March 12, 1935. H. M. KOELLIKER 1,993,967

BLANKING MACHINE

Original Filed Dec. 15, 1930 6 Sheets-Sheet 1

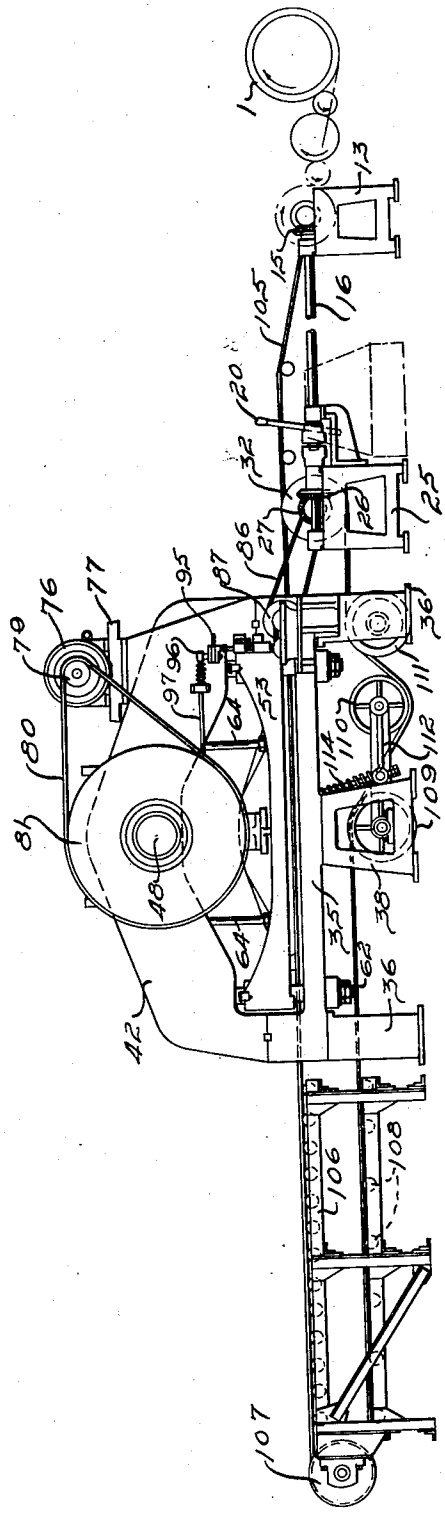


Fig. 1.

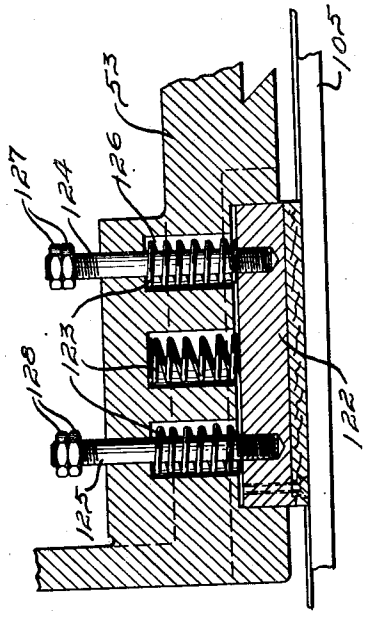


Fig. 3.

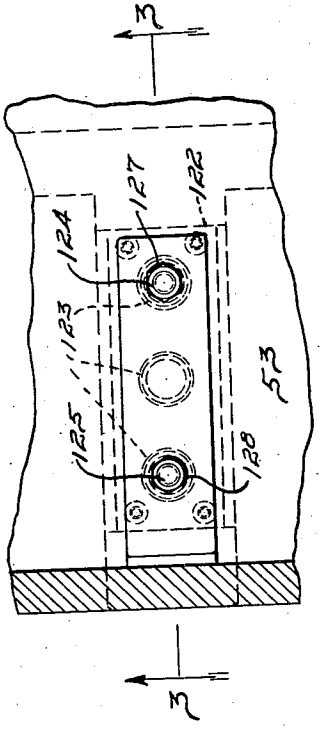


Fig. 2.

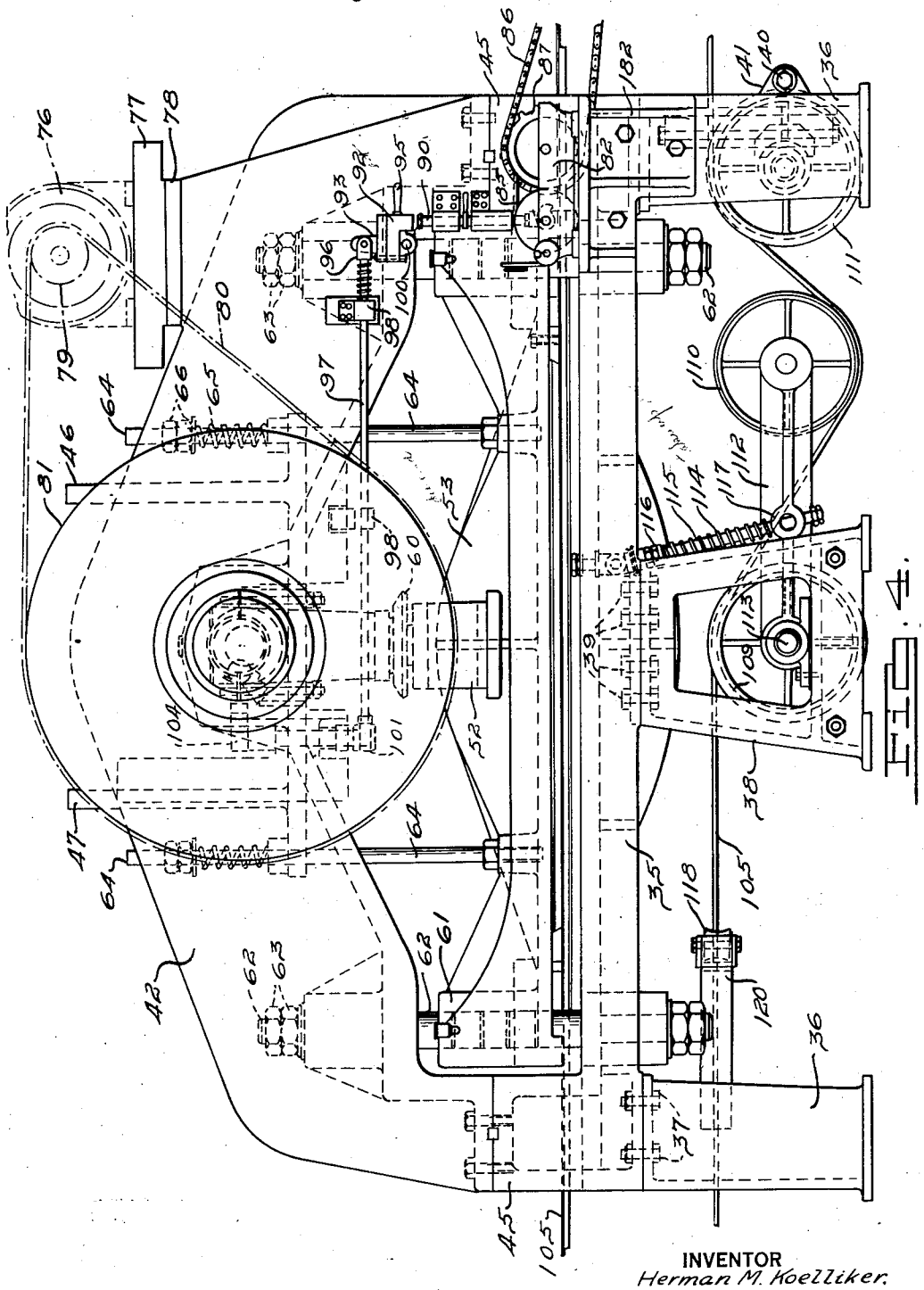
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BLANKING MACHINE

Original Filed Dec. 15, 1930 6 Sheets-Sheet 2



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BLANKING MACHINE

Original Filed Dec. 15, 1930 6 Sheets-Sheet 3

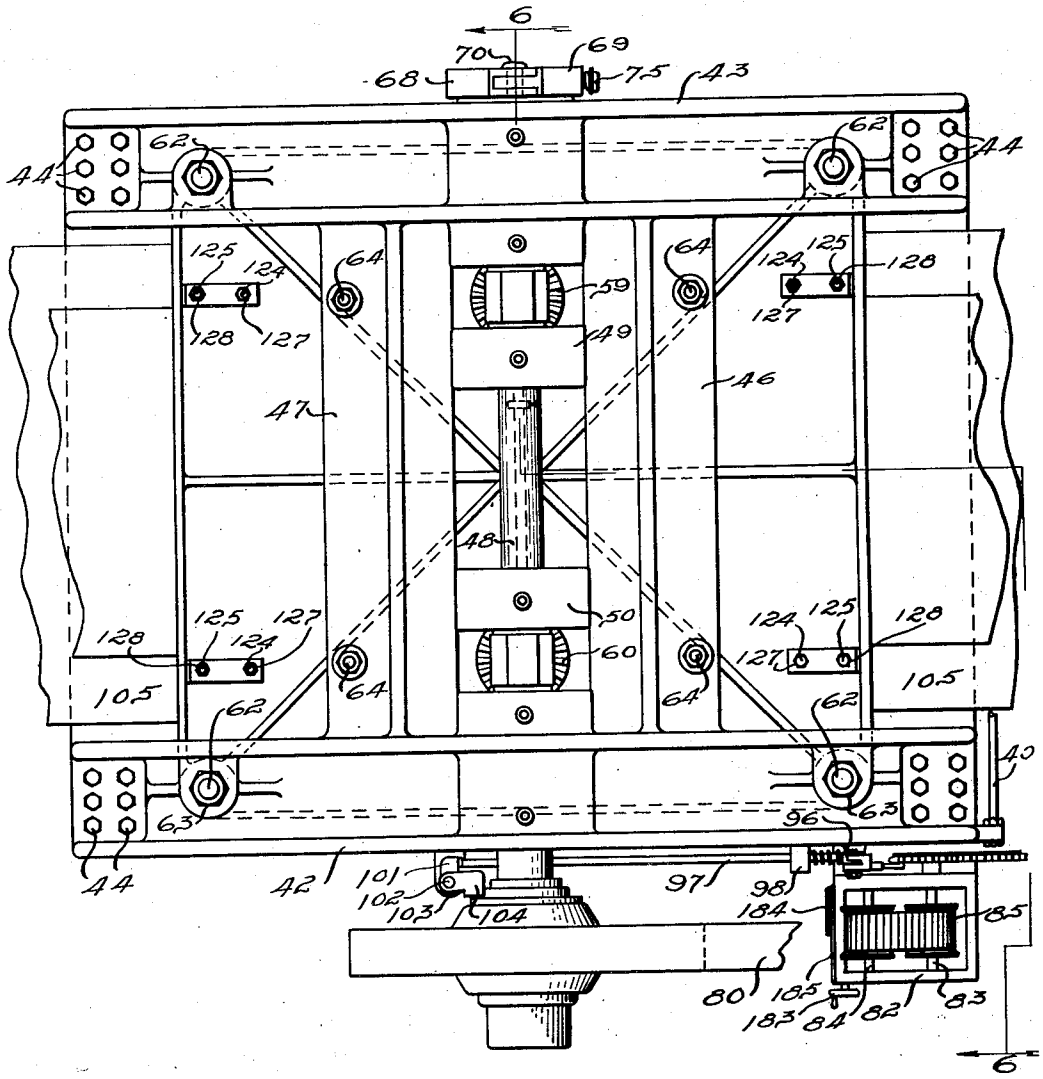


FIG. 3.

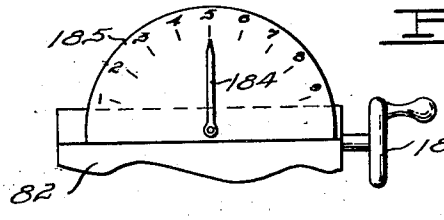


FIG. 7.

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BLANKING MACHINE

Original Filed Dec. 15, 1930 6 Sheets-Sheet 4

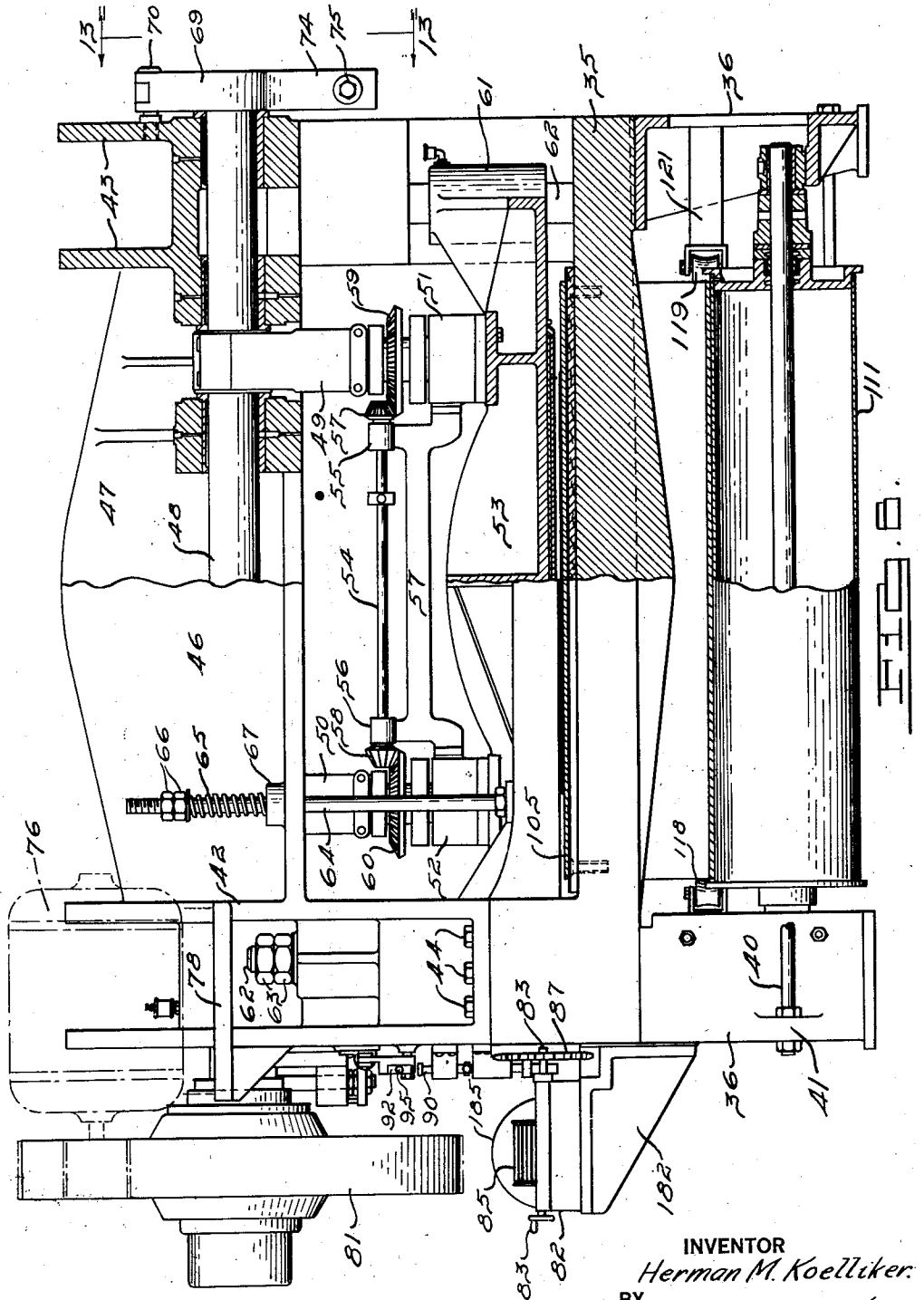


FIG. 8.

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BLANKING MACHINE

Original Filed Dec. 15, 1930 6 Sheets-Sheet 5

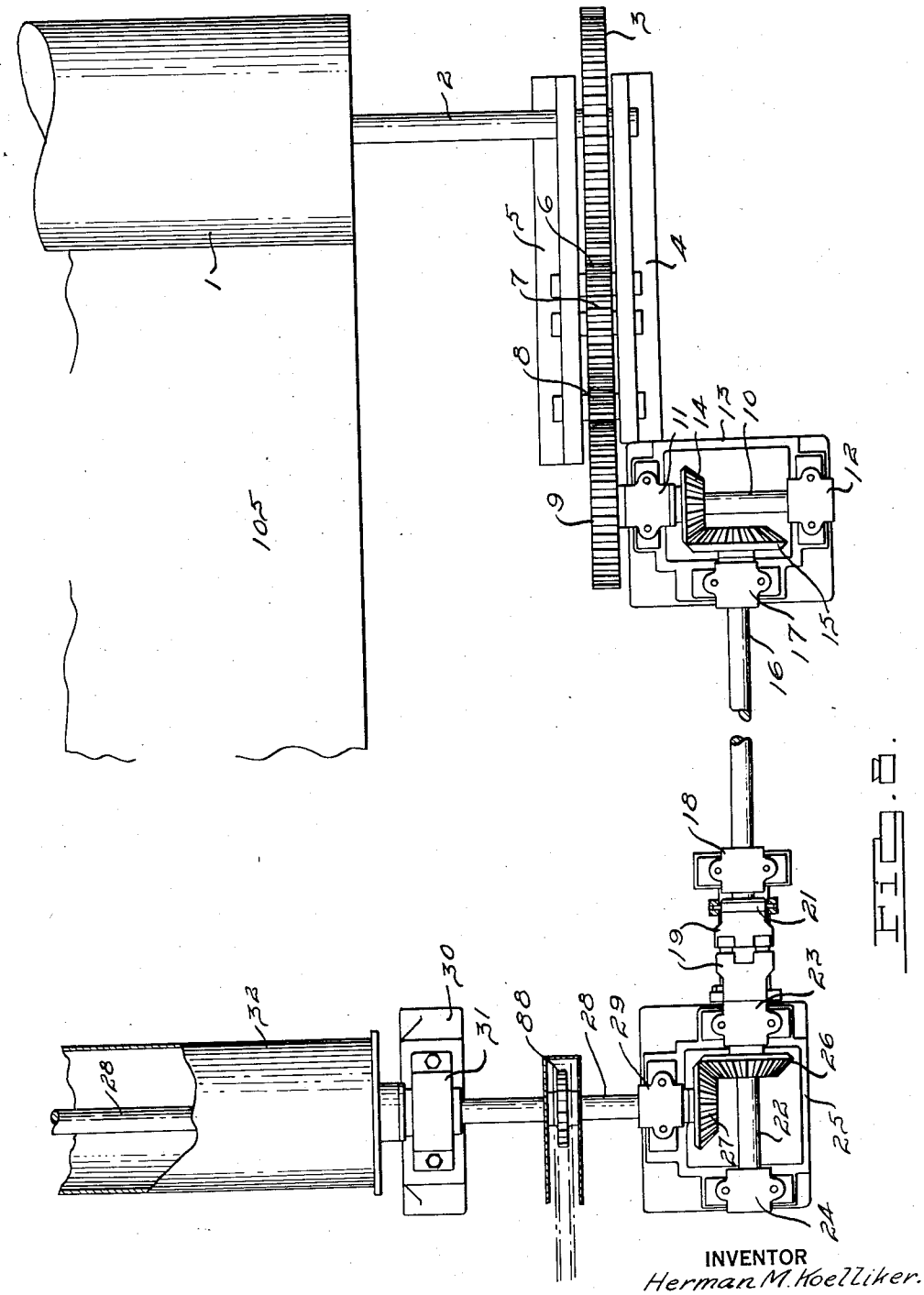


FIG. 1.

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BLANKING MACHINE

Original Filed Dec. 15, 1930 6 Sheets-Sheet 6

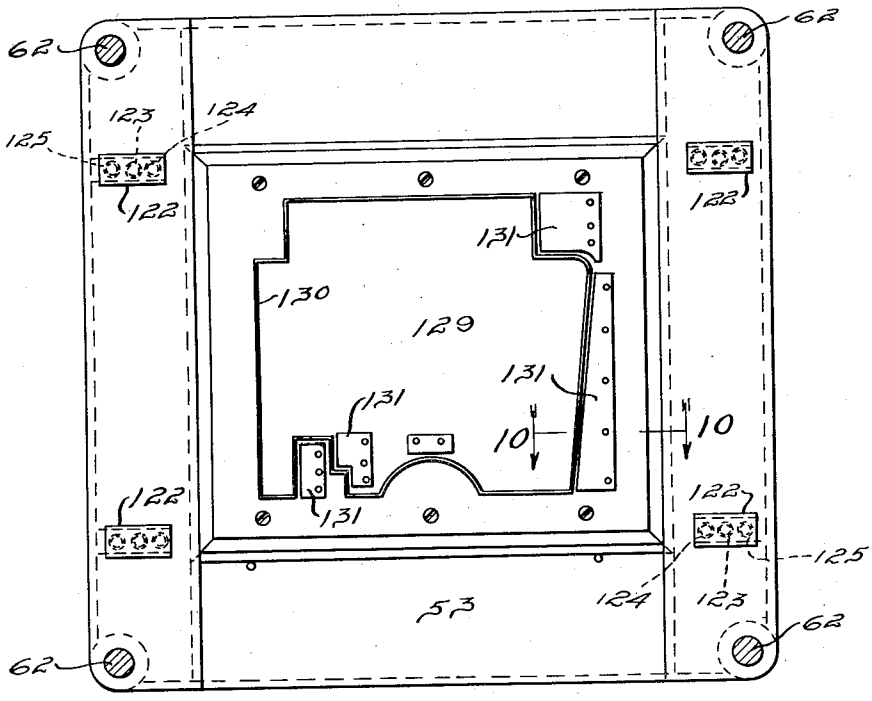


Fig. 9.

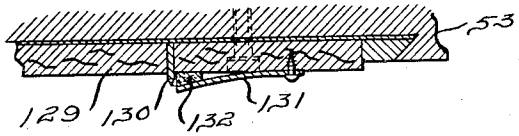


Fig. 10.

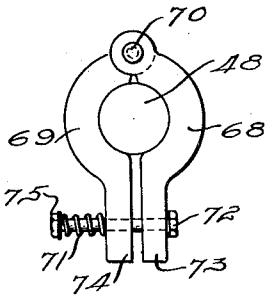


Fig. 13.

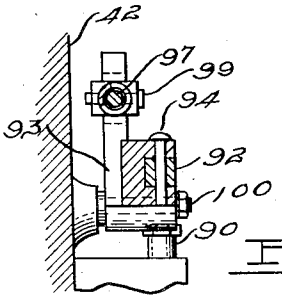


Fig. 12.

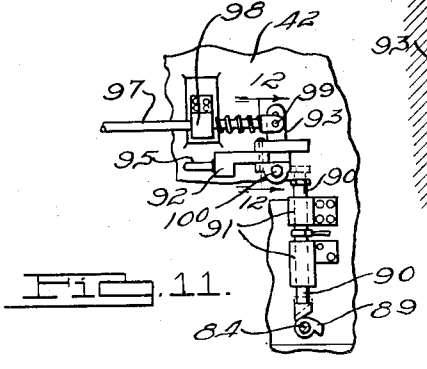


Fig. 11.

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Patented Mar. 12, 1935

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UNITED STATES PATENT OFFICE

1,993,967

BLANKING MACHINE

Herman M. Koelliker, Pontiac, Mich., assignor to Baldwin Rubber Company, a corporation of Michigan

Application December 15, 1930, Serial No. 502,605
Renewed August 6, 1934

8 Claims. (Cl. 164—20)

Manufacturers of rubber floor mats for use in automobiles have heretofore been confronted with the problem of employing skilled labor for manually cutting and trimming the floor mats. This practice still persists although the more modern manufacturers have devised apparatus by which the floor mats are cut or blanked one at a time from individual blanks previously cut from a calender roll. While this latter method of forming the floor mat is somewhat less expensive than the original method, a considerable amount of labor is involved. In the first place the rubber blank must be formed from the calender roll, a distinct operation in itself; secondly, these blanks must be positioned by hand on the table of a blanking machine; thirdly, the blanking machine must be operated to form the blank, and, lastly, the blanks must then be manually removed and the excess material removed and discarded. All of this is more or less expensive and consumes a great deal of time, especially in manufacturing the mats under conditions of mass production. The present invention contemplates the provision of an apparatus which will accomplish the blanking of a great number of rubber mats by continuous and uninterrupted operation and, accordingly, the principal object of the present invention is to provide a machine which will effect the blanking of these mats with little or no attention on the part of the operator.

An additional object of the invention is to provide a machine in which the rubber material is fed on an endless conveyor to the actual blanking tool and which is provided with a means for momentarily arresting the movement of that portion of the conveyor which supports the material being blanked while the blanking operation is being performed, such stopping of the material for the blanking operation not necessarily requiring stopping of the entire conveyor apparatus.

Other objects of the invention are present and it is thought unnecessary to enumerate these objects in detail at the present time, it being sufficient to state that the machine is equipped with numerous auxiliary departments all of which contribute toward the production of floor mats, accurately formed and finished, on an extremely economical scale. These objects and advantages of the invention will become more readily apparent as the nature of the invention is better understood and the same consist in the novel construction, combination and arrangement of parts shown in the accompanying six sheets of drawings, in which—

Fig. 1 is a view in side elevation of the machine showing the same in assembled operative position.

Fig. 2 is an enlarged fragmentary top plan view of one of the conveyor belt clamping devices embodied in the machine.

Fig. 3 is a sectional view taken substantially along the line 3—3 of Fig. 2 in the direction of the indicated arrows.

Fig. 4 is an enlarged view in side elevation of the machine.

Fig. 5 is a top plan view of the machine, the motor for driving the machine being removed to illustrate more clearly the nature of the invention.

Fig. 6 is a view partly in section and partly in elevation taken substantially along the line 6—6 of Fig. 5, looking in the direction indicated.

Fig. 7 is an enlarged view in front elevation of the speed control mechanism for adjusting the relative speed of a clutch operating mechanism employed in connection with the present invention and the speed of travel of the conveyor.

Fig. 8 is a fragmentary top plan view of the drive mechanism for operating the rollers and conveying mechanism.

Fig. 9 is a bottom plan view of a die plate, and its associated parts.

Fig. 10 is an enlarged sectional view taken substantially along the line 10—10 of Fig. 9.

Fig. 11 is a view in fragmentary elevation of part of the clutch operating mechanism with the throw-out latch in an operative position.

Fig. 12 is an enlarged sectional view taken substantially along the line 12—12 of Fig. 11, and

Fig. 13 is a view in elevation of the braking device for the drive shaft shown in Fig. 6, looking in the direction indicated.

In the construction shown in the drawings, the roll 1 of a standard calender machine, (driven by a suitable source of power not shown) is mounted on a shaft 2, one end of which is provided with a gear 3 which meshes with and drives a train of gears mounted between a pair of side frames 4 and 5. The gear 3 meshes with and drives a gear 6, which in turn meshes with and drives a gear 7. The gear 7 in turn meshes with and drives a gear 8 which meshes with and drives a gear 9. The gear 9 is keyed to one end of a shaft 10 which is journalled in spaced bearings 11 and 12 carried on a base frame 13.

The shaft 10, between the bearings 11 and 12, has keyed thereto a bevel gear 14 which meshes with and drives a bevel gear 15 secured to one end of a shaft 16, which is journaled in a bearing

17 on the base frame 13, the shaft 16 being disposed substantially horizontally and at right angles to the shaft 10 and calender roll shaft 2.

The other end of the shaft 16 is journaled in an outboard bearing 18 and the end thereof protrudes beyond the bearing and has one element of a manually operable clutch 19 slidably keyed thereto.

An upstanding handle 20 is provided near its lower end with a yoke which embraces opposite sides of the clutch element and engages radially extending pins on a ring 21 so that the clutch element may be shifted axially on the shaft into and out of engagement with the other complementary element of the clutch 19.

The other element of the clutch 19 is rigidly secured to one end of a shaft 22 which is journaled in bearings 23 and 24 carried on a base frame 25. The shaft 22, at a point between its bearings, has a bevel gear 26 thereto which meshes with and drives a bevel gear 27 keyed to one end of a shaft 28. The shaft 28, which is disposed at right angles to the shafts 16 and 22, is journaled in a bearing 29 on the base frame 25 and is the shaft which carries the conveyor belt driving roll 32 of the improved blanking machine.

The shaft 28 is also journaled on a framework 30 in bearings 31 which are spaced apart and the conveyor belt driving roll 32 is keyed to the shaft between its bearings on the framework 30.

The power drive so far described is so arranged and proportioned that the speed of the drive roll 32 will be the same as the peripheral speed of the calender roll 1 so that the sheet of material coming from the calenders will be carried away by the conveyor belt driven by the drive roller 32.

My improved blanking machine per se comprises generally a substantially rectangular horizontally disposed bed plate 35 and is supported at each of its four corners by legs 36 which are suitably secured to the bed plate by bolts 37. Midway between the supporting legs 36 and at each side of the bed plate, supplementary supporting legs 38 are provided which are secured to the underside of the bed plate adjacent its side edges by suitable means such as bolts 39. The pair of legs 36 at the front end of the machine are preferably secured together by a tie rod 40 which is secured to integrally formed laterally projecting lugs 41 for adding rigidity and strength to the structure.

The bed plate is provided with a super-structure in spaced relation thereabove which comprises a pair of arch members 42 and 43, the base ends of which are rigidly secured by bolts or the like 44 to integrally formed upstanding foundation portions or bases 45 located at the respective four corners of the bed plate. The arches 42 and 43 are secured to each other by integrally formed angle shaped cross-tie members 46 and 47 disposed in spaced parallel relation at each side of the apexes of the arches.

A transversely extending horizontally disposed crank shaft 48 is journalled in the apexes of the arch members 42 and 43 with the opposite ends thereof protruding beyond the outer faces of their respective arches. The shaft 48 carries a pair of crank arms or connecting rods 49 and 50 which extend downwardly therefrom, the lower ends of which are pivotally mounted in upstanding sockets 51 and 52, respectively, formed on the upper side of a vertically reciprocable die head 53.

Means are provided for varying the length of the connecting rods 49 and 50 and comprise a shaft 54 journalled adjacent its ends in bearings 55 and 56 formed on a cross member 57. The opposite ends of the shaft 54 protrude beyond their respective bearings and have bevel pinions 57 and 58, respectively, keyed thereto which mesh with bevel gears 59 and 60, respectively. The bevel gears 59 and 60 have suitable threaded sleeve and swivel connections with the connecting rods so that rotation of the gears in one direction will lengthen the connecting rods 49 and 50 and rotation in the opposite direction will shorten the rods, thus providing means for adjusting the die head 53 relative to the bed plate 35.

The die head 53 is generally of rectangular shape and horizontally disposed so as to be parallel to the bed plate 35 and at each of its four corners is provided with vertically disposed integrally formed bosses 61 having cylindrical bores concentrically formed therethrough. The bores in the bosses 61 slidably receive vertically disposed guide pillars 62, the lower ends of which pass through and are rigidly mounted in the bed plate 35 and the upper ends of which pass through suitably formed bosses on the arch members 42 and 43 and are secured thereto by nuts 63. These four pillars 62 thus tie the bed plate and superstructure rigidly together.

Counterbalancing means are provided for the die head 53 and comprise four vertically disposed rods 64 which have their lower ends threaded into upstanding bosses on the top side of the die head in substantially rectangular relationship. The upper ends of the rods 64 slidably pass through suitable openings formed in the laterally projecting flanges of the cross-members 46 and 47 and extend for a distance therebeyond. Helical compression springs 65 surround the upper projecting ends of the rods 64 and bear between adjusting nuts 66 threaded thereon and upstanding bosses 67 integrally formed on the upper side of the cross member flanges.

One of the projecting ends of the crank shaft 48 is provided with braking means which comprise a pair of members 68 and 69 pivoted on a pin 70 mounted in the arch member 43. The members 68 and 69 each have oppositely bowed arcuate portions which surround and embrace opposite sides of the protruding end of the shaft 48 and are yieldingly urged thereagainst to slidingly grip the shaft by means of a helical compression spring 71. The spring 71 surrounds a protruding end of a bolt 72 which passes through the lower ends 73 and 74 of the members 68 and 69, respectively, and which bears between a nut 75 threaded on the outer end of the bolt 72 and the outer face of the adjacent arm 74.

Means are provided for rotating the crank shaft 48 to vertically reciprocate the die head 53 and comprises an electric motor 76 mounted on a platform 77 which is secured to an integrally formed base or platform 78 on the arch member 42. The armature shaft of the motor 76 is provided with a belt pulley 79 over which passes a drive belt 80. The drive belt 80 passes around and drives a fly wheel 81 journalled on the opposite protruding end of the crank shaft 48. The hub of the fly wheel 81 is provided with any well known and customary clutching mechanism by which it may drive the shaft 48 when clutched thereto and rotate freely with respect thereto when the clutch is disengaged, as is common with various forms of punch presses and the like.

Means are provided for actuating the clutch mechanism to cause the fly wheel to drive the crank shaft and comprise a unit commercially known as a Reeves speed control 82, which is mounted on an outstanding bracket on shelf 182

secured to the machine by bolts or the like. This speed control comprises generally a pair of shafts 83 and 84 each of which carries a pair of opposed cone-shaped pulley wheels which are driven by a flexible V-shaped belt 85. The cones on each shaft are axially adjustable toward and away from each other, the pair on one shaft moving apart when the pair on the other shaft are moved toward each other, adjustment being secured by rotation of a hand wheel 183. An indicator hand 184 is provided for visual reading on an indexed scale 185 in the usual manner.

The speed control unit is driven by a sprocket chain 86 which passes around a sprocket wheel 87 keyed to the shaft 83 and around a sprocket wheel 88 which is keyed to the shaft 28.

The shaft 84 of the speed control unit, as shown most clearly in Figs. 4 and 11 of the drawings, is provided with a rigidly mounted cam 89 which vertically reciprocates a push rod 90 slidably mounted in bearings 91 secured to the outer side of the arch member 42.

The upper end of the push rod 90 normally abuts against a swingable latch 92 as shown in Fig. 4 of the drawings. The latch 92 forms one arm of a bell crank lever 93 which is pivoted on a pin 100 mounted in the frame 42. The latch 92 is pivoted on a vertically disposed pin 94 and is provided with a handle 95 so that it may be manually swung out of registry with the upper end of the push rod, as shown in Fig. 11 of the drawings, whereby the bell crank lever will not be rocked by vertical reciprocation of the push rod.

The other arm of the bell crank lever 93 is vertically slotted and embraced by the bifurcated end 96 of a horizontally disposed axially reciprocable push rod 97 which is mounted in suitable bearings 98. A pin 99 passes through the bifurcated end 96 and is embraced in the slot formed in the upstanding arm of the bell crank lever 93.

The opposite end of the push rod 97 is pivoted to the outer end of an arm 101 which is secured to the lower end of a vertically disposed shaft 102 journalled in bearings 103. The upper end of the shaft 102 carries an arm 104 disposed at right angles to the arm 101, the outer end of which engages with suitable connections in the hub of the fly wheel 81 for clutching the fly wheel to the shaft 48 when the arm is rocked clockwise as viewed in Fig. 5 of the drawings.

Means are provided for carrying the sheet of material from the calender roll through the blanking machine over the top surface of the bed plate and comprise an endless conveyor belt 105 which passes around the drive roll 32, over the top surface of the bed plate 35, across a discharge table 106, around a roll 107 at the far end thereof, back through the discharge table over a series of relatively small rolls 108, over an idler roll 109 journalled in the medial depending legs 38, under a take-up roll 110 and over another idler roll 111 journalled between the two legs 36 at the front end of the machine.

The take-up roll 110 is journalled at the outer ends of a pair of horizontally disposed spaced parallel arms 112, the inner ends of which are pivoted on the shaft 113 which carries the idler roll 109, at opposite ends of the roll.

Means are provided for yieldingly pressing down on the take-up roll 110 and comprise helical compression springs 114 which surround rods 115 and bear between nuts 116 on the upper ends of the rods and laterally extending flanges 117 formed on the outer sides of the arms 112 and through which the lower ends of the rods 115 slidably pass. Adjustment of the springs 114 is secured by movement of the nuts 116 which are threaded on the rods 115.

The conveyor belt 105 is guided laterally as it travels back into the blanking machine below the bed plate thereof by rollers 118 and 119 which are journalled at the outer ends of rigidly mounted arms 120 and 121 respectively, shown in Figs. 4 and 6 of the drawings.

Means are provided for temporarily gripping and stopping movement of that portion of the conveyor belt which passes over the bed plate 35 and comprise gripping blocks 122 mounted adjacent the four corners of the die head 53 in a position to engage the marginal edges of the conveyor belt and press the same downwardly against the upper surface of the bed plate 35. The blocks 122 are vertically slidable in suitably formed pockets which slidably embrace the blocks. Upward movement of the blocks is against the action of helical compression springs 123 which are housed in spaced vertically disposed cylindrical sockets formed in a thickened portion of the die head 53, as shown most clearly in Figs. 2 and 3 of the drawings.

Threaded studs 124 and 125 are slidably mounted through the end walls of two of the sockets 126 with the lower ends thereof threaded into the block 122 and the upper ends thereof provided with nuts 127 and 128 which are positioned so as to permit limited vertical movement of the block 122 with respect to the die head 53 and at the same time retain the blocks 122 within their respective recesses.

The underside of the die head 53 is provided with a broad shallow dove-tail recess which slidably receives a cutting die 129, the lateral edges of which are beveled to be engaged by the inwardly inclined side edges of the recess for retaining the die on the die head. The die 129 has a series of cutting knives 130 protruding from the surface thereof which outlines the piece to be stamped from the strip of material passing through the machine.

Suitably disposed spring steel strips 131 are located closely adjacent to the cutting knives 130. The strips 130 are bowed or curved to cause one edge to normally project below the edge of the cutting knife for the purpose of pushing off the material from the knife when it has been cut thereby. Suitable rubber blocks 132 may be interposed under the free edge of the spring strips 131 for aiding the spring action thereof.

In the operation of this machine, the calender roll 1 feeds the strip of material to the conveyor belt 105, which is driven at the same speed by the drive roll 32, when the clutch 19 is engaged. The fly wheel 81 is constantly driven by the electric motor 76 through the belt 80 and the speed control unit 83 is suitably adjusted for actuating the clutch of the fly wheel 81 at suitably timed intervals depending upon the size of the piece to be blanked from the sheet of material.

With the throw-out latch 92 in the position shown in Fig. 4 of the drawings, the cam 89 of the speed control unit, through the push rod 90, will rock the bell crank lever 93 to give axial movement to the push rod 97. The push rod 97 in turn rotates the shaft 102 through the arm 101 and causes the arm 104 to engage the clutch between the fly wheel 81 and the main shaft 48, thereby causing the shaft 48 to drive the die head 53 downwardly through the medium of the con-

necting rods 49 and 50, for one revolution of the fly wheel and then release the same.

As the die head 53 approaches the bed plate and just before the cutting knives 130 engage the strip of material, the gripping blocks 122 contact with the conveyor belt 105 along the opposite marginal edges thereof and press it tightly against the upper surface of the bed plate thereby stopping movement of the belt momentarily while the cutting knife enters and severs the strip of material being blanked.

During this stoppage of the conveyor belt, a slight slack is caused to form in the belt between the drive roll 32 and the front edge of the bed plate, this slack being permitted by upward movement of the take-up roll 110 against the action of the compression springs 114 and the weight of the roll.

As the head recedes from the bed plate, the take-up roll 110, aided by the compression springs 114, causes a quick and accelerated movement of the conveyor belt to compensate for the slack thrown in the belt during the momentary stoppage of its movement across the bed plate.

If it is desired to stop the reciprocation of the die head for any reason, the handle 95 of the throw out latch 92 is grasped and the latch rotated on its pivot 94 so that the thickened outer end of the latch is out of registry with the upper end of the push rod 90 thereby permitting the push rod 90 to vertically reciprocate without rocking the bell crank 93 on its pivot 100.

If for any reason it is desired to disconnect the drive roll 32 from the driving mechanism of the calender roll 1, the upstanding lever 20 of clutch 19 is grasped and moved to the right as viewed in Fig. 1 of the drawings thereby axially separating the two elements of the clutch 19 as shown in Fig. 8 of the drawings.

Adjustment of the die head 53 relative to the top surface of the bed plate and belt is secured by rotating the shaft 54, thus causing the pinions 57 and 58 carried at the opposite ends thereof to rotate the bevel gears 59 and 60. The gears 59 and 60 have suitable swivel and threaded connections for lengthening or shortening the connecting rods 49 and 50, depending upon the direction they are rotated.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

What I claim is:

1. The combination in a blanking machine, of a continuously driven endless conveyor belt for supporting and carrying the material to be blanked, a die head movable into contact with said conveyor belt for blanking the material, and means on said die head for engaging said belt to stop the movement of that portion of the conveyor belt which supports the material being blanked while the blanking operation is being performed.

2. The combination in a blanking machine, of a continuously driven endless conveyor belt for supporting and carrying the material to be blanked, a die head movable into contact with said conveyor belt for blanking the material and means for gripping the belt to stop movement of that portion thereof which supports the material being blanked while the blanking operation is being performed.

3. The combination in a blanking machine of a stationary table, a continuously driven endless conveyor belt passing over said table for supporting and carrying the material to be blanked, a die head movable towards said table into engagement with said material on said conveyor belt for blanking the material, and means for clamping said belt stationarily against said stationary table to stop its normal travel while the blanking operation is being performed.

4. The combination in a blanking machine of a stationary table, a continuously driven conveyor belt passing over said table for supporting and carrying material to be blanked, a die head movable toward said table into engagement with the material on said conveyor belt for blanking the material, and means on said movable die head for clamping said belt stationarily against said stationary table to stop its normal travel while the blanking operation is being performed.

5. The combination in a blanking machine of a table, a driving roller in spaced relation to said table, an idler roller at the opposite side of said table, an endless conveyor belt passing over said roller and across the top surface of said table for supporting materials to be blanked, said belt having slack therein, a take-up roller bearing on said belt for keeping it taut, a die head movable towards and away from said table, a die on said die head for engaging material on said belt, and means carried by said movable die head for stopping movement of and for engaging that portion of said belt resting on said table during the engagement of said die with said material.

6. The combination in a blanking machine of a frame, a table, an endless conveyor belt for carrying the materials to be blanked, a die head movable toward and away from said table, having bearings thereon adapted to ride on bearing rods positioned in said frame, a die on said die head, and a block positioned in said die head, in advance of said die, for gripping said conveyor belt momentarily while the blanking operation is being performed.

7. The combination in a blanking machine of a table, a continuously driven endless conveyor belt passing over said table, for carrying the material to be blanked, a die head movable toward said table, a die on said die head, and means on said die head for cleaning the material from said die after the blanking operation has been performed comprising spring steel strips each secured at one end to said die head at points around the edges of said die and bent so that the free ends thereof are normally disposed in advance of the cutting edges of the die.

8. The combination in a blanking machine, of an endless conveyor belt for carrying material to be blanked, means for continuously driving said belt, a die head movable toward said belt for blanking the material, means on said movable die head for stopping the movement of that portion of the conveyor belt which carries the material in position to be blanked, means for moving said die head, speed control means operable by said belt driving means, and means operable by said speed control means for controlling the operation of the means for moving said die head.

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