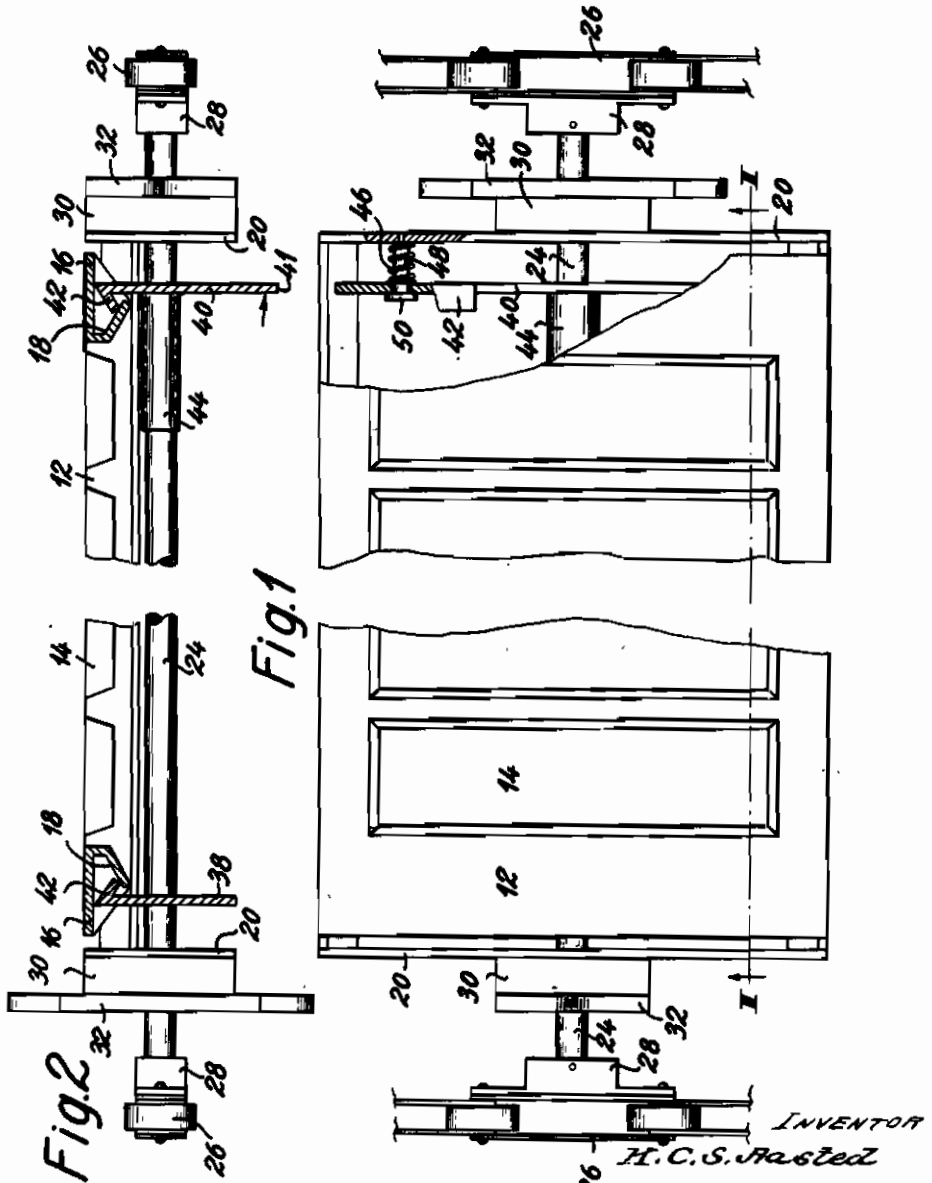
PUBLISHED
MAY 18, 1943.
BY A. P. C.

K. C. S. AASTED
CONVEYOR MECHANISM FOR USE IN CONNECTION WITH MACHINES FOR CASTING CHOCOLATE AND THE LIKE
Filed Aug. 10, 1940

Serial No. 352,164

4 Sheets-Sheet 1



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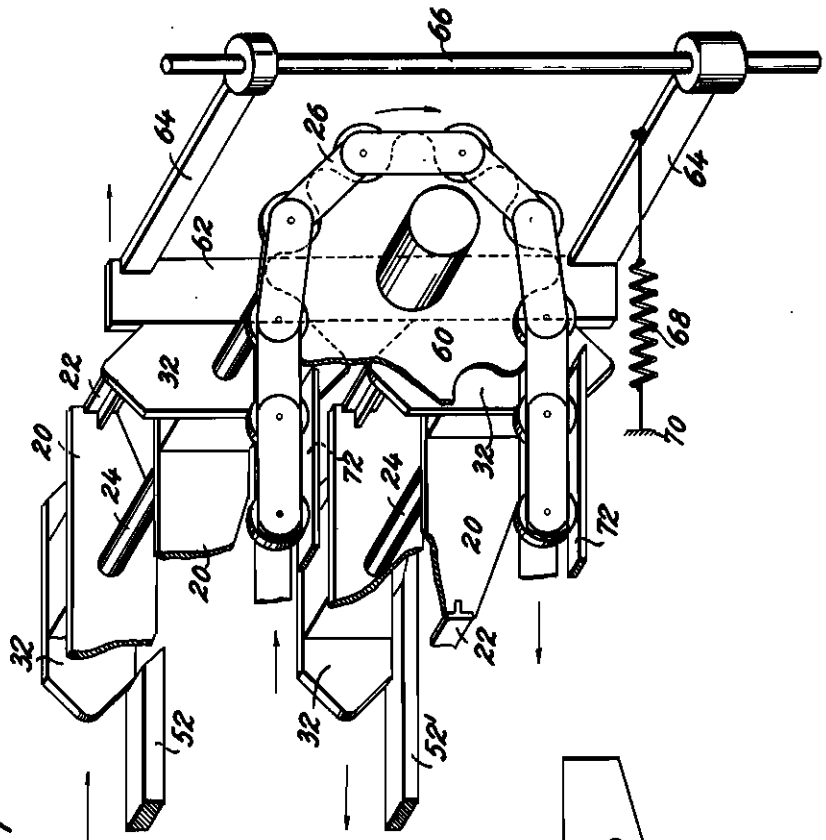

Fig. 7

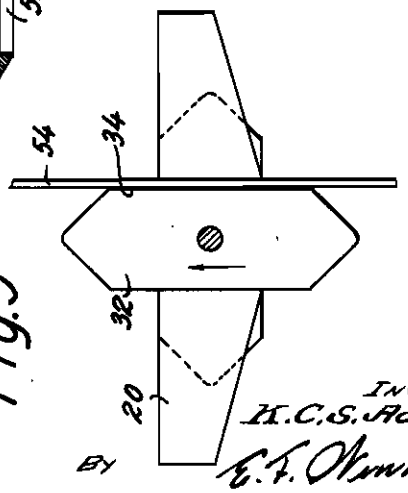

Fig. 5

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Fig. 8

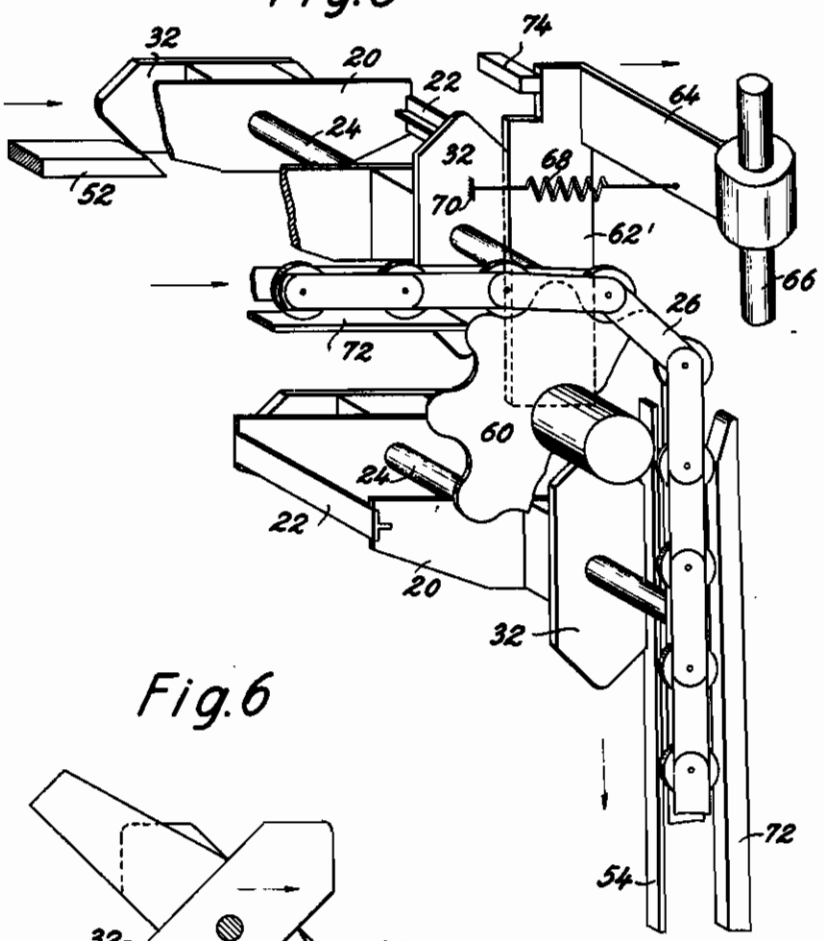
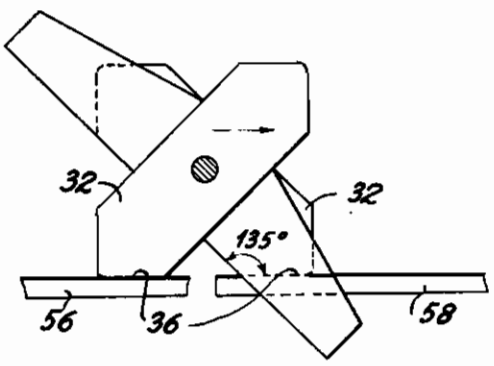


Fig. 6



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4 Sheets-Sheet 4

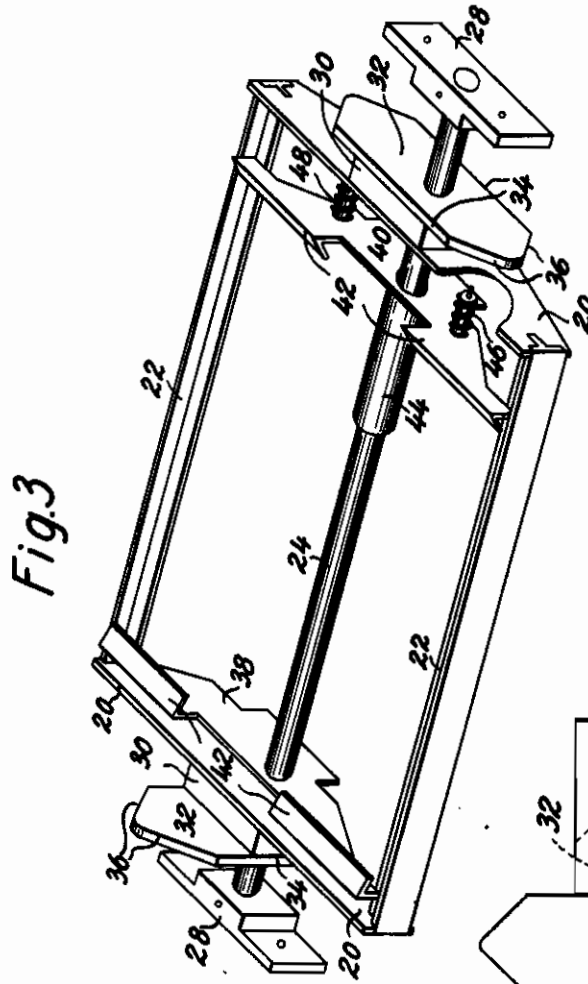

Fig. 3

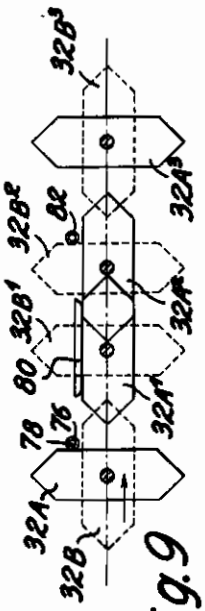

Fig. 9

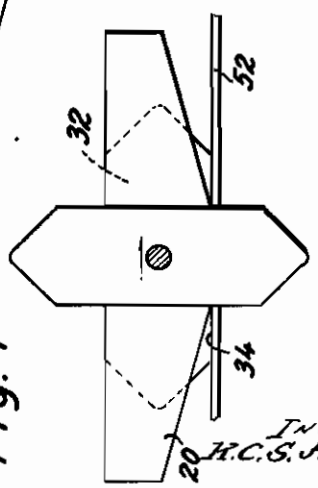

Fig. 4

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ALIEN PROPERTY CUSTODIAN

CONVEYOR MECHANISM FOR USE IN CONNECTION WITH MACHINES FOR CASTING CHOCOLATE AND THE LIKE

Kai Christian Sophus Aasted, Gentofte near Copenhagen, Denmark; vested in the Alien Property Custodian

Application filed August 10, 1940

My invention relates to a conveyor mechanism for use in connection with machines for casting chocolate and the like. The invention can be used in connection with machines adapted either to cast solid chocolate or the like in the form of cakes or pastilles or to cast chocolate shells which is filled with another mass to form creams. In certain cases the invention can also be applied to machines for coating arbitrary goods with chocolate.

In chocolate casting machines it is common practice to use a conveyor belt of considerable extension, serving to carry mould plates through various sections of the machine. Said mould plates are provided with cavities in which the chocolate is cast. After the casting operation the mould plates are carried through a refrigerating chamber in which the chocolate is congealed. Then the mould plates are turned upside down and the cast chocolate pieces are discharged by beating or by vibrating the mould plates. Finally the emply moulds are heated and carried back to the place of casting. During the whole cycle the mould plates remain in connection with the conveyor belt.

In such machines it is known to connect the mould plates fixedly to the conveyor belt so that they always occupy the same position as the latter, which involves that the conveyor belt after the place of casting must have horizontal flights of considerable length as it can not be carried upwards or downwards before the chocolate is mainly stiff.

It is also known to connect holders carrying the mould plates to the conveyor belt by means of studs at the leading edge of each holder. The holders then normally slide in horizontal position over guides arranged along the path of the conveyor belt and by special means it is possible to retain this horizontal position of the holders when the conveyor belt is led over a pulley between two horizontal flights thereof. This, however, leads to complicated mechanisms which are subjected to a material wear during use.

The main object of the invention is to obviate these drawbacks and to provide a conveyor mechanism in which the angle position of the mould plates is made independent of the direction of movement of the conveyor belt and in which the angle position of each mould plate can be altered at an arbitrary stage of its travel and to an arbitrary degree.

Another object of the invention is to arrange the conveyor mechanism in such manner that it can be driven by small power and without material wear.

A further object of the invention is to provide means by which the mould plates can be connected to frames carried by the conveyor belt in a reliable manner so that the mould plates are held safely locked to the frames during the operation of the conveyor belt, irrespective of the angle position of the mould plates in the space.

According to a further object said latter means should be so constructed that the mould plates can be connected to and removed from the mould frames by simple manipulations.

The invention is illustrated by way of example in the accompanying drawings, in which

Fig. 1 is a top view of a mould plate arranged in a mould frame carried by a conveyor belt formed by two roller chains, parts being broken away to show the means by which the plate is locked to the frame,

Fig. 2 is a side elevation of the same parts partly in section along the line II—II in Fig. 1,

Fig. 3 shows the mould frame in a perspective view,

Figs. 4, 5 and 6 show the mould frame as viewed from one end and guided by guiding members under different circumstances and in different positions,

Fig. 7 is a perspective view showing part of one roller chain as it passes a sprockct wheel and partly two mould frames carried by the chain and the means used for guiding the frames during their passage from the upper to the lower horizontal flight of the chain,

Fig. 8 shows the same with the exception that the two chain flights form a right angle to each other and that the guiding means are suited to this altered conditions.

Fig. 9 shows at a reduced scale the means used for turning a mould frame during the advancement of the conveyor belt.

As shown in Figs. 1 and 2 each mould consists of a metal plate 12 provided with depressions 14 forming mould cavities. The edges of the plate 12 are secured, e. g. by soldering, to a circumferential flange 16, the end pieces of which are provided with inclined faces 18, by which the mould plate is locked to the corresponding mould frame, as will be described later on.

The mould frame, as appears from Fig. 3, is formed by two end plates 20 and two side pieces 22 of T-shaped profile. The mould frame is arranged rotatably on a rod 24 connecting two roller chains 28, Figs. 1 and 2, forming together the previously named conveyor belt. To each

end of the rod 24 is secured a cross-piece 28 which in turn is connected to the appertaining chain 26 by means of two successive link bolts of the latter.

The mould frame 20, 22 is journalled on the rod 24 by means of ball bearings, not shown, arranged in casings 30 secured to the outer faces of the end plates 20. To the outer side of each casing 30 is secured an oblong guiding piece 32 having two straight parallel guiding edge faces 34 and at each end two inclined edge faces 36 forming with the faces 34 an angle of 45 degrees, as it appears most clearly from Fig. 3. The two guiding pieces 32 at opposite ends of the mould frames 20, 22 are arranged at right angle to each other. The purpose and operation of the guiding pieces 32 will be explained later on.

Inside each frame two latch pieces 38 and 40 are arranged, each being provided at its top with two projections 42 having a hook shaped cross-section, the hooks on the two pieces 38 and 40 facing against each other. The latch piece 38 is secured to the mould frame, e. g. by its ends being welded to the side pieces 22. The latch piece 40 is displaceable in the mould frame, guided partly by a bushing 44 secured to the piece 40 and slidable on the rod 24 and partly by the ends of the piece 40 sliding along the body of the T-profile of the side pieces 22. The piece 40 is yieldingly pressed against the piece 30 by means of coiled springs 46 surrounding studs 48 secured to one of the plates 20 and provided with enlarged heads 50 restricting the displacement of the piece 40 against the piece 38, vide Fig. 1.

When a mould plate 12 is to be connected to the corresponding mould frame 20, 22 the face 18 at its left hand end, as viewed in Fig. 2, is pushed in beneath the hook shaped end of the projections 42 on the latch piece 38, the flange 16 at the right hand end of the mould plate 12 resting at this time on the inwardly inclined hook faces at the top of the projections 42 on the latch piece 40. When now a downward pressure is exerted on the mould plate 12, especially on the right part thereof, the latch piece 40 will be displaced to the right against the action of the springs 46 sliding mainly on the rod 24, and at last, when the lower edge of the flange 16 has passed the end of the hooks, the latch piece 40 will be moved backwards by the springs 46 with a snap action and the mould plate 12 will be held locked securely in the position shown in Fig. 2. In this position the lower part of the edge flange 16 on the mould plate 12 will be surrounded at all sides by the corresponding mould frame 20, 22 so that the mould plate can not be displaced laterally and thereby be disengaged from the mould frame. The mould plate can be unlocked only by displacing the latch piece 40 to the right as indicated by an arrow in Fig. 2. To this end the piece 40 has a downward extension 41 which can be acted upon either by hands or by a stationary cam, not shown, during the movement of the conveyor belt.

When the conveyor belt, i. e. the chains 26, are moved during the operation of the chocolate casting machine the guiding pieces 32 are used for holding the mould frames and thus the mould plates in certain predetermined angle positions. Generally it is wished to keep the mould plates in a horizontal position. If the conveyor belt moves in a horizontal direction, as shown by an arrow in Fig. 4, one guiding edge 34 of the back guiding piece 32 slides along a stationary guiding member in the form of a metal band or strip 52 arranged along the path of the conveyor.

If the conveyor belt moves in a vertical direction, as indicated by an arrow in Fig. 5, one guiding edge 34 of the front guiding piece 32 slides along a stationary guiding member in the form of a metal band or strip 54 arranged along the path of the conveyor at this part of its travel. It will be understood that the bands or strips 52 and 54 are arranged at opposite sides of the path of movement of the mould plates and frames and inside the conveyor chains. As the guiding pieces 32 and their corresponding guiding members are spaced to a considerable degree perpendicular to the longitudinal direction of the conveyor belt, it will be evident that no exact construction of the mechanism is required to secure that each guiding member will co-act with its own guiding piece only.

In Fig. 6 it is supposed that it is wished to keep the mould plate and thus the mould frame in a position forming an angle of 135 degrees to the horizontal direction. In this case a horizontal guiding strip, 56 and 58 respectively, is arranged at either side of the horizontal path of movement of the mould plates and frames, each co-operating with one inclined edge face 36 on the corresponding guiding piece 32, the active faces 36 lying at opposite sides of the axis of rotation of the mould frame, thereby securing the frame positively in the position in question. By using other of the inclined faces 36 on the guiding pieces 32 it will be possible to obtain other angles than 135 degrees to the horzontal or vertical direction.

In Fig. 7 is illustrated how the mould frames are guided when passing from an upper horizontal flight to a lower horizontal flight of the conveyor belt. In this figure is shown one of the conveyor chains 26 running over a sprocket wheel 60. A mould frame 20, 22 of the previously described kind journalled on the shaft 24 has just arrived at the sprocket 60. The back horizontal guiding piece 32 on the frame 20, 22 has just leaved its guiding strip 52, cfr. Fig. 4, and at the same time the front vertical guiding piece 32 abuts against the vertical guiding edge of a yielding guiding member 62 supported by arms 64 from a shaft 66 which is mounted swingable in suitable bearings, not shown. The guiding face of the member 62 is preferable parallel to the axis of the shaft 66. The frame formed by the member 62, the arms 64 and the shaft 66 is acted upon by a spring which schematically is shown as a coiled spring 68, the ends of which are secured to one arm 64 and a fixed point 70, respectively.

When from the position shown the chain 26 is moved in the direction indicated by the arrows at its ends, the guiding member 62 will remain resting against the corresponding guiding piece 32 with a pressure exerted by the springs 68. Thus the mould frame 20, 22 will remain in a horizontal position during its passage to the lower chain flight and simultaneously the guiding member 62 will be swung a certain angle to and fro about the axis of the shaft 66. When the mould frame has reached the lower position shown, its back guiding piece 32 will be guided by a guiding strip 52' similar to the strip 52 during the further horizontal movement of the frame.

It will be understood that two successive mould frames will occupy the positions shown in Fig. 7 and that accordingly the front guiding piece 32 on the lower mould frame will be released from the guiding member 62 when the front guiding

piece **32** on the upper mould frame reaches the said member **62**.

In Fig. 7 **72** represents rails on which the chain rollers of the upper and lower flight of the chain are running.

When the two flights of the chain **26** running over the sprocket wheel **60** form a right angle, as shown in Fig. 8, the guiding member, as shown at **62'**, is shortened so that from the upper arm **64** it extends to the level of the axis of the sprocket **60** only. When the sprocket **60** has been turned a quarter of a revolution from the position shown, the front guiding piece **32** has swung the guiding member **62'** to a position in which it is flush with the front surface of the vertical guiding strip **54**, cfr. Fig. 5. Now this strip **54** takes over the guiding of the guiding piece **32**, and when this latter is moved away from the guiding member **62'** the latter is swung back by the spring **68** against a stationary abutment **74** and is clear to take care of the guiding of the next mould frame.

In Fig. 9, which illustrates the manner of turning the mould frames through an arbitrary angle, is shown the front guiding piece **32A** of the mould frame in full lines and the back guiding piece **32B** of the same mould frame in dotted lines as viewed in the direction of the axis of rotation of the mould frame. The mould frame is moved by the conveyor belt in the direction of the arrow and the center of the guiding pieces moves along the dash and dot line shown.

In the path of the guiding piece **32A** is mounted a stationary abutment in the form of a roller **76** rotatable on a pivot pin **78**. When the guiding piece **32A** abuts against the roller **76** and the mould frame and thus the said piece are further advanced in the direction of the arrow, the piece **32A** is turned by a right angle to the position $32A^1$ and at the same time the piece **32B** is moved to the position $32B^1$. In the position $32A^1$ the guiding piece is guided by a guiding strip **80** to prevent over-turning. When the front guiding piece has been moved free from the strip **60** to the position $32A^2$ the back guiding piece **32B** occupies the position $32B^2$. Now this latter piece strikes a stationary abutment roller **62** arranged in its path and by the further movement of the conveyor belt the pieces **32A** and **32B** are turned by 90 degrees to the positions $32A^3$ and $32B^3$, respectively. If by an abutment a less angle of rotation than 90 degrees is wished, the abutment is arranged further away from the path of the axis and if the mould frame is to be held in an intermediate position, the means shown in Fig. 6 can be used.

It will appear from the above description that by the conveyor mechanism described it is possible to retain the mould frames and the moulds in a certain angle position independent of the travel of the conveyor belt past pulleys and in horizontal and vertical directions and that furthermore it is possible to turn the frames and the moulds to any angle position practically required at any place of their travel.

It is preferred to let the axis of rotation of the mould frames pass approximately through the center of gravity of the combined mould and frame as then these two members will be substantially in equilibrium in all positions and then they can be turned and guided with less possible power and wear. The invention, however, is not restricted to this special arrangement or to the embodiment shown and described as various modifications may be introduced within the scope of the invention without departing from the spirit thereof as will be evident to those skilled in the art.

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