United States Patent

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[15] **3,635,638**

[45] **Jan. 18, 1972**

[54] ROLL-FORMING MACHINE

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[22] Filed: **Jan. 9, 1970**

[21] Appl. No.: **1,802**

[52] U.S. Cl. .....**425/373**, 107/15 AF, 107/54 A, 198/34, 425/385

[51] Int. Cl. **A21c 11/04**

[58] Field of Search .....107/15 AF, 15, 3, 5, 8 K, 9 D, 107/54 A, 1 A; 198/34

[56] **References Cited**

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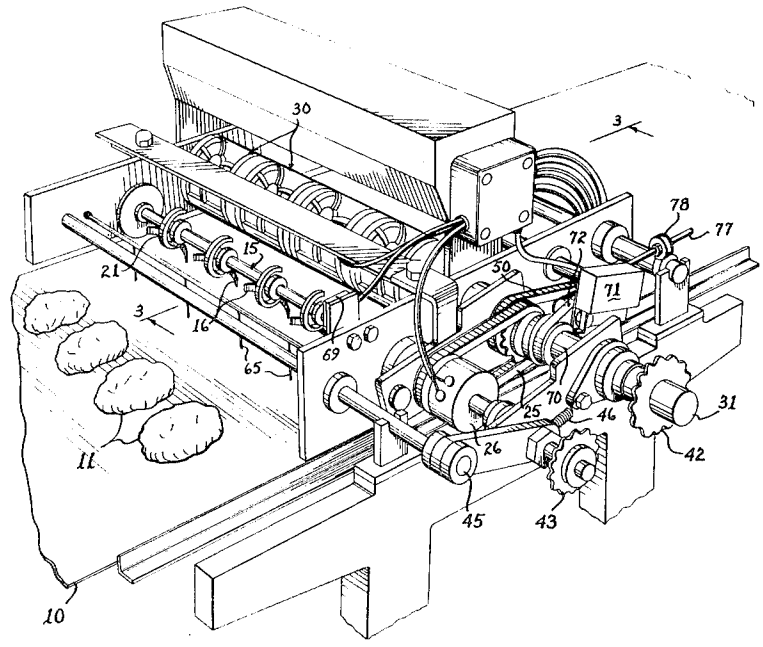
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[57] **ABSTRACT**

A machine is provided for attachment to a conveyor system utilized to transport raw dough rolls. A stop gate is movably positioned in the path of the rolls and, when placed in an interfering position, temporarily stop the rolls while the rolls maintain sliding contact with the conveyor. A roll imprinting drum is positioned above the conveyor and adjacent the stop gate; the stop gate is subsequently moved to a noninterfering position to permit the rolls to pass to the imprinting drums where the rolls are formed into a desired shape.

9 Claims, 7 Drawing Figures



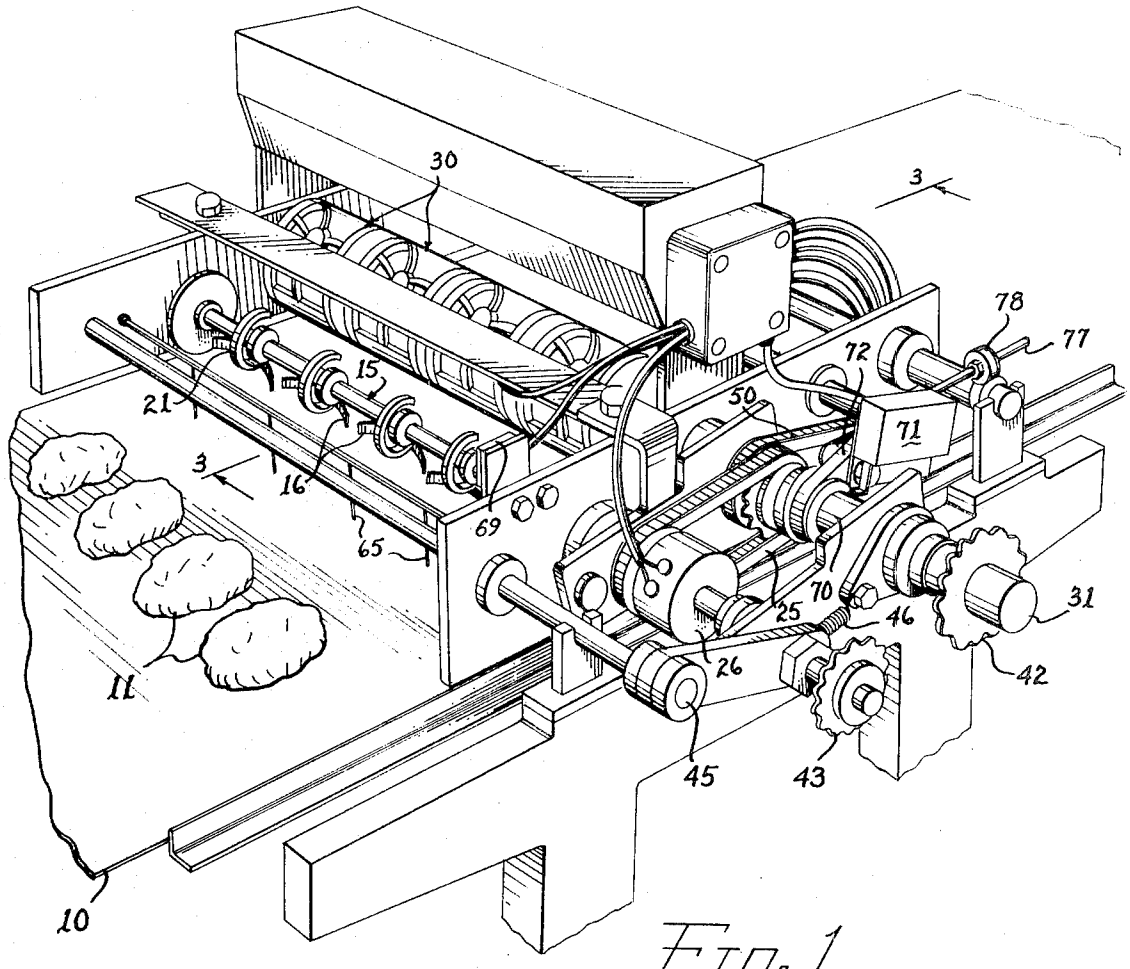


Fig. 1

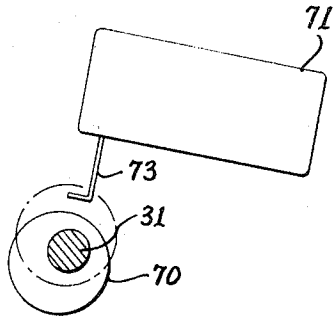
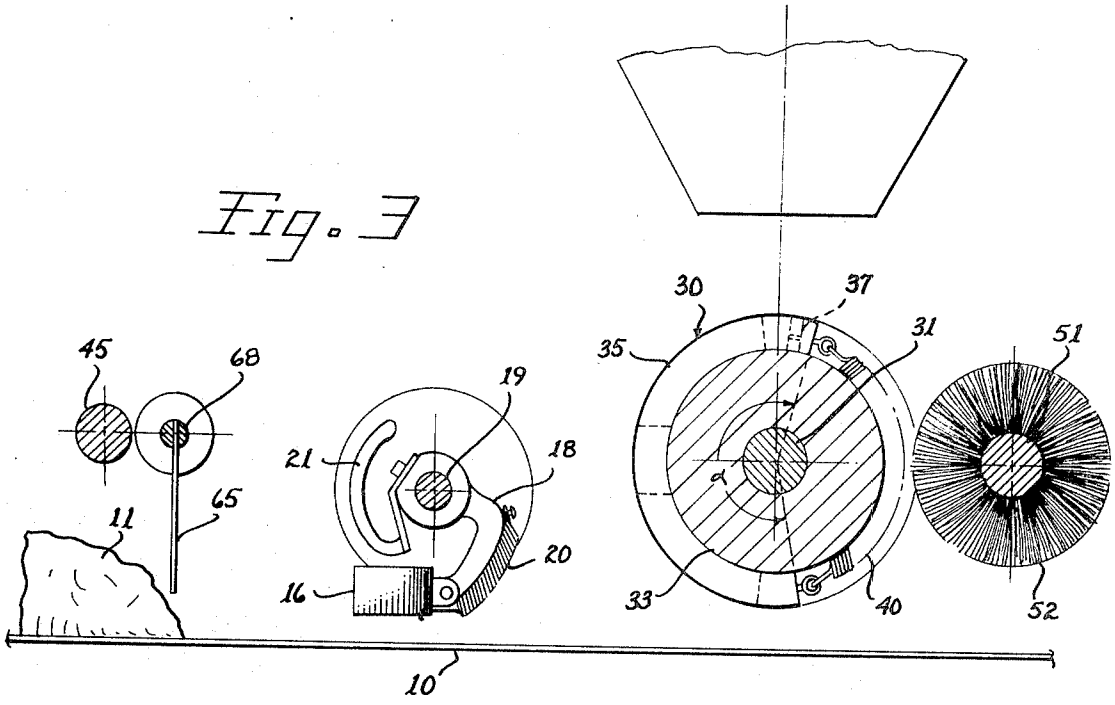


Fig. 2

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Fig. 3



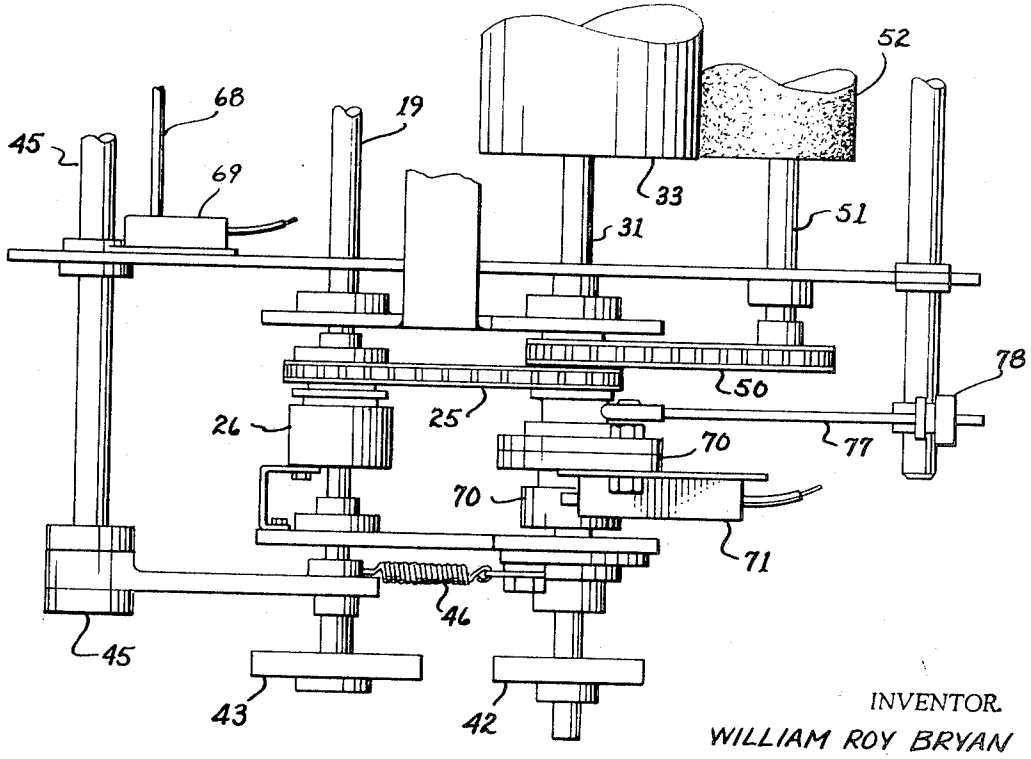


Fig. 4

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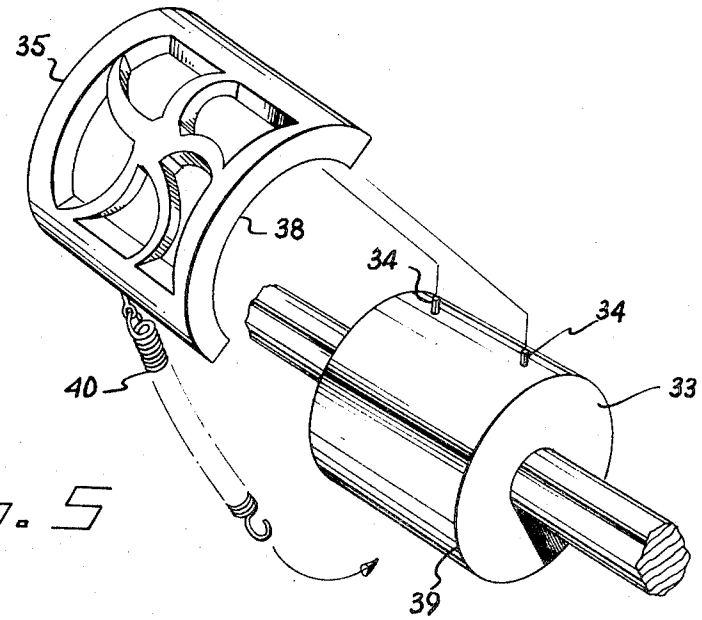


Fig. 5

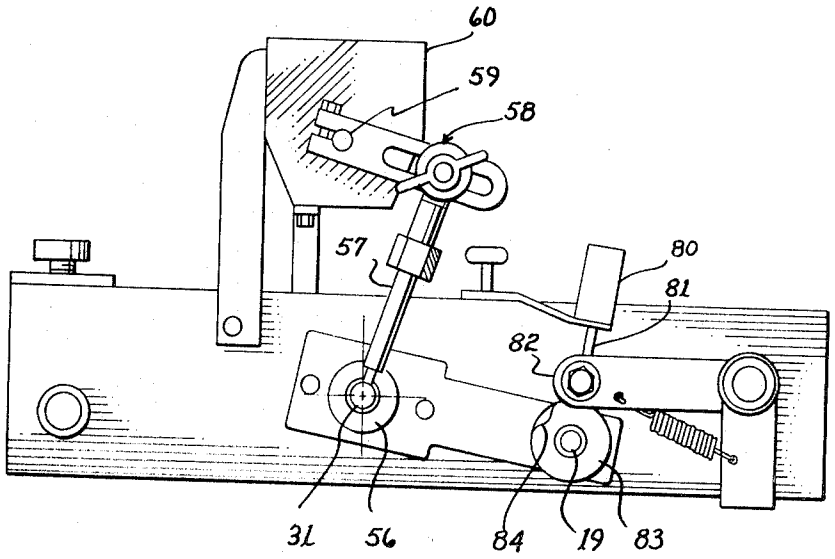


Fig. 6

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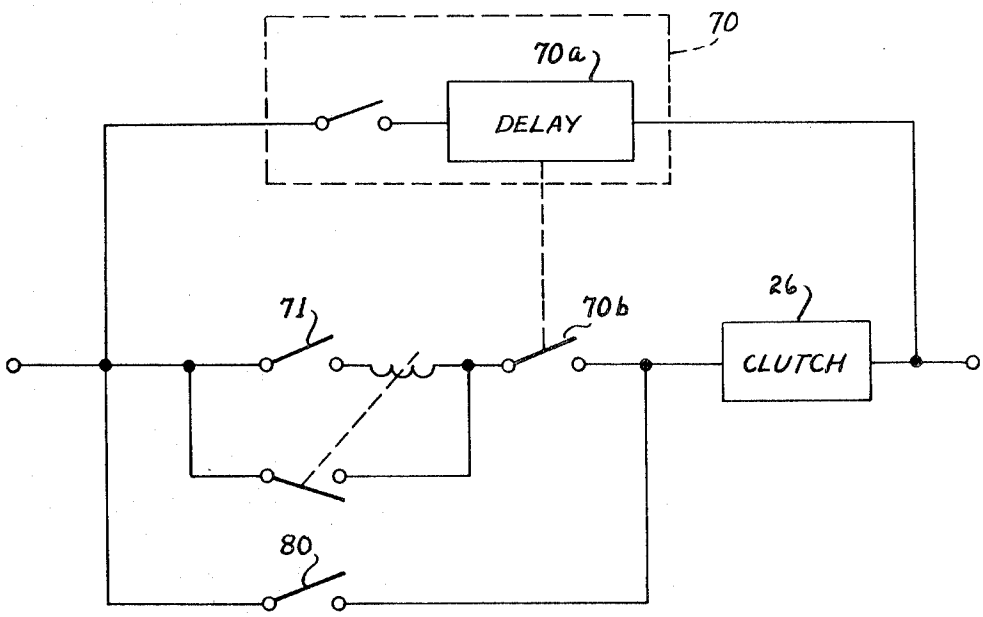


Fig. 7

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ROLL-FORMING MACHINE

The present invention pertains to machinery for utilization in a bakery, and more particularly, to a machine for imprinting raw dough rolls with a desired design.

Rolls are automatically formed from raw dough and are characteristically placed on a conveyor to be transported to a baking pan. It has been found desirable to imprint designs in the rolls to render the finished product more attractive and desirable. For example, by imprinting the rolls with appropriate designs, the roll, when baked, has the appearance of a hand-rolled roll with indentations to facilitate breaking the roll into smaller portions. The utilization of roll-forming drums having a suitable design thereon is old in the art. Such prior art apparatus utilized a plurality of drums having a negative of the design formed therein rotatably positioned on a shaft over the conveyor. As the forming drums are rotated, the raw dough rolls passing therebeneath on the conveyor were imprinted or formed with a suitable design; however, registration between the raw dough roll and the forming drum were impossible. The result of the prior art apparatus was the formation of rolls with a desired design, but with the design substantially randomly positioned on the roll. Attempts at synchronizing the position of the raw dough roll on the conveyor and the rotation of the dough-forming drums resulted in extremely complex machinery with imperfect results.

The problem of registration of the design on the raw dough roll is complicated by the fact that the dough is usually deposited on the moving conveyor in rows aligned transverse to the conveyor. The raw dough rolls in each row are almost always imperfectly aligned so that the rolls will pass under their respective forming drums at different times.

It is therefore an object of the present invention to provide an improved roll-forming machine for imprinting designs in raw dough rolls.

It is another object of the present invention to provide a roll-forming machine for attachment to a conveyor system utilized to transport raw dough rolls.

It is another object of the present invention to provide a roll-forming machine wherein the individual raw dough rolls are stopped prior to passage to a roll-forming drum.

It is still another object of the present invention to provide a roll-forming machine that will permit accurate registration of raw dough rolls with roll-forming drums by temporarily stopping the raw dough rolls and aligning the rolls prior to their passage to the forming drums.

These and other objects of the present invention will become apparent to those skilled in the art as the description thereof proceeds.

Briefly, in accordance with the embodiment chosen for illustration, a stop gate comprising a plurality of stop bars is positioned above the conveyor. The stop gate is movably positioned in the path of raw dough rolls being transported by the conveyor and engages the rolls, forcing the latter to stop while maintaining sliding contact with the conveyor. At a predetermined time, the stop gate is moved out of its interfering position to permit the raw dough rolls to pass under a plurality of rotating drum mounted dies. The stoppage of raw dough rolls is timed to permit all of the rolls to engage the stop gate and thus become perfectly aligned in a row. The movement of the stop gate to a noninterfering position is also timed with the roll-imprinting drums so that the row of rolls reaches the drums in substantially the same time, row after row. The synchronizing obtainable by reason of the alignment of the rows enables the utilization of a unique roll-forming drum wherein only a portion of its surface is formed into a die.

The present invention may more readily be described by reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a roll-forming machine constructed in accordance with the teachings of the present invention.

FIG. 2 is an enlarged side-elevational view of a portion of FIG. 1.

FIG. 3 is a cross-sectional view of a portion of FIG. 1 taken along line 3—3.

FIG. 4 is a top view of a portion of FIG. 1, showing various drive elements.

FIG. 5 is a perspective, exploded view of a roll-imprinting drum constructed in accordance with the teachings of the present invention.

FIG. 6 is a side-elevational view of the apparatus of FIG. 1.

FIG. 7 is a schematic electrical diagram of a suitable electric circuit for use in the machine of the present invention.

Referring now to the drawings, a conveyor 10 is shown and forms a part of the usual raw dough roll conveying system for transporting raw dough rolls 11 to baking pans (not shown). The apparatus of the present invention is mounted in any convenient manner above the conveyor to position a stop gate 15 in the path of the rolls. The stop gate 15 comprises a plurality of stop bars 16, each of which is slightly formed into a concave shape to intercept and stop an individual raw dough roll as the latter is being transported by the conveyor 10. The stop bars 16 are pivotally mounted on a rod 18 which, in turn, is secured to a shaft 19. A spring 20 urges the stop bars into the position shown while the pivotal attachment to the rod 18 permits the bars to be mounted closely to the conveyor belt 10 since movement about the shaft 19 causes the stop bars 16 to contact the conveyor and pivot on the rod 18 while the bar and rod are rotated by the shaft 19. The concave shape of the stop bar tends to center the raw dough roll 11 and thereby laterally align the roll while the roll is being transversely aligned with other rolls in its row.

A plurality of resilient, coated starting fingers 21 are also attached to the shaft 19 and positioned correspondingly with the stop bars. As the shaft 19 rotates and the stop bar 16 is moved out of its interfering position to enable the roll 11 to start moving, rolls occasionally tend to hesitate prior to starting. This hesitation can result in misalignment of the rolls in a row; therefore, the starting fingers 21 gently contact the top of the rolls and help to start the rolls by gently pushing them and also by lightly pressing downwardly to assist the frictional engagement of the roll with the conveyor 10. The stop gate 15 is maintained in its interfering position as shown in FIGS. 1 and 3, and is rotated out of the interfering position by the rotation of shaft 19. The shaft 19 is coupled to a drive chain 25 through a conventional magnetic clutch 26. When the magnetic clutch is energized, the shaft 19 is driven by the chain 25 out of the interfering position to permit the previously stopped rolls to pass.

A plurality of roll-imprinting drums 30 are mounted on a shaft 31 and are positioned above the conveyor 10 and adjacent the stop gate 15. Each of the drums 30 includes a solid cylindrical core 33 having a pair of registration pins 34 extending radially therefrom. A die 35 is provided with a pair of holes 37 that register with the pins 34. The die 35 includes a nonroll-contacting face 38 that conforms to the surface 39 of the drum 33. The die 35 is formed having a negative of the desired design to be imprinted in the roll. The die 35 is placed on the drum 33 with the holes 37 engaging the registration pins 34; the die may be clamped or otherwise secured to the drum surface such as by flexible coil spring 40. The die is formed of a material such as polytetrafluoroethylene, available commercially under the trademark "Teflon," that is of sufficient rigidity to imprint the soft raw dough and may be sufficiently flexible to "snap" over the drum 33. When the die is made of such flexible material, it has been found that operation of the die and mounting of the die limits the angle alpha (FIG. 3) to less than 270°. However, to provide ease of manufacture, the dies may readily be formed of cast aluminum with subsequent Teflon coating. When the dies are inflexible, the angle alpha will obviously have to be limited to approximately 180°.

In the embodiment chosen for illustration, the shaft 31 is continuously rotated by means of a chain (not shown) engaging sprocket 42 and held in proper tension by tensioning idler sprocket 43. The idler sprocket 43 is mounted for pivotal movement about shaft 45 and tensioning force is provided by a spring 46. The shaft 31 therefore drives the chain 25 to pro-

vide rotational force to the shaft **19** and also drives a chain **50** for rotating the shaft **51**. The shaft **51** supports a cleaning brush **52** which peripherally engages imprinting drums **30** to brush particles of raw dough that may have adhered thereto to prevent these particles from obstructing the formation of subsequent rolls.

The opposite end of the shaft **31** (FIG. 6) is attached to an eccentric **56** to which is journaled an adjustable shaft **57**. The resulting reciprocating motion is imparted through adjustable linkage **58** to a shaft **59** extending through a flour hopper **60**. The hopper is of conventional design and is utilized to provide a continuous "dusting" of the imprinting drums **30** with flour to further inhibit the adhesion of the raw dough with the dies **35**.

A plurality of fingers **65** extend downwardly from a rotatable shaft **68**; each finger is positioned adjacent a corresponding stop bar and is in the path of a raw dough roll **11**. When a roll contacts a finger **65**, the finger is pivoting upwardly out of the way of the roll, thus rotating the shaft **68**. The shaft is connected to a conventional switch mechanism **69**, thereby closing an electrical circuit. The rolls continue past the fingers and engage the stop bars **16** in their interfering positions. A cam **70** is mounted on the shaft **31** and a switch **71** is secured to a mounting bracket **71**. When the shaft **31** rotates the cam **70**, the latter engages a switch arm **73**, closing the switch **71**. The simultaneous closure of switches **69** and **71** result in the energization of the magnetic clutch **26**. With the magnetic clutch **26** energized, the shaft **19** is rotated by the chain **25**, thereby rotating each of the stop bars **16** into a noninterfering position to permit the corresponding raw dough rolls **11** to pass to the roll-forming drums **30**. It may be noted that the moment of release of the rolls from their corresponding stop bars is synchronized to the rotation of the roll-imprinting drums **30** by means of the cam **70** and switch **71**. The synchronization may be adjusted through the utilization of a bracket-adjusting screw **77** and knurled nut **78**. The screw **77** is pivotally attached to the bracket **72**, the latter being pivotable about the shaft **31**. Thus, the angular relationship of the switch arm **73** and the cam **70** is adjustable. The magnetic clutch **26** remains energized and the shaft **19** continues to rotate until the switch **80** is opened. The switch actuating arm **81** is secured to a cam follower **82** which rides upon a surface of rotating cam **83**. The cam **83** is secured to the shaft **19** and includes a detent **84** therein into which the cam follower **82** drops to open the switch **80**.

The operation of the roll-forming machine of the present invention may now be described by reference to the accompanying figures, and particularly with the aid of the schematic electrical diagram of FIG. 7. Raw dough rolls **11** are deposited on the conveyor by conventional roll machines (not shown) and the rolls are transported to the roll-forming machine of the present invention. As the rolls **11** approach the stop gate **15**, they are positioned in a transverse row, but are typically misaligned. Characteristically, one of the rolls **11** will contact its corresponding finger **65** prior to contact between the remaining rolls and fingers. Contact of the roll **11** with the finger **65** will rotate the shaft **68** and close switch **69**. Closure of the switch **69** energizes a one-half second delay **70***a* followed by the closure of contacts **70***b*. The leading roll, having contacted its finger **65**, is first to be stopped by its corresponding stop bar. The one-half second delay permits the remaining rolls in the row of rolls to come in contact with their corresponding stop bars. The shaft **31** is continuously rotating and the cam **70** thus subsequently closes self-latching switch **71** to complete an electrical circuit to the magnetic clutch **26**. Energization of the clutch **26** causes the rotation of shaft **19** to lift stop bars **16** out of their interferring position and permit the rolls **11** to pass beneath the dies **35**. The rolls travel on the conveyor **10** and arrive at the dies **35** at the proper time in accordance with the synchronization adjustment made on the mounting bracket **72** to which the switch **71** is attached. After imprinting the rolls, the dies continue to rotate and are cleaned by the rotating brush **52**. As the shaft **19** begins to rotate, the cam follower **82** is lifted out of the nesting detent **84** to close switch **80**, thereby completing a second electrical circuit in parallel with the first to provide continuous energization for the clutch **26** while the switch **80** is closed. When the fingers **65** return to their original downward position, switch **70** is opened, thus opening the first circuit and unlatching contact **71**. Since the clutch **26** remains energized, the shaft **19** continues to rotate until the cam **83** completes a 360° revolution and the cam follower **82** drops into the detent **84** to open the switch **80**. At this point in time, the switch **19** has been returned to its original position and the stop gate has been returned to its interfering position in readiness to intercept and stop the next row of raw dough rolls. It may be noted that in the embodiment chosen for illustration, the magnetic clutch was placed on the shaft **19**; it will be obvious that the magnetic clutch may be placed on the shaft **31**, thereby intermittently driving the imprinting drums as well as the stop gate. The synchronization between the stop gate and the drums would be inherent in the positioning of the two since both shafts **19** and **31** would be driven in synchronism at all times.

It will also be obvious that a variety of stop gate actuation devices may be utilized; for example, the electrical circuit of FIG. 7 may readily be replaced by other circuits providing similar functions and may even be replaced by pneumatic actuating apparatus. Pneumatic systems may be found in certain instances to be more desirable since pneumatic actuation is very commonly found in automatic machinery of the type utilized in bakeries.

It will therefore be apparent to those skilled in the art that many modifications may be made in the embodiment chosen for illustration without departing from the spirit of the invention.

I claim:

1. A roll-forming machine for attachment to a conveyor for forming a design in raw dough rolls being transported by said conveyor, comprising: a stop gate movably positionable into and out of an interfering position in the path of said raw dough rolls for temporarily stopping said rolls while said rolls maintain sliding contact with said conveyor; roll-imprinting means mounted above said conveyor and positioned adjacent said stop gate to imprint a design on said rolls after they pass said stop gate; stop gate actuator means for moving said stop gate out of said interfering position to permit said rolls to pass to said imprinting position; sensing means for sensing the arrival of a raw dough roll at said stop gate; time delay means connected to said sensing means and responsive to the sensing of said raw dough roll at said stop gate for energizing said stop gate actuator after a predetermined time delay; said stop gate moving in synchronism with said roll-imprinting means whereby each of said raw dough rolls is imprinted with a design in a predetermined position thereon.

2. The combination set forth in claim **1**, wherein said imprinting means comprises a plurality of forming drums, each positioned adjacent said stop gate to contact a single roll and form an imprint therein as said single roll passes therebeneath.

3. The combination set forth in claim **1**, wherein said stop gate comprises a plurality of stop bars, each positioned to intercept and stop a single roll when said stop gate is in said interfering position.

4. The combination set forth in claim **3**, wherein said imprinting means comprises a plurality of forming drums, each positioned adjacent a different one of said stop bars to contact a single roll and form an imprint therein as said single roll passes therebeneath.

5. The combination set forth in claim **3**, wherein said stop bars are secured to a rotatable shaft positioned above said conveyor.

6. The combination set forth in claim **5**, wherein said stop gate actuation means includes means for rotating said shaft to move said stop bars out of said interfering position.

7. The combination set forth in claim **5**, including a sensing device responsive to the passage of a roll for activating said actuation means.

8. The combination set forth in claim 7, wherein said sensing device includes a plurality of fingers extending downwardly from a rotatable rod positioned above said conveyor, each finger extending into the path of a different roll of a row of rolls being transported by said conveyor.

9. The combination set forth in claim 8, including electrical

switch means responsive to the rotation of said rod for closing an electrical circuit and wherein said actuation means comprises an electrical clutch responsive to the closing of said electrical circuit for rotating said shaft.

* * * * *