

July 30, 1940.

R. PEDALINE

2,209,472

MACHINE FOR FORMING AIR CUSHION FRAMES

Filed Feb. 13, 1939

2 Sheets-Sheet 1

Fig. 1.

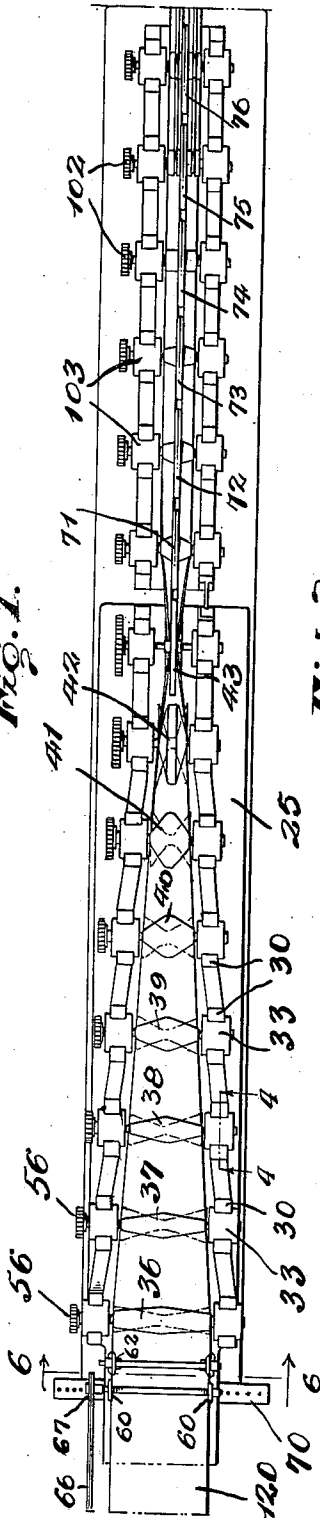


Fig. 3.

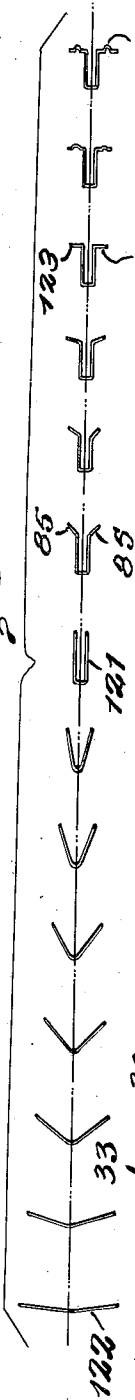


Fig. 2.

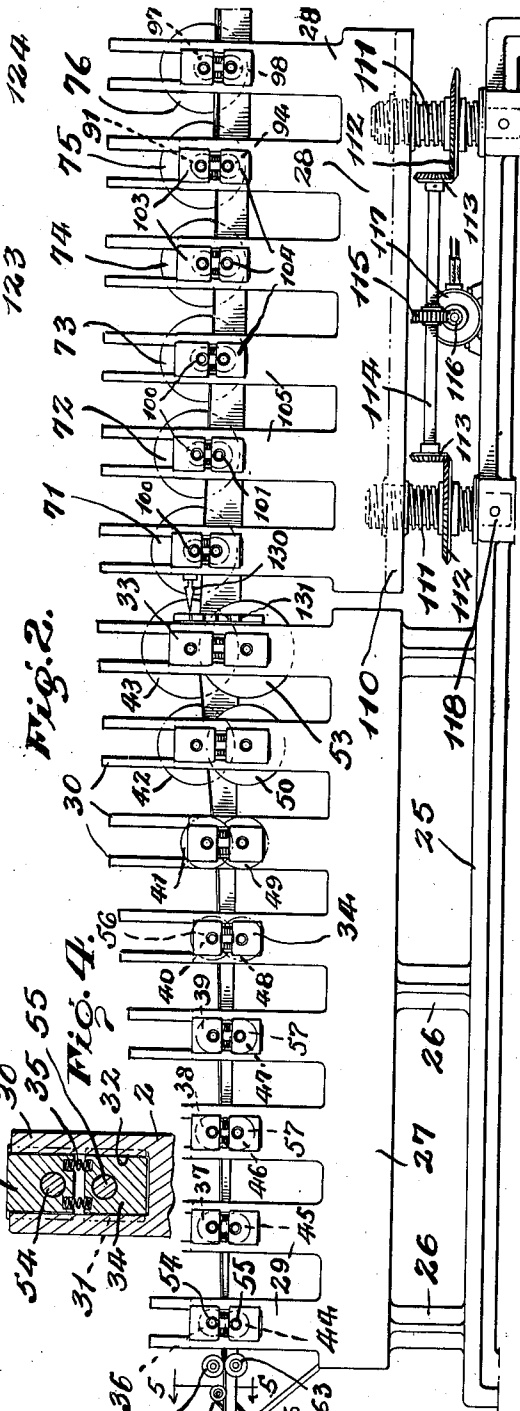
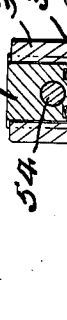


Fig. 4.



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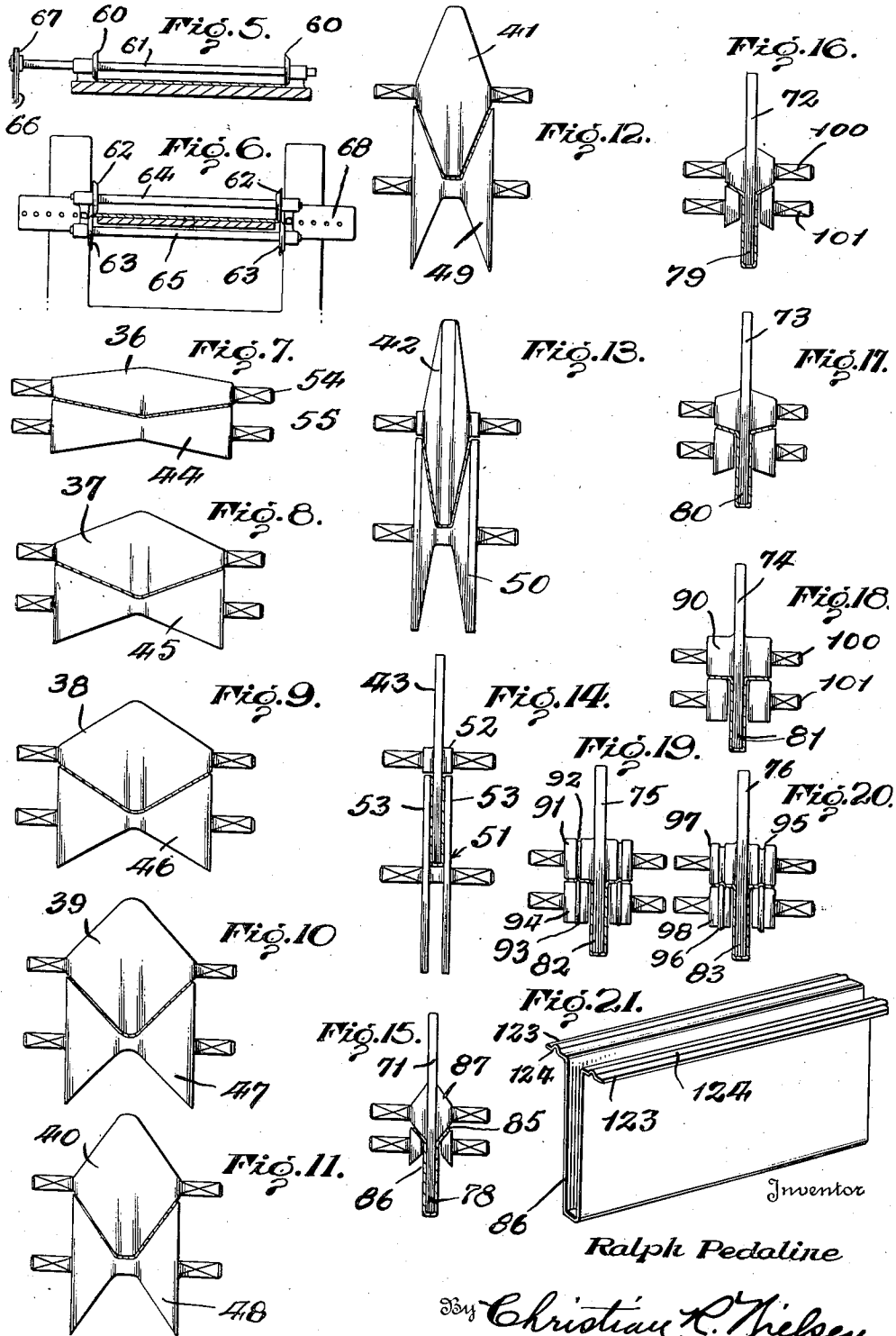
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2 Sheets-Sheet 2



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MACHINE FOR FORMING AIR CUSHION
FRAMES

Ralph Pedaline, Youngstown, Ohio

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7 Claims. (Cl. 153-2)

This invention relates to a machine for forming air cushion frames for spacing sections of a concrete road bed.

An object of the invention is the provision of a machine for forming U-shaped metal frames, said machine including a series of pairs of positively driven pressure rolls, certain of the rolls progressively decreasing in length while progressively increasing in diameter at a point intermediate the ends thereof, said rolls tapering from a central point to the opposite ends.

Another object of the invention is the provision of a machine for forming U-shaped metal frames, the machine being formed in two sections, one section containing a series of pairs of pressure rolls of progressively decreasing lengths and of progressively increasing widths midway of the lengths thereof, the other section containing finishing rolls to provide corrugated flanges on the U-shaped frames formed by the pressure rolls.

A further object of the invention is the provision of a machine in two sections for forming U-shaped metal frames, one section containing pressure rolls for roughing out the metal frame, the other section containing finishing rolls for forming corrugated flanges on the ends of frames, each section being so constructed that pressure rolls of varying diameters may be employed in said sections, means raising the second section when larger sized rolls are employed in the sections.

Additional objects, advantages and features of invention will be apparent from the following description considered in conjunction with the accompanying drawings wherein

Figure 1 is a plan view of a machine constructed in accordance with the principles of the invention,

Figure 2 is a longitudinal side view of the machine.

Figure 3 is a diagrammatic representation of the progressive formation of an air cushion frame.

Figure 4 is a vertical section taken along the line 4-4 of Figure 1.

Figure 5 is a vertical section taken along the line 5-5 of Figure 2.

Figure 6 is a vertical section taken along the line 6-6 of Figure 1.

Figures 7 to 14 inclusive show in elevation pairs of the varying forms of pressure rolls.

Figures 15 to 20 inclusive show in elevation 55 pairs of the varying forms of finishing rolls.

Figure 21 is a view in perspective of a finished air cushion frame.

Referring more particularly to Figures 1 and 2, 25 designates a base from which rise standards 26. A frame 27 is supported by the standards and forms the first section of the machine. A second frame 28 is vertically adjustable on the base and forms the finishing section while the first section is employed for roughing out the frames before it is received by the second section.

The first section has a plurality of spaced vertically disposed guides 29 which are U-shaped. The legs 30 (Fig. 4) are provided with vertical slots 31 to receive fins 32 formed on the side walls of bearing blocks 33 and 34. Springs 35 separate and cushion the blocks.

Each of the guides have considerably greater lengths than the normal sized bearings so that bearings of larger sizes may be supported by the guides when rolls of larger diameters are employed. Furthermore, the guides from the front end of the first section to the rear end gradually increase in length because rolls of progressively increasing diameters are carried by the guides.

The pressure rolls generally designated by the numerals 36 to 43 inclusive are the upper rolls and these rolls not only progressively decrease in length but they increase in diameter from the frame end to the rear end of the first section represented by the frame 27. These rolls are tapered from the central portion to the opposite ends as shown more particularly in Figures 7 to 14 inclusive.

The lower rolls 44 to 51 inclusive of each pair are complementarily formed with the rolls 36 to 43 inclusive. The lower rolls resemble in shape various forms of spool with the central portions progressively decreasing in diameter, while the ends progressively increase in diameter. The rolls also progressively decrease in length.

The roll 43 has a reduced hub portion 52 against which bears the spaced circular flat portions 53 of the roll 51. Each upper roll includes a shaft 54 mounted in the bearing blocks 33 while the lower rolls include a shaft 55 mounted in the bearing blocks 34.

The shafts 54 and 55 are driven by intermeshing gears 56 and 57 driven in opposite directions as are the associated pressure rolls. The gears are increased in diameter to conform to the increase in the diameters of the rolls. Means not shown are employed for revolving the gears simultaneously.

A pair of cutters 60 secured to a shaft 61 in 55.

spaced relation at the extreme front end of the first section cut the metal blank to the proper width while pairs of opposed cutters 62 and 63 secured to shafts 64 and 65 respectively, trim and finish the edges of the blank, after it has been cut by the members 60.

The shaft 61 is driven by a chain 66 and a sprocket 67.

The cutters 62-63 and shafts 64-65 may be replaced by cutters on longer shafts when desired, since the shafts are removable as a unit from the perforated plate 68. Similarly a longer shaft 61 and cutters 60 may be connected to the perforated plate 70 by bolts (Fig. 1).

The second section containing the pairs of complementarily formed finishing rolls 71 to 76 inclusive and 78 to 83 inclusive, receive the extruded work from the last pressure rolls 43 and 51 when flanges 85 at the upper ends of the work or U-shaped frame 86 is initiated.

The upper finishing rolls are flat circular disks having flange forming hubs which start with frusto-conically shaped members 87 at opposite sides of the disks and these hubs progressively converge to cylindrical form as shown at 90 (Fig. 18), where the hubs on both rolls 74 and 81 have the same shape. Beyond this point the hubs 91 are provided with a narrow circular groove 92 which receives a head 93 on the hub 94. The grooves 95 and the bead 96 of the respective hubs 97 and 98 are increased in width.

The upper and lower finishing rolls are driven respectively by shafts 100 and 101 and intermeshing gears 102, only one of which is shown. These gears are revolved at a speed to conform to the speed of travel of the work 86 when leaving the first section.

The shafts 100 and 101 are mounted in bearing blocks 103 and 104 respectively carried by guides 105 which are similar in construction to the guides 29 already described. These guides however, are of the same height but are made considerably longer than necessary for a normal finishing roll to accommodate rolls of greater dimensions when a wide blank of metal is used, as shown in Figure 2.

When pressure rolls of greater diameter are employed, it is necessary to raise the frame 28, so that the "passes" of the finishing rolls will be in the same horizontal plane with the work leaving the pressure rolls.

The bottom 110 of the frame 28 has spaced threaded openings to receive screw 111 so that when these screws are simultaneously revolved by the gears 112 and 113 the frame 28 will be elevated or lowered.

The gears 113 are revolved by a shaft 114, gears 115, 116 and a motor 117. The lower ends of the screws 111 are mounted in thrust bearings 118 carried by the base 25. In order that the frame 28 may be raised or lowered to the height necessary to receive the work from the rolls of the frame 27, the first guide 105 of the frame 28 includes an indicator or pointer 130 which is to be brought into registry with markings 131 on the adjacent guide 29.

After the blank 120 has been cut it passes between the various pairs of pressure rollers and is progressively bent into the U-shaped form shown at 121 in Figure 3, although it passes through various stages of bending beginning with the slight bend shown at 122.

After the work passes the first section the ends 85 are pressed outwardly and progressive action completes the horizontal flanges 123. The final

finishing rolls forms the corrugations 124 and the air cushion frame has been completed.

I claim:

1. A machine for forming U-shaped air cushion frames and divided into two longitudinally aligned sections, one section comprising a series of pairs of complementarily formed upper and lower pressure rolls, means driving the rolls with one of the rolls in each pair being revolved in an opposite direction to the other roll, the upper rolls from the inlet end of the section to the outlet end progressively decreasing in length while progressively increasing in diameter midway of the ends thereof, said upper rollers tapering from a central point to the opposite ends, a series of finishing rolls in the other section to receive the work from the pressure rolls and said finishing rolls having complementary beads and grooves whereby to form corrugated horizontally disposed flanges on the edges of the frames.

2. A machine for forming U-shaped air cushion frames and divided into two longitudinally aligned sections, one section comprising a series of pairs of complementarily formed upper and lower pressure rolls, means driving the rolls with one of the rolls in each pair being revolved in an opposite direction to the other roll, the upper rolls from the inlet end of the section to the outlet end progressively decreasing in length while progressively increasing in diameter midway of the ends thereof, said upper rollers tapering from a central point to the opposite ends, a series of pairs of finishing rolls in the other section having means for progressively bending the free edges of the U-shaped frames into corrugated flanges.

3. A machine for forming U-shaped air cushion frames and divided into two longitudinally aligned sections, one section comprising a series of pairs of complementarily formed upper and lower pressure rolls, means driving the rolls with one of the rolls in each pair being revolved in an opposite direction to the other roll, the upper rolls from the inlet end of the section to the outlet end progressively decreasing in length while progressively increasing in diameter midway of the ends thereof, said upper rollers tapering from a central point to the opposite ends, bearings for the ends of the rolls and upwardly opening guides to support the bearings, said guides being of such length that bearings of varying sizes may be supported by said guides so that rolls of varying sizes may be employed.

4. A machine for forming U-shaped air cushion frames and divided into two longitudinally aligned sections, one section comprising a series of pairs of complementarily formed upper and lower pressure rolls, means driving the rolls with one of the rolls in each pair being revolved in an opposite direction to the other roll, the upper rolls from the inlet end of the section to the outlet end progressively decreasing in length while progressively increasing in diameter midway of the ends thereof, said upper rollers tapering from a central point to the opposite ends, a series of finishing rolls in the other section to receive the work from the pressure rolls and having means to form corrugated horizontally disposed flanges in the edges of the frames, a plurality of vertically disposed upwardly opening bearing guides connected together in each section, bearings for the ends of the rolls in each guide, said guides being of greater length than the bearing supporting rolls which form a frame of normal size

so that bearings and rolls of greater size may be carried by the guides.

5 5. A machine for forming U-shaped air cushion frames and divided into two longitudinally
aligned sections, one section comprising a series
of pairs of complementarily formed upper and
lower pressure rolls, means driving the rolls with
one of the rolls in each pair being revolved in
an opposite direction to the other roll, the upper
10 rolls from the inlet end of the section to the out-
let end progressively decreasing in length while
progressively increasing in diameter midway of
the ends thereof, said upper roller tapering from
a central point to the opposite ends, a series of
15 pairs of finishing rolls in the other section pro-
gressively bending the free edges of the U-shaped
frames into corrugated flanges and means for
raising the second section vertically.

20 6. A machine for forming U-shaped air cushion
frames and divided into two longitudinally
aligned sections, one section comprising a series
of pairs of complementarily formed upper and
lower pressure rolls, means driving the rolls with
one of the rolls in each pair being revolved in
an opposite direction to the other roll, the upper
25 rolls from the inlet end of the section to the out-
let end progressively decreasing in length while
progressively increasing in diameter midway of
the ends thereof, said upper rollers tapering from
a central point to the opposite ends, a series of
30 finishing rolls in the other section to receive the

work from the pressure rolls and having means
to form corrugated horizontally disposed flanges
on the edges of the frames, a plurality of ver-
tically disposed upwardly opening bearing guides
connected together in each section, bearings for
5 the ends of the rolls in each guide, said guides
being of greater length than the bearing sup-
porting rolls which form a frame of normal size
so that bearings and rolls of greater size may be
carried by the guides, and means for raising the
10 second section when rolls of greater diameter are
used in both sections.

7. A machine for forming U-shaped air cushion
frames and divided into two longitudinally
aligned sections, one section comprising a series
15 of pairs of complementarily formed upper and
lower pressure rolls, means driving the rolls with
one of the rolls in each pair being revolved in
an opposite direction to the other roll, the upper
rolls from the inlet end of the section to the out-
20 let end progressively decreasing in length while
progressively increasing in diameter midway of
the ends thereof, said upper rollers tapering from
a central point to the opposite ends, a series of
pairs of finishing rolls in the other section hav-
25 ing means for progressively bending the free
edges of the U-shaped frames into corrugated
flanges, means for raising the second section ver-
tically and indicator means cooperable between
the first and second sections. 30

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