

May 30, 1939.

O. R. MAXFIELD

2,160,336

ROOF SEAMING MACHINE

Filed May 26, 1938

3 Sheets-Sheet 1

Fig. 1.

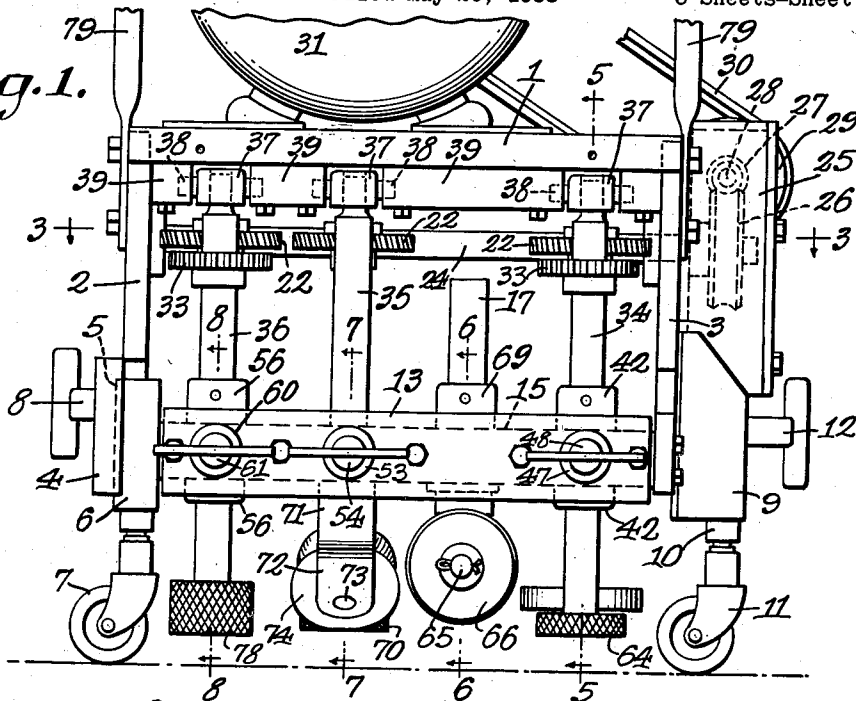
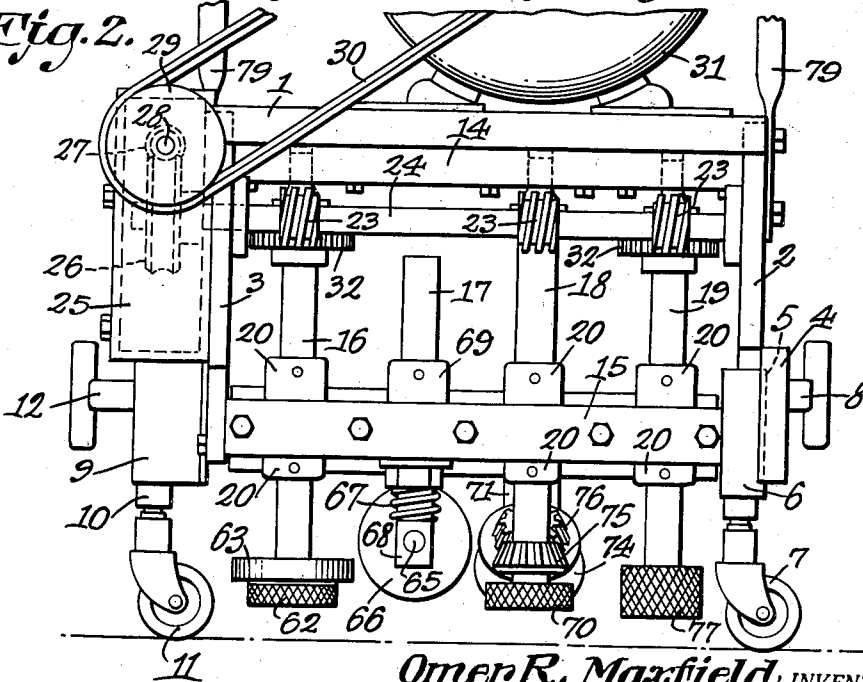


Fig. 2.



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3 Sheets-Sheet 2

Fig. 3.

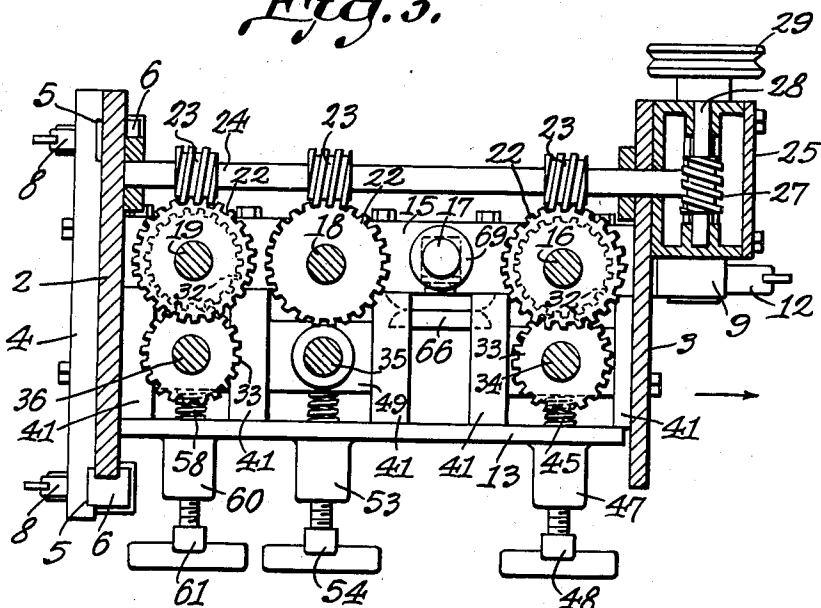
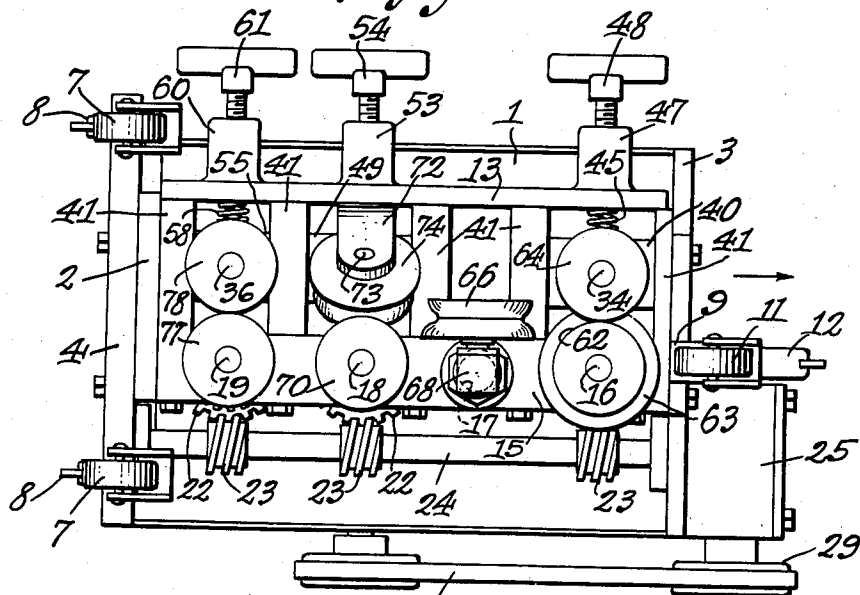


Fig. 4.



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3 Sheets-Sheet 3

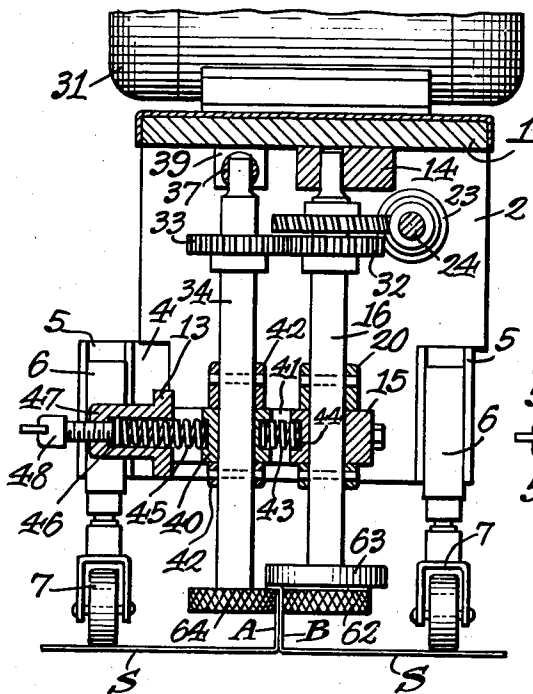


Fig. 5.

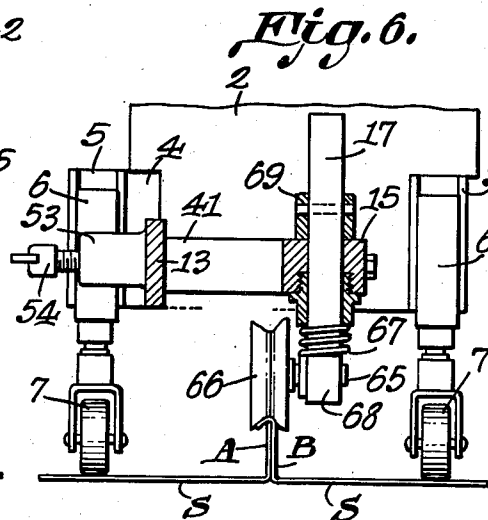


Fig. 6.

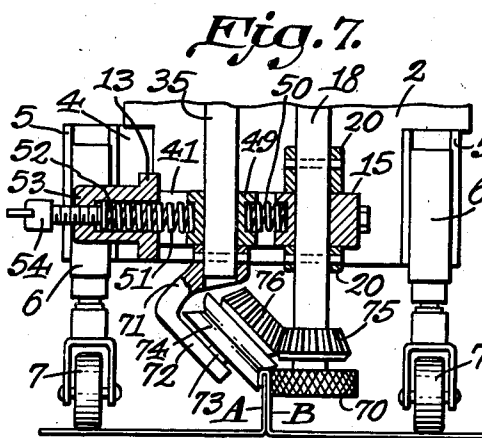


Fig. 7.

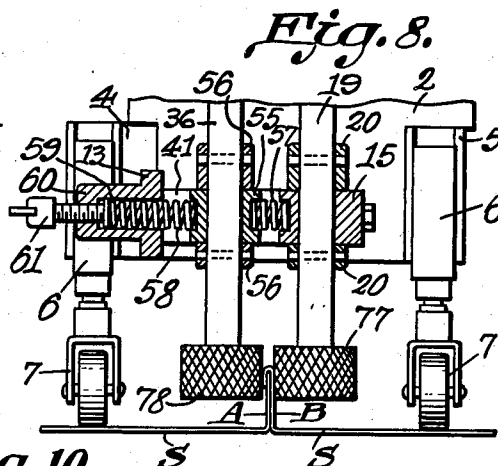


Fig. 8.

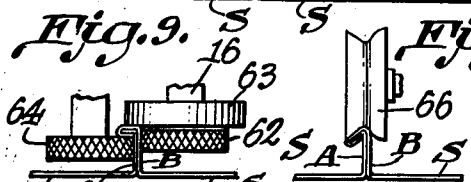


Fig. 9.

Fig. 10.



Fig. 11.

Fig. 12.

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UNITED STATES PATENT OFFICE

2,160,336

ROOF SEAMING MACHINE

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Application May 26, 1938, Serial No. 210,249

2 Claims. (Cl. 113—55)

This invention relates to machines designed primarily for forming seams connecting sheets of metal roofing, one of the objects being to provide a machine which can be operated to travel longitudinally of the meeting upstanding edge portions of the metal sheet and, during such movement, will bend the edge portions by successive operations to produce an interlocking standing seam.

A further object is to provide metal bending and compressing elements which can be adjusted readily into proper positions for the purpose of producing the desired results, a suitable power means being provided for the purpose of operating said element and, incidentally, driving the mechanism along the seam during its formation.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings, the preferred form of the invention has been shown.

In said drawings:

Figure 1 is an elevation of one side of the machine, a portion of the motor being broken away.

Figure 2 is a similar view showing the opposite side of the machine.

Figure 3 is a section on line 3—3, Figure 1.

Figure 4 is a bottom plan view.

Figure 5 is a section on line 5—5, Figure 1.

Figure 6 is a section on line 6—6, Figure 1.

Figure 7 is a section on line 7—7, Figure 1.

Figure 8 is a section on line 8—8, Figure 1.

Figure 9 is an elevation of the gripping and turning rolls shown in Figure 5 but adjusted to effect the first bend in the second folding operation.

Figure 10 is an elevation of the roll shown in Figure 6 and showing it carrying out the second step of the second folding operation.

Figure 11 is an elevation of the rolls shown in Figure 7 and illustrating them carrying out the third step of the second folding operation.

Figure 12 is an elevation of the roll shown in Figure 8 and illustrating the final or compressing step of the second folding operation.

Referring to the figures by characters of reference 1 designates the top plate and 2 and 3 designate the respective end plates of the frame of the machine. One of the end plates, 2, has a

cross bar 4 secured thereto in any suitable manner and provided at its ends with channelled guides 5 in which are located slides 6 supported by casters 7. These slides are adapted to be held in predetermined positions by set screws 8.

The other end plate 3 has a small housing 9 fastened thereon at one side of the center of the end plate and in this housing is mounted a slide 10 supported by a caster 11. A set screw 12 is used for holding the slide 10 adjustably in position. Obviously by using the means described the end plates can be adjusted upwardly or downwardly relative to the casters so that the frame can thus be supported at any desired distance from the surface on which the casters are mounted.

Connecting the end plates 2 and 3 at one side is a longitudinal bar 13 and extending longitudinally of the frame along the bottom of the top plate 1 is a bar 14 providing bearings for the upper ends of a series of shafts which extend through and are journaled within a lower bearing bar 15 connecting the end plates.

Four parallel shafts 16, 17, 18 and 19 are journaled in the bar 15, the shafts 16, 18 and 19 being held against up and down movement by collars 20 secured thereto and bearing against the bar while shaft 17 is limited in its downward movement by a collar 21 which bears downwardly on the bar under normal conditions. The upper ends of shafts 16, 18 and 19 are journaled in the top bearing bar 14 and each of them is provided with a worm gear 22 in constant mesh with a worm 23 carried by a longitudinal shaft 24. This shaft is journaled in the end plates 1 and 2 and its forward end projects into a gear case 25 containing a worm gear 26 secured to shaft 24 and receiving motion from a worm 27 on a transverse shaft 28. This shaft has a pulley 29 adapted to receive motion through a belt 30 from a motor 31 mounted on the top plate 1.

Each of the shafts 16, 18 and 19 has a gear 32 meshing with another gear 33 and these latter gears 33 are carried by shafts 34, 35 and 36 respectively at one side of and normally parallel with shafts 16 and 19. The upper ends of shafts 34, 35 and 36 are journaled in blocks having oppositely extending bearing pins 38 all of which are aligned and journaled within combined spacing and supporting blocks 39 secured to the bottom of the top plate 1.

Shaft 34 is journaled in a bearing block 40 which is slidable transversely of the machine between guides 41 which connect the bars 13 and 15. Collars 42 secured to this shaft hold it

against upward and downward movement relative to its bearing. A spring 43 is interposed between bearing block 40 and bar 15, sockets 44 being provided for the ends of the spring. Another spring 45 bears against the opposite side of block 40 and extends into a recess 46 in bar 13. This recess extends back into a boss 47 formed on bar 13. An adjusting screw 48 is in engagement with the boss and constitutes a thrust bearing for spring 45. By means of this screw the tension of spring 45 can be regulated.

Another bearing block 49 is journaled between two of the guides 41 and is engaged by shaft 35. A spring 50 is interposed between this bearing block and bar 15 while another spring 51 bears against the opposite side of the block and extends into a deep socket 52 formed in bar 13 and a boss 53 thereon. By means of a screw 54 the compression of the spring 51 can be regulated.

A third bearing block 55 is slidably mounted between two of the guides 41 and is engaged by shaft 36, there being collars 56 on this shaft for holding it against sliding movement within the bearing block. A spring 57 is interposed between this block and the bar 15 while another spring 58 thrusts against the opposite side of the bearing block and is seated in a socket 59 extending into a boss 60 on bar 13. A screw 61 constitutes a thrust bearing for spring 58 and by means thereof the compression of the spring can be varied.

Secured to the lower end of shaft 16 is a gripping roll 62 the periphery of which is preferably roughened and a turning flange 63 extends outwardly from the upper portion of the roll so as to overlie the peripheral portion of another gripping roll 64 carried by the lower end of shaft 34 and also formed preferably with a roughened periphery.

The lower end of shaft 17 has a laterally extending stud 65 on which is journaled a depressing roll 66 formed with a substantially V-shaped peripheral groove and rotating in a plane parallel with the direction of movement of the machine. A spring 67 is mounted on shaft 17 and exerts a downward thrust against a head or enlargement 68 at the lower end of the shaft, this downward movement being limited by a collar 69 secured to the shaft and normally bearing upon the bar 15.

To the lower end of shaft 18 is secured a gripping roll 70 formed preferably with a roughened periphery and to the lower end of the adjoining shaft 35 is secured a bracket 71 having a downwardly and laterally inclined arm 72 supporting an upwardly and laterally inclined bearing stud 73. On this stud is journaled a folding roll 74 having a substantially V-shaped peripheral groove the lower wall of which is substantially parallel at its lower portion with the adjacent portion of the periphery of roll 70. The upper wall of the groove 74 is adapted to overlie the peripheral portion of roll 70. Meshing gears 75 and 76 are carried by shaft 18 and roll 74 respectively so that the two rolls 70 and 74 are thus caused to rotate in unison in opposite directions respectively.

To the lower end of each of the shafts 19 and 36 is secured a compressing roll 77 and 78 respectively, the peripheries of these two rolls being preferably roughened as shown.

When the machine herein described is to be used the roofing sheets are first placed together with upstanding side flanges in contact. In the drawings two of these sheets have been shown

at S while the contacting upstanding flanges have been shown at A and B respectively. The flange B extends above the flange A. After the plates to be joined have been assembled, the machine is placed astride the flanges so that its casters will rest on the plates as shown. The machine is then adjusted upwardly or downwardly relative to its casters in order to bring the rolls 62 and 64 in such positions as to turn the upper portion of flange B as shown in Figure 5 without correspondingly turning flange A. This adjustment of the machine should also be such as to bring the other rolls thereof substantially to the positions shown in Figures 5, 6, 7 and 8. The shafts 34, 35 and 36 are swung away from the corresponding shafts 16, 18 and 19 to permit the flanges to enter between the rolls and to allow the roll 66 to bear downwardly on the upper portion of flange B, as shown in Figure 6. With the machine thus adjusted and located and the several springs 45, 51 and 58 placed under proper compression by means of their adjusting screws, the motor 31 is set in motion, transmitting power through the belt 30 and pulley 29 to shaft 28, which, in turn, through its driven gearing, causes the shaft 23 to operate and drive the gears on shaft 16, 18 and 19. At the same time motion will be transmitted from gears 16 and 19 to the gears on shafts 34 and 36. As rolls 62 and 63 are held in gripping engagement with the flanges A and B, the machine will be moved forwardly thereby and flange 63 will turn the upper portion of flange B so as to extend laterally over flange A as shown in Figure 5. Thereafter roll 66 travelling along the laterally bent portion of flange B will cause it to be folded or depressed downwardly as in Figure 6. Thereafter this folded or depressed portion of flange B will enter between the rolls 74 and 70 which will complete the folding operation and this will be followed by the compressing operation exerted by the rolls 77 and 78 which, obviously, cooperate with the rolls 62 and 64 to propel the machine forwardly.

The foregoing operation completes the first fold. After the first fold has been produced by moving the machine once along the meeting flanges of the sheets, the machine is lowered relative to its casters a distance substantially equal to the height of the downturned portion of flange B. Thus when the machine is again driven along the standing seam the rolls 62 and 64 with flange 63 again will cooperate to impart the first or lateral bend of the final seaming operation as shown in Figure 9. Next will follow roll 66 which will impart the second bend to the standing flanges as in Figure 10 and this roll will be followed by the cooperating rolls 74 and 70 which, as in Figure 11, will complete the second fold of the seam which subsequently will be tightly compressed and sealed between the compressing rolls 77 and 78 as in Figure 12. Thus a double standing seam is produced forming a tight joint between the plates.

It is to be understood that suitable handles, portions of which have been indicated at 79 can be located at the ends of the machine whereby the seams can be manipulated into position astride the flanges of the roofing plates.

By mounting the shafts 34, 35 and 36 so that they can swing laterally, it is possible for their rolls to yield when subjected to more than ordinary resistance by the metal extending into the passes between the rolls. Furthermore by utilizing adjustable springs, the pressure exerted by the rolls can be varied at will.

It has been found in practice that a machine such as herein described is capable of producing standing seams more quickly than by other means and that these seams thus produced are very efficient because of the heavy compression to which the parts are subjected. Thus the seams are made water-tight, it having been found that, by seaming a roof with this machine, leakage will not occur even though the level of the water should extend above the top of the seams.

What is claimed is:

1. A machine for forming standing seams on flanged roofing sheets including a wheel-supported frame, shafts arranged in pairs and supported within the frame, one shaft of each pair being mounted for lateral swinging, motor driven means on the frame for simultaneously driving the shaft of two pairs, gripping rolls carried by the shaft of said driven pairs positioned to receive the upstanding flanges therebetween and to grip them, means rotatable with one roll of one of the pairs for overturning the upper portion of one of the gripped flanges, all of said gripping rolls cooperating with the flanges to propel the machine along the flanges, cooperating rolls on one pair of shafts for folding the laterally turned portion of one of the flanges downwardly against the opposed flange, and means rotatable with said last named rolls for transmitting motion in opposite directions from one to the other, adjustable yielding means engaged by one shaft of each of the pairs and constituting a bearing therefor, for urging the roll on said shaft toward the opposed shaft of said pair, and a yieldingly pressed roll interposed between the rolls of two of the pairs for imparting an intermediate bend to the later-

ally turned flange during the movement of the machine along the seam, and means for adjusting the frame of the machine toward or from its supporting surface to vary the elevation of the rolls relative to said surface.

2. A machine for forming standing seams of flanged roofing sheets including a wheel-supported frame, shafts arranged in pairs and supported within the frame, one shaft of each pair being mounted for lateral swinging, motor driven means on the frame for simultaneously driving the shaft of two pairs, gripping rolls carried by the shaft of said driven pairs positioned to receive the upstanding flanges therebetween and to grip them, means rotatable with one roll of one of the pairs for overturning the upper portion of one of the gripped flanges, all of said gripping rolls cooperating with the flanges to propel the machine along the flanges, cooperating rolls on one pair of shafts for folding the laterally turned portion of one of the flanges downwardly against the opposed flange, and means rotatable with said last named rolls for transmitting motion in opposite directions from one to the other, adjustable yielding means engaged by one shaft of each of the pairs and constituting a bearing therefor, for urging the roll on said shaft toward the opposed shaft of said pair, and a yieldingly pressed roll interposed between the rolls of two of the pairs for imparting an intermediate bend to the laterally turned flange during the movement of the machine along the seam, and yielding means for resisting the movement of the movable shaft of each pair toward the other shaft of said pair.

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