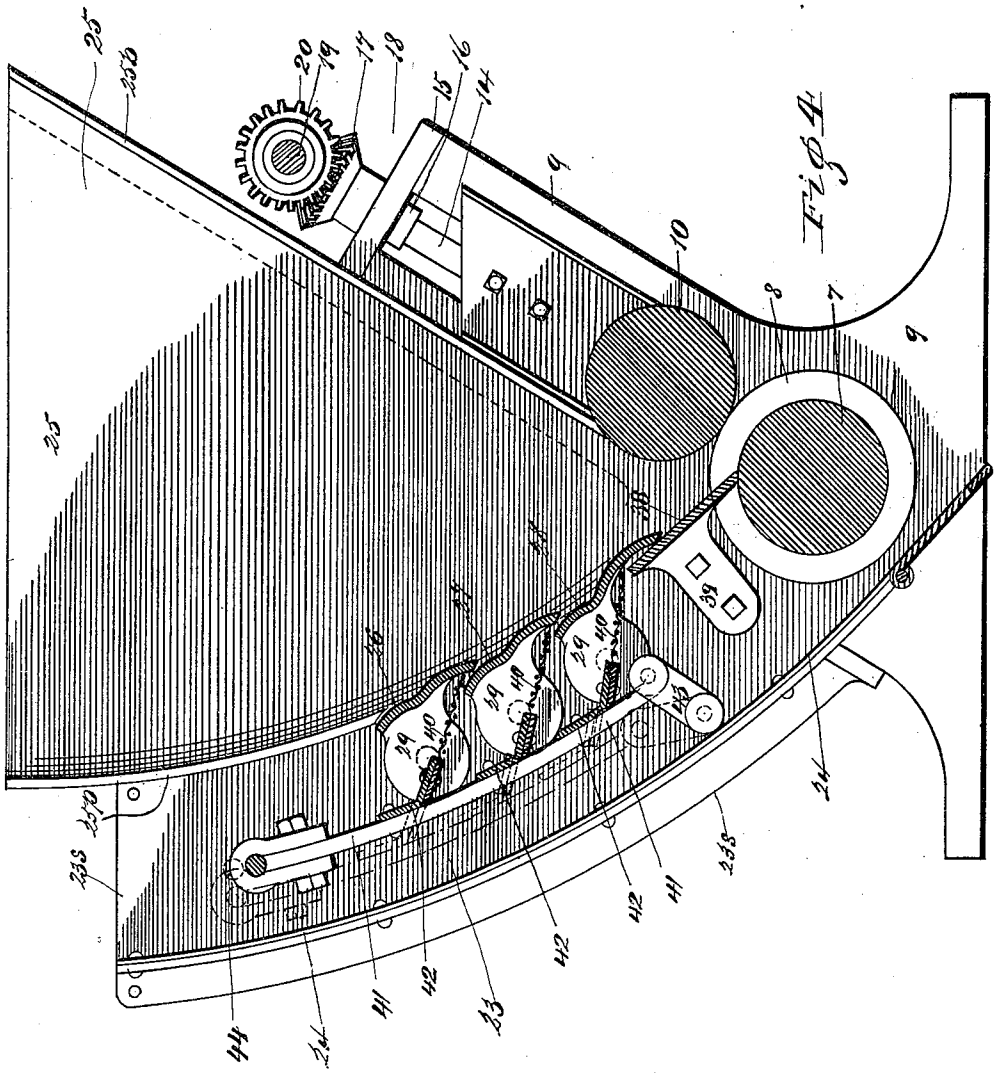


Fig 4.

WITNESSES:

Chas. Burke

Ollie E. Towles

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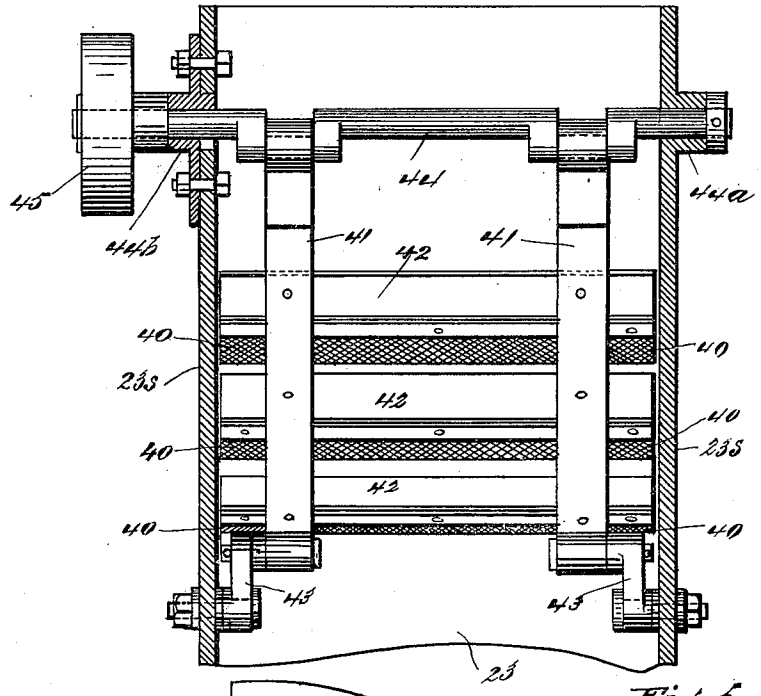


Fig 5

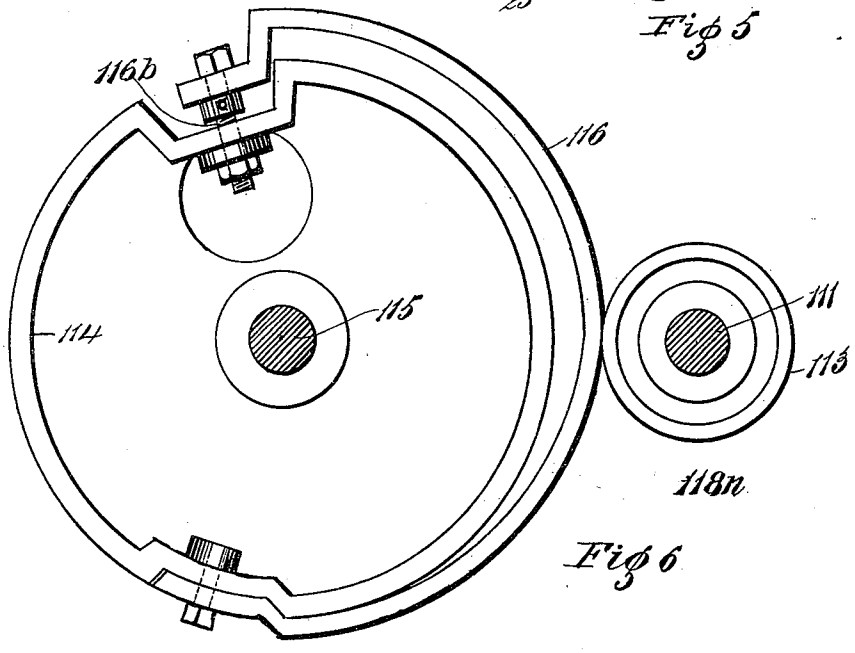


Fig 6

WITNESSES:

Chas. Burke

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 661,999. Patented Nov. 20, 1900.

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AUTOMATIC BREAD MAKING MACHINE.

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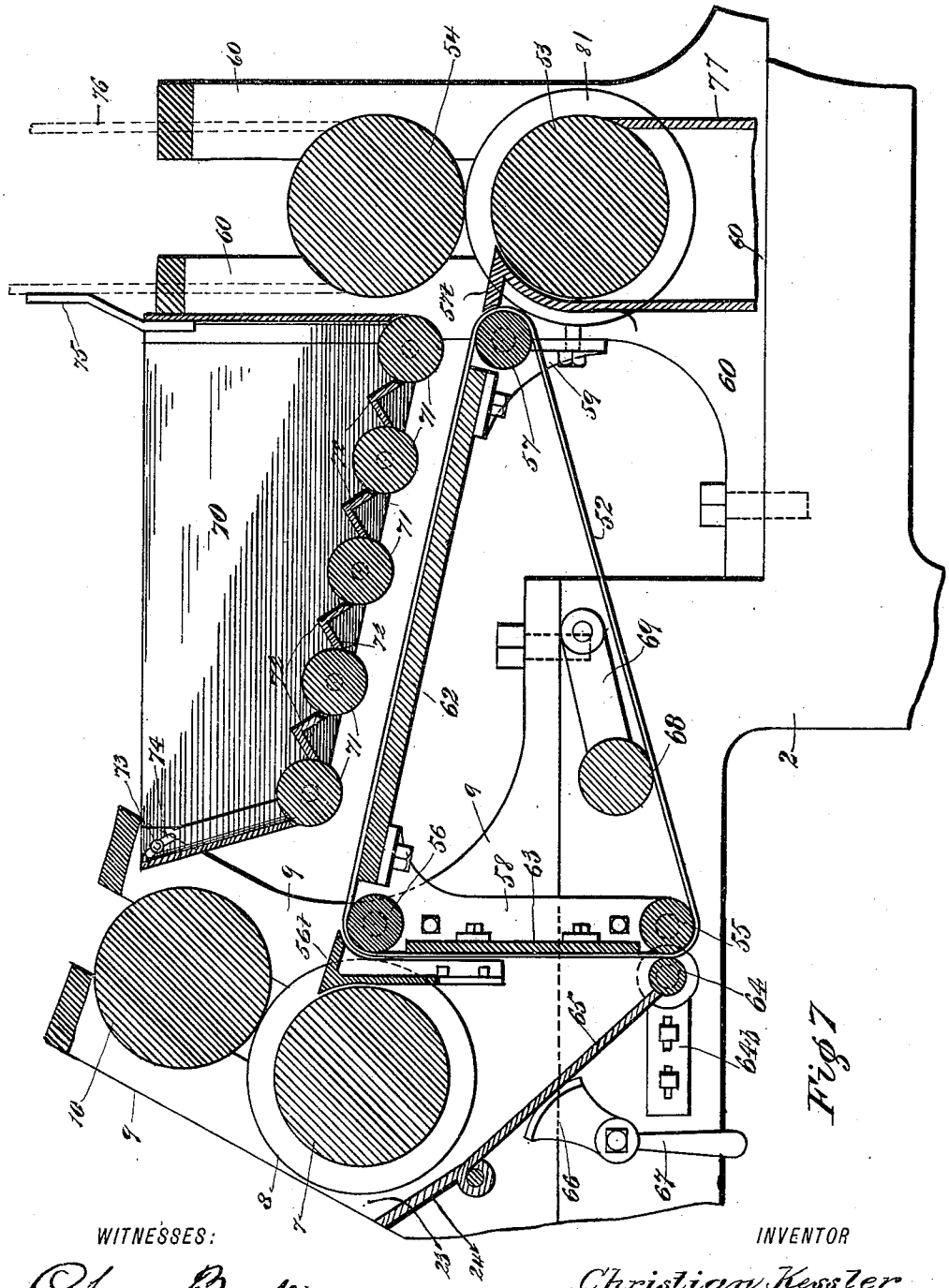


Fig. 7

WITNESSES:

Chas. Burke

Collie E. Lewis

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 661,999. Patented Nov. 20, 1900.

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AUTOMATIC BREAD MAKING MACHINE.

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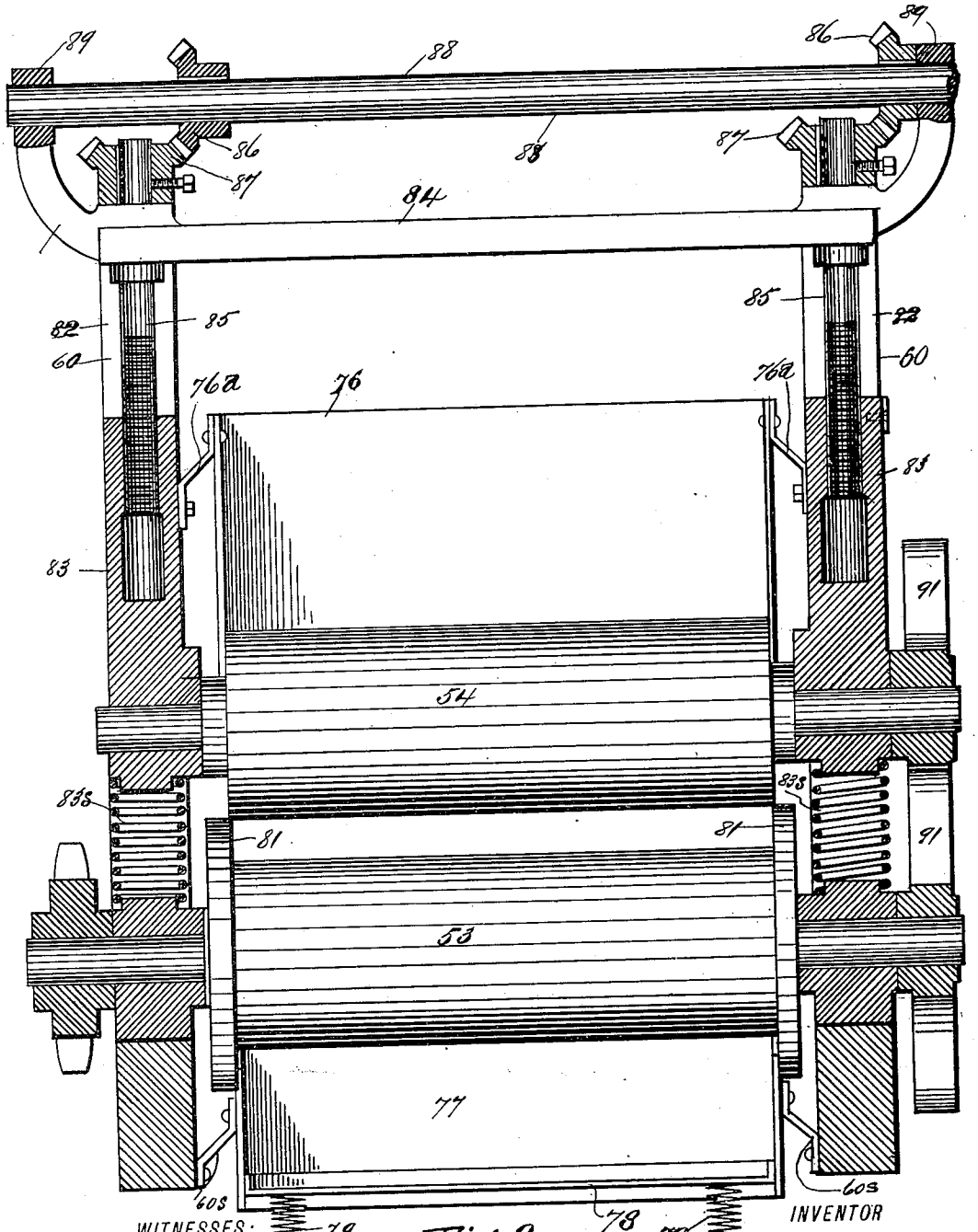


Fig 8

WITNESSES:

Chas. Burk.

Collie E. Turney

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 661,999. Patented Nov. 20, 1900.

C. KESSLER.

AUTOMATIC BREAD MAKING MACHINE.

(Application filed Dec. 5, 1899.)

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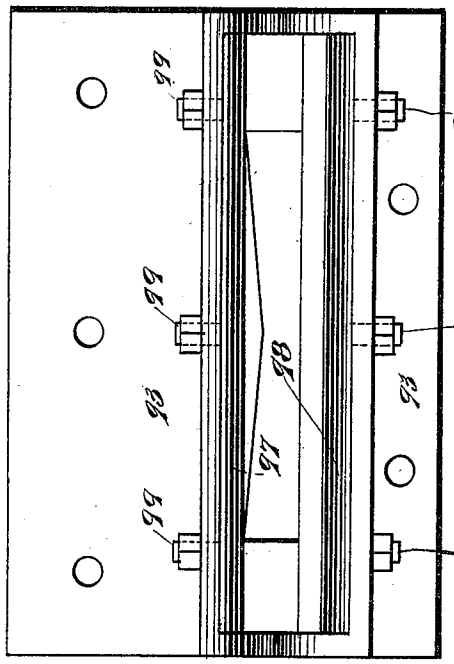


Fig. 10.

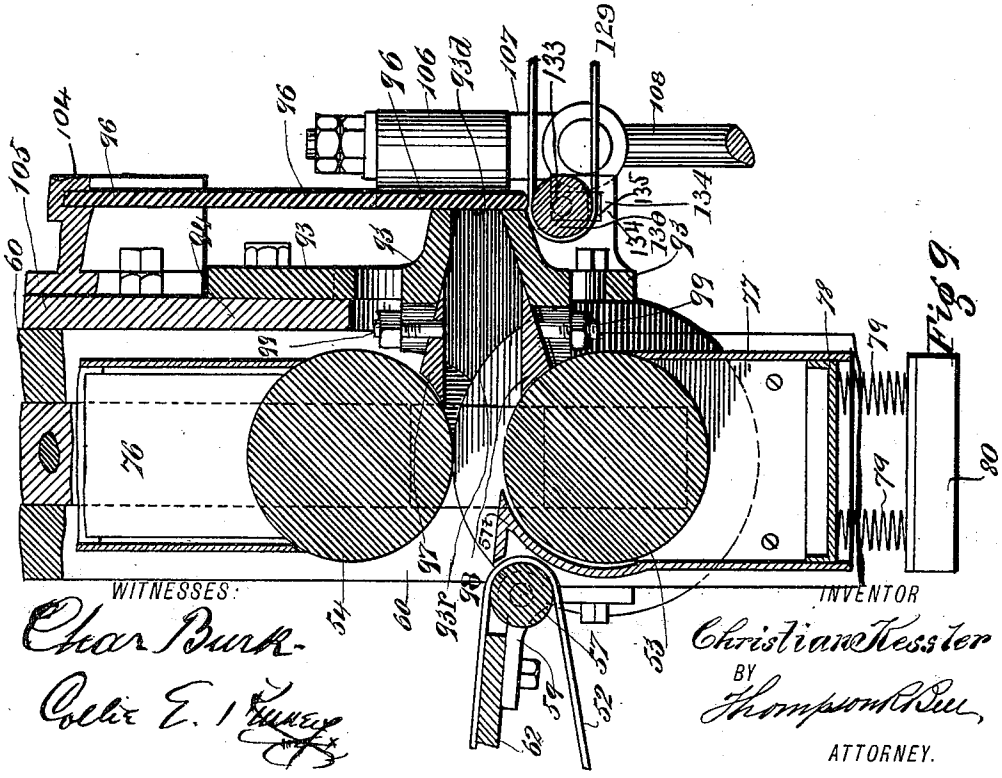


Fig. 9.

WITNESSES:

Oscar Burk.

Collie E. Turner

INVENTOR

Christian Kessler

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ATTORNEY.

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No. 661,999. Patented Nov. 20, 1900.

C. KESSLER.

AUTOMATIC BREAD MAKING MACHINE.

(Application filed Dec. 5, 1899.)

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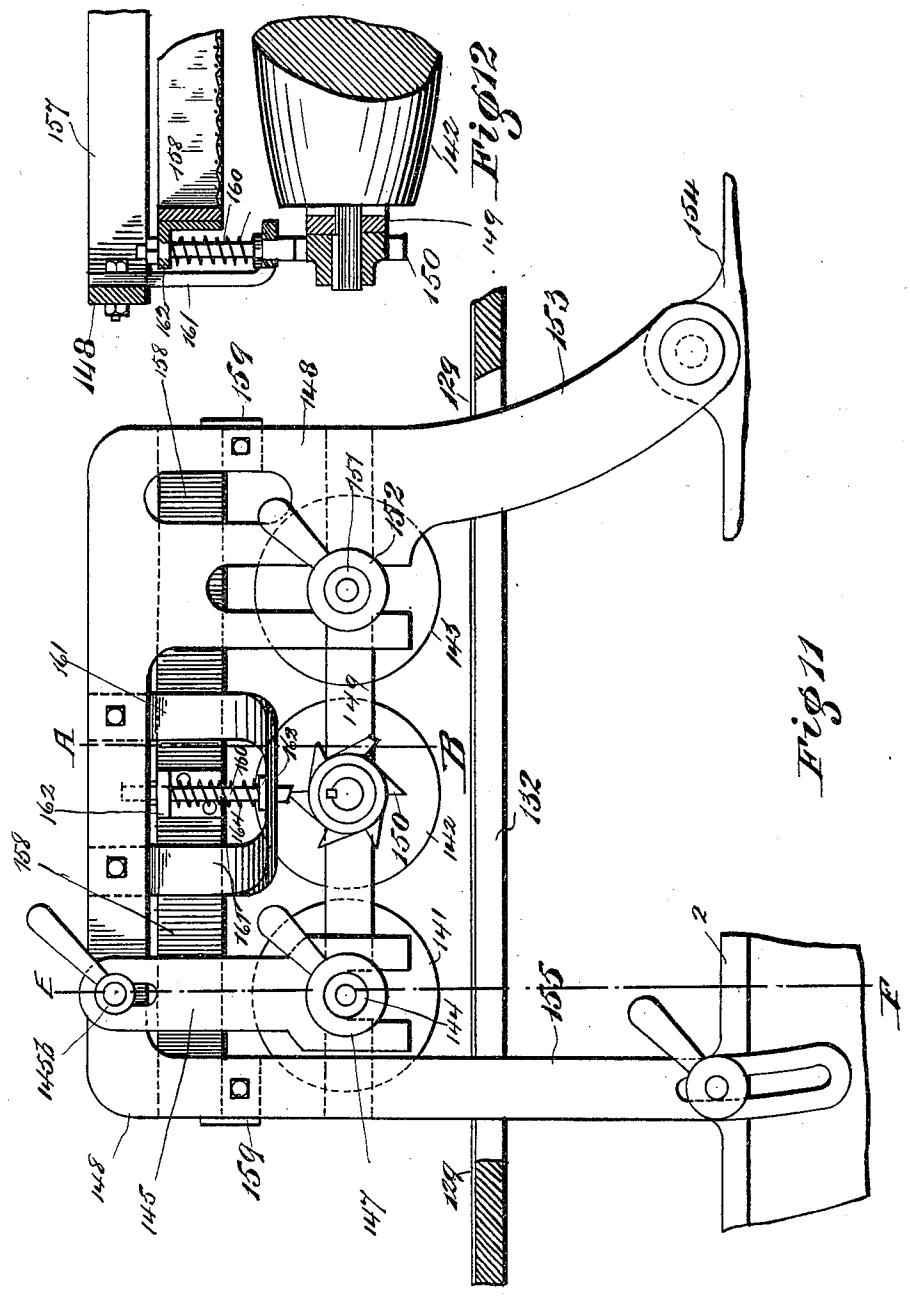


Fig 11

WITNESSES:

Chas. Burr

Collie E. Tilley

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Christian Kessler

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ATTORNEY.

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No. 661,999. Patented Nov. 20, 1900.

C. KESSLER.

AUTOMATIC BREAD MAKING MACHINE.

(Application filed Dec. 5, 1899.)

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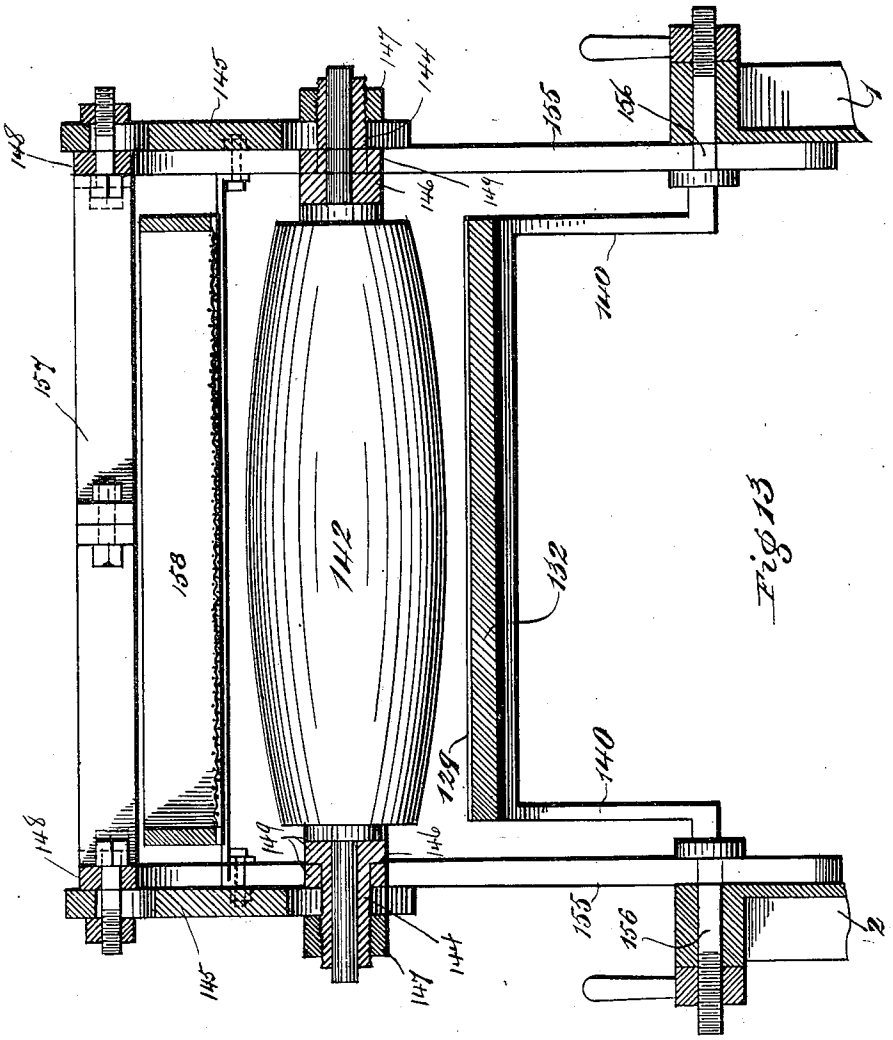


Fig 13

WITNESSES:

Jas. Burke.

Collie E. Thurston

INVENTOR

Christian Kessler

BY

Thompson & Bee

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 661,999. Patented Nov. 20, 1900.

C. KESSLER.

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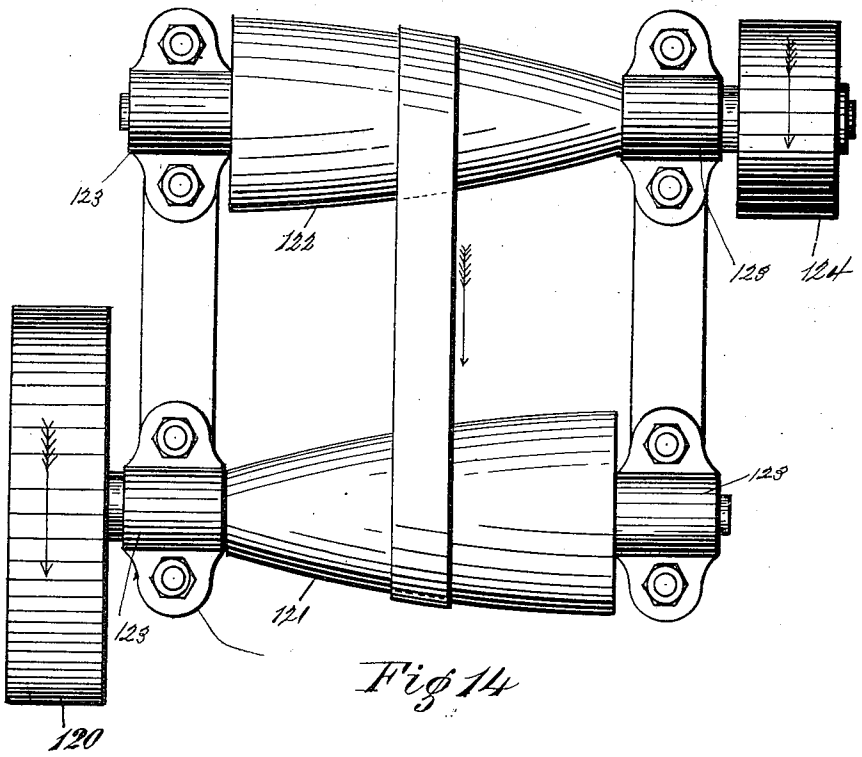


Fig 14

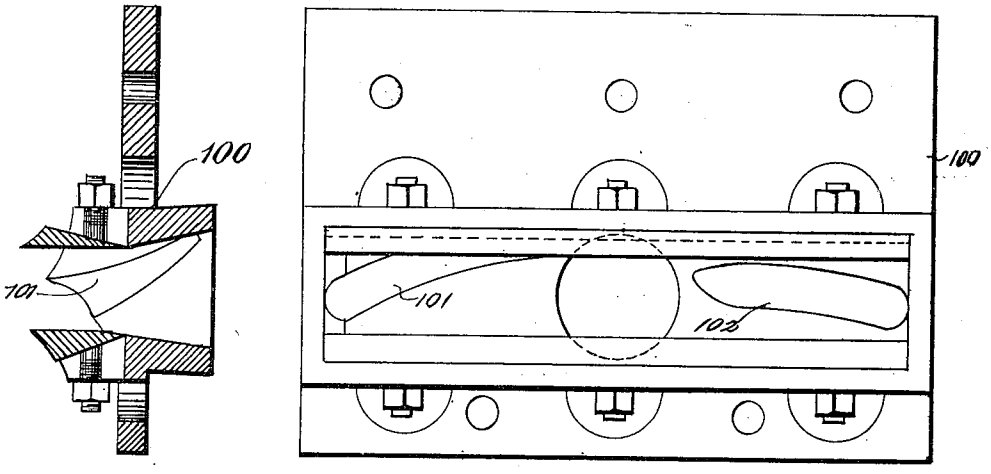


Fig 15

WITNESSES:

Chas Burk.

Callie E. Fuller

INVENTOR

Christian Kessler

BY

Thompson & Bell,

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHRISTIAN KESSLER, OF INDIANAPOLIS, INDIANA.

AUTOMATIC BREAD-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 661,999, dated November 20, 1900.

Application filed December 5, 1899. Serial No. 739,305. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN KESSLER, a subject of Franz Joseph, Emperor of Austria-Hungary, residing at No. 236 East Morris street, Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Automatic Bread-Making Machines, of which the following is a specification.

My invention relates to a machine for automatically forming or molding loaves of bread; and it consists in the mechanism and means employed for performing the various operations necessary to form the loaves of bread, divide the dough into parts of equal size and weights, and to prepare the divided portions to be placed in the baking-oven.

The object of this my invention is, first, to prepare the dough by specially arranged and designed mechanism to be rolled into a continuous sliver of equal and uniform weight and density, then forced by suitable means into and through a forming-die, then to provide a suitable means for dividing or separating the dough thus rolled into parts or loaves of equal sizes and weights and similar forms, and finally to provide means whereby the dough throughout its passage through the machine will be thoroughly floured or dusted and the divided portions of the dough or loaves will be floured or dusted and finished by suitably-formed finishing-rollers and delivered completely formed ready to be placed in the baking-oven. I attain these objects by means of the mechanism illustrated in the accompanying drawings, in which similar numerals of reference designate like parts throughout the several views.

Figure 1 is a side elevational view of the machine. Fig. 2 is a side sectional elevational view of the machine, taken through a plane passing longitudinally through the center of the machine. Fig. 3 is a side elevational view of the machine, showing that side opposed to that of Fig. 1. Fig. 4 is a longitudinal sectional elevational enlarged detail view of the dough-receiving hopper and flour-bin and the dough-receiving or feed rollers. Fig. 5 is an enlarged broken-off transverse sectional elevational view of the flour-bin of the dough-receiving hopper and showing the flour-agitators thereof. Fig. 6 is an enlarged detail side elevational view of the friction-pulley and its driving-cam and by which mechanism the dividing-knife is intermittently reciprocated. Fig. 7 is a broken-off enlarged longitudinal sectional elevational view showing the feed and the reducing or delivering rollers and the means employed intermediate between said rolls for flouring or dusting the dough on both the top and bottom sides thereof at the same time and before entering between the reducing-rolls. Fig. 8 is an enlarged part transverse sectional elevational view of the machine, showing the reducing or delivering rolls thereof. Fig. 9 is an enlarged broken-off side sectional elevational view showing the reducing or discharge rollers, the forming-die, and the dividing-knife. Fig. 10 is an enlarged detail front view of the forming-die, showing the forms of the receiving and discharging openings thereof. Fig. 11 is a broken-off side elevational view of the adjustable frame for supporting the finishing-rollers. Fig. 12 is a broken-off transverse sectional view of the same, taken through the line A B. (See Fig. 11.) Fig. 13 is a similar sectional view taken through the line E F. (See, also, Fig. 11.) Fig. 14 is an enlarged detail view of the change-speed driving mechanism by which the driving-knife pulley is connected and by which the speed of the latter is adjusted and regulated. Fig. 15 is enlarged front and longitudinal sectional views of another form of forming-die that may be used in connection with this machine.

The main frame of this machine is composed of the side frames 1 and 2, which are maintained in vertical position and parallel to each other by suitable distance-frames 3, 4, 5, and 6, which latter are bolted to said frames 1 and 2.

The dough-receiving or feed rollers consist of the master or fixed bottom roller 7 and the adjustable roller 10, and said roller 7 is preferably provided with suitable end flanges 8 for the purpose of preventing the dough as it passes between the said rollers from spreading out beyond the contacting surfaces thereof, and said roller 7 has its end journals journaled in suitable box-bearings fitted in and supported by the standards 9, which latter are firmly and securely bolted to the top of the frames 1 and 2. The top or adjustable

feed-roller 10 is situated slightly in advance of the bottom roller 7 for the purpose of exposing a greater surface of the said roller 7 to the dough contained in the dough-receiving hopper hereinafter described, and said roller 10 has its end journals journaled in suitable box-bearings 12, which latter are adapted to slide in the inclined ways 13, formed in the standards 9. The boxes 12 are each caused to be moved simultaneously and equal distances to raise or lower said roller 10 by the adjusting-screws 14, which latter are journaled at their top ends in the braces 15 and are prevented from moving longitudinally therein by their integral collars 16, which bear against the bottom side of the brace 15 and the hubs of the bevel-gears 17, which bear on the opposite side of said brace, and the latter gears are secured on the top ends of said screws 14 to turn therewith, and the bottom or screw ends of said screws are screwed into the top ends of the boxes 12. The brace 15 is securely bolted on the top ends of the standards 9, and said brace is provided with the end bearings 18, formed integral with the said brace and in which bearings the hand-shaft 19 is adapted to rotate. The hand-shaft 19 is provided with the bevel-gears 20, which are keyed or otherwise secured on said shaft to turn therewith, and said bevels mesh with the bevel-gears 17 to turn the screws 14. A suitable hand-wheel 21 is secured on either end of said hand-shaft the most convenient for the operator and by which the shaft 19 is turned when it is required to change or adjust the position of the roller 10. A flour-box 22, having open top and bottom ends, is secured at its ends to and between the box-bearings 12 in such a position that the bottom open end thereof is closed by the roller 10, thereby exposing the said roller 10 to contact with the flour contained in said flour-box 22 to receive a regular and even coating of flour to prevent the dough with which it contacts adhering to its surface. A flour-bin 23, composed of the sides 23^s and the back 24, is bolted to the standards 9 at the front or feed side of the rollers 7 and 10 and extends across the machine to entirely inclose the front portion of the roller 7 to insure a continuous and even coating or layer of flour to be applied to the peripheral surface of the roller 7, similar to that of the roller 10 previously described. 25 is a removable hopper having the inclosing sides 25^s, the sloping back 25^b, and the dividing-partition 25^p, which incloses only the top front portion of the hopper and the flour-bin, leaving an extended base-opening connecting the flour-bin and dough-hopper, the purpose of which I will now proceed to describe. A series of rocking curved slats 26, 27, and 28 are disposed between the dough-hopper 25 and the flour-bin 23 and extend across the opening between them and overlap to form a dividing-partition between said hopper and bin and present their convex surfaces toward the dough contained in the dough-hopper for the purpose of permitting a slight rocking of the slats to open them for the admission of flour to the dough with a minimum degree of resistance and to prevent the dough from being broken at its surface by said slats when thus moved open or closed, and the said slats have their concave faces or sides directed toward the flour-bin and in contact with the flour contained therein, which form and disposition of said slats is the best calculated to facilitate the flow of the flour between them when open into the dough-hopper and against the dough contained therein. The slats 26, 27, and 28 are each provided with the integral arms 29 of equal radii and have their trunnions 30 central on the radial centers of the top portions of the said slats and journaled in suitable bearings formed in the sides 23^s. The trunnions on one end of each of the slats are made to project some distance beyond the sides 23^s of the flour-bin to receive the arms 31 and 32, which are keyed or otherwise firmly secured thereon. The arm 31 is prolonged to an extent greater than the arms 32, and on the outer or free end thereof is formed a journal-bearing, in which is journaled the hand-shaft 33. Intermediate between the free end or shaft-carrying end and the pivotal center of the arm 31 is connected the rod 34, which is also connected at an intermediate point and at its opposite end to the arms of the intermediate and end slats, and by means of this connecting-rod each of the slats 27 and 28 are caused to open simultaneously and an equal extent with the slat 26 when the arm 31 is moved. The movement of the arm 31 is controlled by a gear-segment 35, which may be either formed integral with the side 23^s of the flour-bin 23 or it may be constructed separately and bolted thereto, and the said segment meshes with a gear-pinion 36, keyed or otherwise firmly secured to the hand-shaft 33, the latter shaft being rotated by means of its hand-wheel 37, also secured on the outer end of said shaft and by means of which and the mechanism described the slats 26, 27, and 28 are either opened or closed, as required, and the extent of the opening between the slats is regulated. A fixed separating-plate 38 extends entirely across the flour-bin 23 between the slat 28 and the receiving or feed roller 7 and is provided with the bearing ends or feet 39, formed integral thereon, which are firmly bolted to the side frames or sides 23^s of the flour-bin 23. A slight space between the lower edge of the plate 38 and the roller 7 is provided for the purpose of permitting a thin layer or coating of flour to adhere to the surface of the roller and be carried over to the dough as the latter enters into the bite of the feed or dough-receiving rolls to prevent the dough from sticking to said roller 7. For the purpose of facilitating the flow of the flour from the flour-bin 23 through the openings between the slats 26, 27, and 28 to and against the dough contained in the dough-hopper 25 I

provide a series of agitators 40, which preferably extend across the interior of the bin 23 its entire width and have their projecting ends or edges directed toward the laps or lines of openings between the slats 26, 27, and 28. The agitator-screens or agitators are made, preferably, of wire-netting of sufficient strength and degree of coarseness of mesh to withstand the resistance of the flour when vibrated in the flour, and the said agitator-screens are either bolted, riveted, or otherwise secured to the angle-bars 42. The agitator-frame is composed of the two side bars 41 and the angle-bars 42, which extend across from side bar to side bar and are riveted thereto at their ends to form a rigid frame. The lower ends of the side bars 41 are pivoted to the free ends of the swinging links 43, which latter are pivotally secured to the inner sides of the flour-bin 23, and the top ends of the said side bars 41 are each provided with the removable strap-bearings 41^s, which are adapted to receive the crank-bearings of the crank-shaft 44, by which latter means and the links 43 a combined rotary and reciprocating movement is imparted to the agitators 40. The crank-shaft 44 is inclosed in the flour-bin 23, at or near the top open portion thereof, and is journaled at its ends in suitable bearings, one formed in one of the sides 23^s and the removable bearing 44^b, secured to the opposing side 23^s of said bin 23, said crank-shaft 44 having one of its ends prolonged to receive its driving-belt pulley 45, which is keyed or otherwise secured thereon to turn therewith and by which means said crank-shaft is rotated at the required degree of speed.

The main driving-shaft 46 of the machine is journaled in suitable bearings 47, securely bolted to the side frames 1 and 2, and on one end of said shaft is secured the belt-pulley 48, which is driven by a changeable-speed mechanism hereinafter referred to, and on the opposite end of said shaft is secured the pinion 49, which meshes with the gear-wheel 50, which latter is keyed on the prolonged end of the journal of the roller 7, and by this mechanism said roller 7 is rotated. Gear-pinions 51, having similarly-formed gear-teeth and of equal diameters, are secured on one of the ends of the rollers 7 and 10, and said teeth mesh with each other, and the form of prolonged teeth in said pinions is provided for the purpose of permitting the movable or adjustable roller 10 to be moved either closer to or farther from its companion roller 7 without disengaging the teeth of the pinions, and by this means a simultaneous rotation of the rollers 7 and 10 is obtained and maintained.

An endless traversing apron 52 is provided between the feed or receiving rollers 7 and 10 and the reducing-rollers 53 and 54 and passes over its guiding and supporting rollers 55 and 56, one of which is placed vertically above the other and the driving-roller 57. The rollers 55 and 56 are each journaled in bearings formed in the bearing-bracket 58, securely bolted to the side frames 1 and 2, and the roller 57 in the brackets 59, secured to the standards 60, and the said roller 57 is rotated by means of the sprocket-chain 61, extending from a suitable sprocket-wheel on the roller 7 to a sprocket-wheel on the prolonged journal end of the roller 57. Tables 56^t and 57^t are placed and secured in position by any suitable means between the feed-roller 7 and the apron-roller 56 and between the apron-roller 57 and the reducing-roller 53 and are provided for the purpose of filling up the spaces between said oppositely-rotating rollers and preventing the dough from passing between them.

An apron-supporting table 62 is supported by and secured to suitable supporting-feet formed on the journal-brackets 58 and 59 and is provided for the purpose of preventing said apron 62 from sagging when the dough is being traversed in a continuous sliver or ribbon from the feed-rollers 7 and 10 to the reducing-rollers 53 and 54.

It will be particularly observed that the apron 52 traverses vertically from the roller 55 to the roller 56, and this portion of said apron is in constant contact with the flour contained in the bottom portion of the flour-bin 23, thereby receiving a continuous coating of the flour to be applied to the under surface of the dough in its passage from the receiving or feed rollers 7 and 10 to the reducing-rollers 53 and 54. A reinforcing-board 63 is bolted or otherwise secured at its ends in vertical position to the rear of the vertically-extending portion of the apron 52 to the brackets 58 and is provided for the purpose of forming a backing for this portion of the apron 52 to resist the pressure of the flour contained in the bin 23 and to relieve said apron from undue tension.

A closing-roller 64 extends between the lower edge of the swinging bottom 65 and the apron-roller 55 and contacts with both throughout its entire length, and the said roller 64 is journaled at its ends in the bearings 64^b, secured to the side frames 1 and 2. The swinging or drop bottom 65 is held closed by means of the locking-cam 66, having the arm 67, by which said cam is held in contact against said swing-bottom, and said cam 66 is pivotally secured to the side frames 1 and 2 in positions equally distant from and contacting with said drop or swing bottom to hold the latter closed. A tension-roller 68, of a length equal to the width of the apron 52, bears on the top of the slack side of the apron and has its journal ends bearing in the free ends of the swinging links 69, which latter are pivotally secured to the side frames 1 and 2.

A flour-box 70 extends over the apron 52 and is provided with the flouring-rollers 71, which latter are journaled at their ends in the sides of said flouring-box toward the bot-

tom thereof and are adapted to be rotated by contact with the dough as it passes under them between the inclined or angle hoppers 72, which latter almost close the space intervening between the rollers and said hopper-boards, leaving a space only sufficient to permit a thin layer or coating of flour to adhere to said flouring-rollers and to be applied to the surface of the dough as it passes under them. The flour-box 70 is supported at its top front ends of its sides by the bolts 73, passing through the slots 74, formed in said sides and screwed into the standards 9, by which arrangement the front portion of the said flour-box may be raised or lowered into any desired position and clamped and secured in such position. A supporting-strap 75 is secured to the top portion of the back of said flour-box 70 by a rivet or other suitable fastening and is slotted at its other or free end to receive the clamping-bolt 75^b, by which means the back end of said flour-box 70 is clamped to the fixed flour-box 76 over the top reducing-roller 54 to adjust the back end of said box 70 to either a more elevated or a lower position, as required. The bottom reducing-roller 53 is provided with the lower fixed flour-box 77, which latter extends along the under side of said roller and completely incloses the bottom half surface of said roller 53 and is firmly secured at its ends to the inner sides of the standards 60 by the supporting-arms 60^s (see Fig. 8) in a manner similar to the supporting means employed in connection with the flour-box 76, hereinafter described, to retain said box in its fixed and stable position. A yielding or ascending bottom 78 is fitted into the open bottom side of the box 77 and is forced upwardly therein by suitable coil-springs 79, which are of a tension sufficient to elevate the flour contained in said box 77 against the roller 53, and said elevating-springs 79 rest on suitable supporting plates or shelves 80, secured to the inner sides of the side frames 1 and 2. It will be observed that one lip of each inclined or angle hopper 72 of the flouring-boxes is purposely made with a keen edge and bear or contact with that side of the periphery of the rollers that enters the flour-box, and said lips are thus for the purpose of removing any dough that might possibly adhere to the rollers and preventing the dough from being carried into the flour-boxes.

The reducing-roller 53 is provided with the end flanges 81 and has its journal ends journaled in suitable bearings formed in the standards 60, which latter are securely bolted in position on the side frames 1 and 2, and the roller 54 has its end journals journaled in the journal-boxes 83, which latter are adapted to slide in their guideways 82, formed in the standards 60. The flouring-box 76, previously referred to, has its top and bottom ends open and is placed directly over the roller 54 with its open bottom end inclosing the top portion of said roller and is firmly secured at its ends and held in fixed position by the distance-arms 76^a, (see Fig. 8,) which are secured by a rivet or other suitable means at one of their ends and to the boxes 83 by bolts at their other ends. A cross-brace 84, screws 85, gears 86 and 87, a hand-shaft 88, journaled in the end bearings 89, and a hand-wheel 90 are also provided for the purpose previously described in connection with the standards 9, and the said parts are similar and alike in construction and function, and said mechanism needs no special description. The rollers 53 and 54 are also connected to rotate simultaneously by means of their pinions 91, which are similar in form and construction to the pinions 51 previously described. The roller 53 is driven or rotated by the sprocket-chain 92, extending from a suitable driving-sprocket wheel on the receiving or feed roller 7 to a similar sprocket-wheel secured on the prolonged end journal of the said roller 53.

Suitable counterbalance-springs 83^s are interposed between the tops of the lower journal-boxes formed in the standards 60 and the bottoms of the upper journal-boxes 83 and are provided for the purpose of sustaining the weight of the top roller 54 and the parts connected thereto and for relieving the elevating-screws from undue stress.

The forming or molding die 93 is bolted or otherwise removably secured to the supporting bars or plates 94 and 95, which latter are bolted to the standards 60, and said die 93 is provided with the rectangular receiving-opening 93^r, which extends along and is directed toward the delivering side of the delivering or reducing rollers 53 and 54 and at which opening the dough enters the die as it is discharged from said rollers, and a discharge-opening 93^d, which opening is of a width, height, and form to reduce the dough as it passes through the die to the proper form and density before being divided or cut off by the dividing-knife 96. Adjustable top and bottom lips or liners 97 and 98 extend along the inner top and bottom portions of the top and bottom walls of the die 93 and have their bearing-surfaces planed truly to fit the top and bottom inclined surfaces of said top and bottom walls, to which they are secured by the stud-screws 99, which extend through suitable slots formed in said top and bottom walls to receive their clamping-nuts and by which means said lips or liners 97 and 98 may be placed nearer to or farther from the rollers 53 and 54, as the conditions of the working of the dough may require. I do not confine myself to any special form of the interior of the die to be employed in connection with this machine, as any die having its interior surface formed to mold any required form of loaf may be used without departing from the spirit of my invention.

It will be noted that the form of die illustrated particularly in Figs. 2, 9, and 10 is adapted to one form of loaf only—namely, that class of loaves in which the center por-

tions thereof are reduced in area in order that when fully baked or ovened said loaves will expand at such reduced portion or center to the required size and form and which in this case will be uniformly and approximately rectilinear. Another form of molding-die 100 is illustrated in Fig. 15 and in which the interior surface is provided with the longitudinally-converging grooves 101 and 102 and which latter extend in spiral paths commencing at the ends of the inlet-opening of the die and converging toward the discharge-opening thereof, where said grooves die out or vanish into the form of the discharge-opening, whether the latter be annular or rectilinear, and the said grooves are provided for the purpose of causing the rolled, flat, and continuous sliver of dough to be folded, overlapped, or rolled up longitudinally before being discharged from the die 100 and which discharge-opening is formed to give either a round, oval, or rectilinear form to the dough as it is discharged from the die, as required.

The dividing-knife 96 is preferably constructed with a rounded blunt dividing edge, and this form of edge is provided for the purpose of dividing the dough by compression without cutting or severing it at that part of separation, and by this method of dividing the dough the outer skin of the latter is preserved without either crack or break, and said knife 96 is adapted to reciprocate vertically with its face in close contact with the discharge end of the die 93 in the guideways 104, which latter are securely bolted to the standards 60. The outer reduced ends of the dividing-knife 96 extend outwardly beyond the side frames 1 and 2, and the said ends 106 are bent vertically to tubular form to receive the stems of the eyebolts 107, which are secured therein by suitable nuts screwed on the threaded ends of said eyebolt-stems. Longitudinally-adjustable connecting-rods 108 have their top stub ends pivotally connected to the eyes of the eyebolts 107, and their lower stub ends receive the crank-pins 109 secured on the faces of the crank-disks 110. The disks 110 are each secured on the outer projecting ends of the shaft 111 to turn therewith, and the said shaft 111 is journaled in suitable bearings 112, formed in the side frames 1 and 2. A friction-pulley 113 is keyed on the shaft 111, at or about the center portion thereof, and contacts with the friction-cam 114, secured on the shaft 115 and by which cam said pulley is caused to be rotated intermittently. The friction-cam 114 is provided with the peripheral cam-spring 116, which is firmly secured to the cam-center 114 at one of its ends and has its opposite bent and yielding end adjustably secured to said cam-center by means of the adjusting-bolt 116, by means of which the said spring is forced outwardly to increase or inwardly to diminish the intensity of its contact with the driven pulley 113. The arc of contact of the friction-spring 116 must be such that the shaft 111 will make one complete revolution to return the knife 96 to its upper or starting position, and the said shaft 111 is prevented from further rotation by the stop or locking spring 117, which is securely bolted at one end to the cross-brace 5 and has its opposite rounded end or locking end 118 adapted to engage the notch 118^n, formed in the periphery of the roller 113. A suitable belt-pulley 119 is securely keyed on the end of the shaft 115, and a suitable belt connects this pulley with the pulley 120, keyed on the prolonged journal end of the speed-cone 121. The cones 121 and 122 are similar in form and equal and are provided with suitable end journals which are journaled in the bearings 123, which latter are supported overhead and in a suitable position above the machine. The cone 121 is driven by a suitable belt passing over the opposite cone 122, and the velocity ratio of the driving-pulley 120 is either increased or diminished by simply traversing the cone-belt from either right to left, or vice versa, on the cones an amount equal to and corresponding with the required degree of velocity of reciprocation of the dividing-knife 96, and by this means the dough as it is discharged from the forming-die 93 is divided into either larger or smaller sections or divisions of equal size and weight, according to the size, weight, and form of the loaves to be produced. The cone 122 is rotated by its pulley 124, secured on the prolonged end of the journal end thereof, which latter is connected by a suitable belt to a driving-pulley suitably located on the line of shafting of the factory in which the machine is placed. Any of the many suitable means (not shown) may be employed in connection with the belt on the cone-pulleys 121 and 122 for the purpose of shifting it into any required position on said cones and for retaining it in such position. A similar speed mechanism is used in connection with the driving-pulley 48, whereby the speed of the feed or receiving rollers 10 and 7 may be varied independently of the speed mechanism for driving the knife 96.

A suitable flour-box 125, having a screen bottom and open top, is secured to the guides 104, to be adjustable vertically thereon by suitable clamping-screws 126. Suitable knockers 127 are secured to the prolonged ends 106 of the dividing-knife 96, and these are adapted to strike the pieces 128, secured to the bottom of the ends of the flour-box 125, thereby causing a vibration of said flour-box to discharge the flour contained therein in a shower to be precipitated on the dough at that part where the knife 96 descends to divide said dough.

An endless apron 129 extends from the roller 130 to the roller 131 over and under the table 132. The roller 130 is located directly under the dividing-knife 96 and extends along and under the dividing blunt edge thereof and has its journal ends journaled in the box-

bearings 133, which latter are adapted to slide vertically in the supporting-brackets 134, secured to the plates 95, and said boxes 133 rest on resilient cushions 135, which may be of rubber or other similar resilient material that will secure a yielding support to the roller 130 against the shock produced by the knife as it contacts with the latter at the completion of its downward stroke, or steel springs may be interposed between said boxes 133 and their supporting-brackets 134 to accomplish the desired result. The roller 131 has its end journals bearing in the adjustable bearings 136, which latter are bolted to the side frames 1 and 2 and have their positions on said frames adjusted by the adjusting-bolts 137. (See Figs. 1, 2, and 3.) A tension-equalizing roller 138 is journaled at its ends in the free ends of the arms 139, and these are pivotally secured to the intermediate table-supporting brace 140. The table 132 is supported by the table-braces 140 and bolted or otherwise secured thereto, and the said braces are bolted securely to the side frames 1 and 2.

The finishing or flouring rollers 141, 142, and 143 are each of equal diameter and similar form of profile, and the forms of the said rollers are dependent entirely on the form of loaves to be passed under them to be finished. The roller 141 has its end journals bearing in the adjustable bearings 144, which latter pass through the bottom slotted portion of the suspension-link 145 and are adapted to clamp the latter between the integral collar 146 and the clamping collars or nuts 147, screwed on the threaded ends of the necks of said journal-bearings. The suspensory links 145 are slotted at their top ends to receive the clamping-screws 145^b, by which said links are clamped to the frame 148 and by which means the height of the forward or first finishing-roller 141 is adjusted to either a higher or lower position, as the case may require. The intermediate roller 142 has its end journals bearing in suitable bearings formed in the horizontal supporting-bars 149, intermediate between the ends thereof, and the said end journals of the intermediate roller are prolonged beyond the bearings thus formed a sufficient distance to receive the knocker-wheels 150. The end or last finishing-roller 143 is journaled in the end bearings 151, which latter are similar in construction to the bearings 144, but longer, and are provided with the hand clamping-nuts 152, which are adapted to clamp the horizontal supporting or bearing bars 149 to the frame 148. The frame 148 is provided with the downwardly-extending arms 153, which are pivotally connected to the bearing-boxes 154, secured to the side frames 1 and 2, and the forward downwardly-extending arms 155, which are slotted to receive the clamping-bolts 156, by which the said depending arms are bolted to the side frames 1 and 2, and whereby the said rollers 141, 142, and 143 may be adjusted to any degree of inclination and secured in such position without a change of position of said rollers individually, and the said frame 148 is pivotally secured to said side frames 1 and 2 for the purpose of permitting it to be revolved sufficiently to remove any one or all of said finishing-rollers 141, 142, and 143 and replacing them by others without destroying the alinement of said frame. Stiffening-braces 157 extend diagonally from the four top corners of the said frame 148 for the purpose of securing the required rigidity of the said frame and preserving the alinement of said finishing-rollers.

A flour-box 158, having an open top and a screen-covered bottom side, is supported between the frames 148 directly above the finishing-rollers 141, 142, and 143 and beneath the braces 157 by the transversely-extending supporting-braces 159, which latter are secured at their ends to the inner sides of the frames 148.

Vertically-extending spring-rods 160 are adapted to slide longitudinally in the stirrups 161, which latter are secured to the frames 148 and the guide-brackets 163, secured on opposite sides of the flouring-box 158, both of said brackets 163 and said stirrups 161 being drilled to loosely receive said rod and disposed one directly above the other to preserve the vertical alinement of said spring-rod 160. Coil-springs 164 surround the spring-rods 160 between the collars 162 thereof and the guide-brackets 163, between which said springs are compressed, and while the knocker-wheels 150 are rotating the teeth of said wheels alternately contact with the bottom projecting ends of said spring-rods 160 to force them upwardly to compress said coil-springs 164, and immediately said spring-rods 160 are released the latter descend rapidly against the stirrups 161, thereby imparting a slight vibration to the flour-box 158 sufficient to cause the required quantity of flour to be sprinkled on the loaves of bread as they pass under the finishing-rollers 141, 142, and 143. The roller 131 is driven by a sprocket-chain 165, which passes over a sprocket on the journal end of the roller 53 and a sprocket of suitable diameter on the end of the said roller 131.

Any suitable receptacle may be placed at the discharge end of the apron 129 for the purpose of receiving any of the loaves that might be permitted to remain too long a time on the said apron and to prevent such loaves falling on the ground or floor of the factory.

The sides of the standards 9 and 60 are graduated, as shown particularly in Fig. 1, and suitable pointers are secured to the sliding boxes 12 and 83 to indicate the spaces between the rollers 7 and 10 and the rollers 53 and 54.

The operation of the machine will be readily understood from the following: The dough having been prepared in the customary way in any dough-mixing machine is deposited in the hopper 25, and said dough by its gravity descends to the bottom of the hopper and con-

tacts with the receiving-rollers 7 and 10 and at the same time contacts at its under side with the slats 26, 27 and 28 and receives a coating of flour on this surface as the latter is being discharged through the slat-openings, as previously described, and said rollers 7 and 10 draw the dough between them to reduce it to a sliver or ribbon of uniform width and thickness, which latter dimension or primary thickness is determined by experiment and the needed density of the dough. The sliver or ribbon of dough is discharged from said rollers 7 and 10 onto the endless apron 52, by which latter said dough is traversed to the reducing-rollers 53 and 54, having been previously coated with flour on both of its sides or surfaces simultaneously by the flouring-rollers 71 on its top side and the flour-coated apron 52 on its bottom side, and the said dough is discharged from said reducing-rollers 53 and 54, which have been previously adjusted and set to reduce the dough to the proper degree of density and thickness, to and into the molding or forming die 93, by which latter said dough is molded into form. The dividing-knife 96 is maintained in its upper position for a period of time sufficient to permit the proper quantity of dough to pass under it to produce the required size and weight of loaf, at which time said knife 96 descends rapidly upon the dough and against the forward apron-roller 130 to sever or divide the dough. The periods of rest between the reciprocations of the knife 96 are readily regulated and adjusted by the speed-cones 121 and 122 by moving the belt on said cones into such position to impart the desired degree of velocity of rotation to the crank-shaft 111, and by these means the dough can in its passage from the die 96 to the apron 129 be accurately divided into loaves of bread of equal weights, sizes, and density. The dough thus divided is conveyed by the apron 129 under the finishing-rollers 141, 142, and 143, by means of which latter, the profiles of which are made to conform with the form of bread or loaves desired, the divided portions of the dough or loaves are further rolled into form or molded and receive a final coating of flour before being taken off said apron 149 and placed into the oven.

Having thus fully described this my invention, what I claim as new and useful, and desire to cover by Letters Patent of the United States therefor, is—

1. In an automatic bread-making machine, the combination with a dough-receiving hopper having its top and base open, and receiving or feed rollers extending in front of the base-opening of said hopper, a flour-bin adjacent to said hopper, and a partition between said hopper and said flour-bin having openings connecting said flour-bin and said hopper.

2. In an automatic bread-making machine, the combination with a dough-receiving hopper having its top and base open, and receiving or feed rollers extending across said hopper in front of said base-opening thereof, of a flour-bin adjacent to said hopper and a slatted partition between said flour-bin and said hopper.

3. In an automatic bread-making machine, the combination with a dough-receiving hopper having top and base openings, receiving or feed rollers extending across said hopper in front of said base-opening thereof of a flour-bin adjacent to said hopper and a series of overlapping slats between said bin and said hopper and means whereby said slats are moved to open or to close.

4. In an automatic bread-making machine, the combination with a dough-receiving hopper having top and base openings, receiving or feed rollers extending across said hopper in front of said base-opening thereof, of a flour-bin contiguous to said hopper and a series of overlapping slats extending across said flour-bin between the latter and the said hopper, and pivotally mounted at their ends and means exterior of said bin for rocking said slats to either open or close and for retaining them in either open or closed position.

5. In an automatic bread-making machine, the combination with a dough-receiving hopper having an open top and base, receiving or feed rollers extending across said hopper in front of the base-opening thereof, a flour-bin contiguous to said hopper, a series of overlapping segmental formed slats extending across said flour-bin between the latter and said hopper, said slats having their convex surfaces exposed or directed toward the interior of said hopper and pivotally mounted at their ends and means exterior of said bin for rocking said slats to either open or close and to retain them in either open or closed position.

6. In an automatic bread-making machine, the combination with a dough-receiving hopper having an open and top base, receiving or feed rollers extending across said hopper in front of said base-opening, of a flour-bin contiguous to said hopper, a series of overlapping segments or slats extending across said flour-bin between the latter and said hopper, said segments or slats having their convex surfaces directed toward the interior of said hopper, arms on the ends of said slats and extending backwardly from the concave sides of said slats, trunnions or journals extending outwardly from said arms and having their axes coinciding with the radial centers of the top segmental portions of said slats, means or bearings for supporting said trunnions, arms on one of the ends of said trunnions, a rod connecting said arms, a shaft journaled in the prolonged end of one of said arms, a hand-wheel and a pinion on said shaft, and a fixed toothed segment meshing with said pinion.

7. In an automatic bread-making machine, the combination with a dough-receiving hopper having its top and base ends open, a flour-

bin contiguous to the front of said hopper, a separating-partition extending downwardly between the top portions of said hopper and said bin, of a series of overlapping slats horizontally disposed across the lower opening connecting said hopper and said bin to form a lower separating-partition, and means whereby said slats are moved to either open or to close and for retaining them in either open or closed position.

8. In an automatic bread-making machine, the combination with a dough-receiving hopper having its top and base ends open, a flour-bin contiguous to the front of said hopper and a partition between said flour-bin and said hopper having a plurality of openings connecting the former with the latter, of a series of slats arranged in parallel rows one above the other and each opposite one of said partition-openings, and means for rocking said slats, substantially as and for the purpose set forth.

9. In an automatic bread-making machine, the combination with a dough-receiving hopper having its top and base ends open, a flour-bin contiguous to the front of said dough-receiving hopper and a separating-partition between said flour-bin and said dough-receiving hopper, and having a plurality of openings arranged in parallel rows and connecting the dough-receiving hopper with the bin, of a series of imperforate slats arranged in parallel rows and each having its edge directed toward its opposing partition-opening, and means for rocking said slats.

10. In an automatic bread-making machine, the combination with a dough-receiving hopper having its top and base ends open, a flour-bin contiguous to the front of said hopper, a separating-partition between the said dough-receiving hopper and said flour-bin and having a plurality of parallel openings connecting said bin and said hopper.

11. In an automatic bread-making machine, the combination with a dough-receiving hopper having its top and base ends open, upper and lower receiving-rollers extending across and in front of the base-opening of said hopper, a flour-bin having an open top, situated in front of said hopper and extending across and downwardly beneath said hopper and said lower receiving-roller to inclose the latter, an apron-reinforcing board extending across the base-opening of said flour-bin to the rear of the discharge side of said receiving-roller, an apron-roller above said reinforcing-board, a closing plate or table extending along and between said apron and receiving or feed roller, a lower apron-roller beneath said reinforcing-board and an endless apron passing over said upper and said lower apron-rollers through the interior of said bin in front of said reinforcing-board, all substantially as and for the purpose set forth.

12. In an automatic bread-making machine, the combination with a dough-receiving hopper having its top and base ends open, upper and lower receiving or feed rollers extending across and in front of the base-opening of said hopper, of a flour-bin, having an open top, situated in front of and extending across and downwardly beneath said hopper and the lower receiving or feed roller to inclose the same, and an apron-reinforcing board extending across the base-opening of said flour-bin to the rear or discharge side of said bottom receiving or feed roller, an apron-roller above said closing-board, a reinforcing-board extending along and between said apron and said receiving or feed roller, a lower apron-roller beneath said reinforcing-board, an endless apron passing over said upper and said lower apron-rollers through the interior of said bin in front of said reinforcing-board, and a closing-roller contacting with and extending across along and between said lower apron-roller and the lower edge of the front wall of said flour-bin, substantially as and for the purpose set forth.

13. In an automatic bread-making machine, the combination with upper adjustable and lower fixed receiving or feed rollers, upper adjustable and lower fixed reducing-rollers, of a traversing apron extending between said receiving or feed rollers and said reducing-rollers, means for coating said rollers and said apron with dry flour, and means for dusting the top surface of the product as it is traversed between said pairs of receiving or feed and reducing rollers, substantially as and for the purpose set forth.

14. In an automatic bread-making machine, the combination with an upper adjustable and lower fixed receiving or feed roller and an upper adjustable and a lower fixed reducing-roller, an apron-supporting table extending between said pairs, of receiving or feed rollers and said reducing-rollers, and an apron adapted to traverse over the top surface of said table, of means for coating said apron and said rollers with dry flour, and means for dusting the top surface of the product as it is traversed between the pairs of rollers.

15. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed feed or receiving roller, and an upper adjustable and a lower reducing-roller, an apron-supporting table extending between said pairs of receiving or feed rollers and said reducing-rollers, an apron adapted to traverse over said table and means for coating the surface of said apron with dry flour, of a flour-box above said apron and a series of flouring-rollers having their upper sides contacting with the dry flour contained in said flour-box, and their lower sides projecting through the base of the latter, and means whereby the said flouring-rollers may be lowered or elevated nearer to or farther from said traversing apron.

16. In an automatic bread-making machine, the combination with an upper adjustable roller and a fixed receiving or feed roller, and an upper adjustable and a lower fixed reduc-

ing-roller, a supporting-table between said pairs of receiving and said reducing rollers, an apron adapted to traverse over said table and means for coating said apron with dry flour, of a flour-box above said traversing apron, a series of flouring-rollers extending across the base of said flour-box, in the same horizontal plane and parallel to each other, and angle-hoppers between each of the pairs of said flouring-rollers.

17. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed or feed roller, an upper adjustable roller and a fixed reducing-roller, an apron-supporting table between said pairs of receiving or feed and said reducing rollers, apron-carrying rollers contiguous to the ends of said apron-supporting table, an endless apron passing over said apron-rollers and over and under said table and fixed closing plates or tables between said apron-rollers and said fixed receiving or feed roller and said fixed reducing-roller, of a flour-box above said traversing apron, a series of flouring-rollers extending across the base of said box in the same horizontal plane and parallel with each other, and angle-hoppers extending along and between each of the pairs of said flouring-rollers with their angles or corners directed upwardly in the interior of said flour-box.

18. In an automatic bread-making machine, the combination with an upper adjustable roller and lower fixed receiving or feed roller, of a flour-box above said upper roller and having its top and bottom ends open, said open bottom end adapted to receive and to inclose the top half of said adjustable top roller, a lower flour-box beneath said fixed roller and having its top and bottom ends open, said top end adapted to receive and to inclose the bottom half of said fixed roller, and an ascending bottom or base in said lower flour-box.

19. In an automatic bread-making machine, the combination with upper adjustable and lower fixed rollers, of a flour-box above said upper roller and having its top and bottom ends open, said open bottom end adapted to receive and to inclose the top half of said adjustable roller, a lower flour-box having its top and bottom ends open, said top open end adapted to receive and to inclose the bottom half of said fixed roller, a removable ascending bottom in the latter flour-box, and means for automatically moving said ascending bottom toward said fixed roller as the flour is used, and means for cleaning said top, and bottom rollers while they are in motion.

20. In an automatic bread-making machine, the combination with upper adjustable and lower fixed rollers, of a flour-box above said upper roller and having its top and bottom ends open, said bottom end adapted to receive and to inclose the top half of said upper roller, a depending lip having its reduced or knife edge contacting with and extending along the entering side of said roller, a lower flour-box beneath said lower fixed roller and having its top and bottom ends open, said top end adapted to receive and to inclose the bottom half of said fixed roller, a projecting lip having its reduced or knife edge extending across and contacting with the entering side of said fixed roller, a removable ascending bottom in said lower flour-box, springs under said ascending bottom, and means for supporting said springs, all substantially as and for the purpose set forth.

21. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed roller, of a forming die or mold having closed sides, top and bottom, and open receiving and discharging ends, said receiving end directed toward the discharging side of said rollers, and means for dividing the product into equal sections or parts as it is discharged from said die.

22. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed roller, of a forming die or mold having closed sides, top and bottom, and open receiving and discharging ends, said receiving end directed toward the discharging side of said rollers and said receiving end of said die of larger area than the discharging end thereof, and said discharging-opening formed to impart the desired form to the product as it is discharged from said die or mold, and means whereby the product is divided into equal sections or parts as it is discharged from said die.

23. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed roller, of a forming die or mold having closed sides, top and bottom, and open receiving and discharging ends, said forward or receiving end of rectilinear form and extending along the entire length of said rollers at their discharging side, and said rear or discharging opening of said die of lesser or reduced area than said forward or receiving opening, and of a form conforming with the desired form of the product, upper and lower interior liners in said die, and means whereby said liners are moved and adjusted in position nearer to or farther from said rollers.

24. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed roller, of a forming die or mold having closed sides, top and bottom and having open receiving and discharging or forming ends, a reciprocating knife extending over and along the discharge open end of said die and means for reciprocating said knife and retaining it in close contact with the die at the discharging or molding opening thereof.

25. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed roller, of a forming or molding die having closed sides, top and bottom and end open receiving and discharging or forming openings, of a vertically-recipro-

cating knife having a blunt or rounded dividing edge extending over and along the discharge-opening of said die, a roller extending along and beneath said knife, and means for simultaneously rotating said roller and reciprocating said dividing-knife.

26. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed roller, of a forming or molding die having closed sides, top, and bottom and open receiving and discharging or forming end openings, of a vertically-reciprocating dividing-knife extending over and along the discharging or forming opening of said die, a roller extending along and beneath said knife and adapted to contact therewith when the latter descends, means for yieldingly supporting said roller, and means for simultaneously rotating said roller in one direction and reciprocating said knife, all substantially as and for the purpose set forth.

27. In an automatic bread-making machine, the combination with an upper adjustable roller and a lower fixed roller, of a forming or molding die having closed sides, top and bottom, and open receiving and discharging or forming open ends, a reciprocating knife situated at the discharge end of said die or mold, a flour-box above said knife and having an open top and a screen-covered bottom and means for vibrating said flour-box, substantially as and for the purpose set forth.

28. In an automatic bread-making machine, the combination with upper and lower rotative rollers, of a die contiguous to said rollers at the discharge sides thereof, and having closed sides, top and bottom, and open receiving and discharging ends, of a vertically-reciprocating knife contiguous to the discharging end of said die, and means for intermittently reciprocating said knife.

29. In an automatic bread-making machine, the combination with upper and lower rotating rollers, a die or former contiguous to said rollers at the discharging side thereof, and having closed sides, top and bottom, and open receiving and discharging ends, of a vertically-reciprocating knife, a crank-shaft, connecting-rods connecting said crank-shaft to said reciprocating knife, a friction-roller, a rotative friction-cam having a segmental portion of its periphery adapted to engage or contact said friction-roller to rotate the latter intermittently.

30. In an automatic bread-making machine, the combination with upper and lower rollers and a die or forming-mold having closed sides, top and bottom and open receiving and discharging ends, of a vertically-reciprocating knife, a crank-shaft, adjustable connecting-rods connecting said crank-shaft and said knife, a friction-roller, and a driving-cam composed of a carrying-center and an adjustable segmental spring-cam portion, means for rotating said cam at an increased or diminished speed and means for adjusting said cam-spring to increase or diminish its frictional contact with said friction-roller, all substantially as and for the purpose set forth.

31. In an automatic bread-making machine, the combination with upper and lower rotative rollers, and a die having closed sides, top and bottom, and open receiving and discharging ends, of a vertically-reciprocating knife, a crank-shaft, adjustable connecting-rods connecting said crank-shaft and said knife, a friction-roller, a friction driving-cam, and mechanism whereby the said driving-cam is rotated and whereby the speed of rotation of the same may be either increased or diminished while said cam is in motion.

32. In an automatic bread-making machine, the combination with an endless traversing carrying and discharging apron, of a series of two or more finishing-rollers extending transversely across the direction of motion of said apron, and adjustably supported above the latter, a flour-box above said rollers having an open top and a screen-covered bottom, and means for vibrating said flour-box.

33. In an automatic bread-making machine, the combination with an endless traversing apron, of a series of two or more finishing-rollers extending transversely across the line of motion of said apron and arranged parallel to each other, and means for independently raising or lowering either end roller of the series, and a carrying-frame whereto said rollers are adjustably secured, said supporting-frame pivoted at one end and adjustably secured at its opposite end to the main frame of the machine, all substantially as and for the purpose set forth.

34. In an automatic bread-making machine, the combination with the feed-rollers thereof, the reducing-rollers, a forming-die contiguous to said reducing-rollers, and a dividing-knife, of means for varying and regulating the speed of said rollers and said dividing-knife while the machine is in motion and independently of each other, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHRISTIAN KESSLER.

Witnesses:
THOMPSON R. BELL,
GEORGE HITZ.