May 31, 1932. W. A. BATES 1,860,980

GRATING TURNING MACHINE

Filed May 15, 1929 2 Sheets-Sheet 1

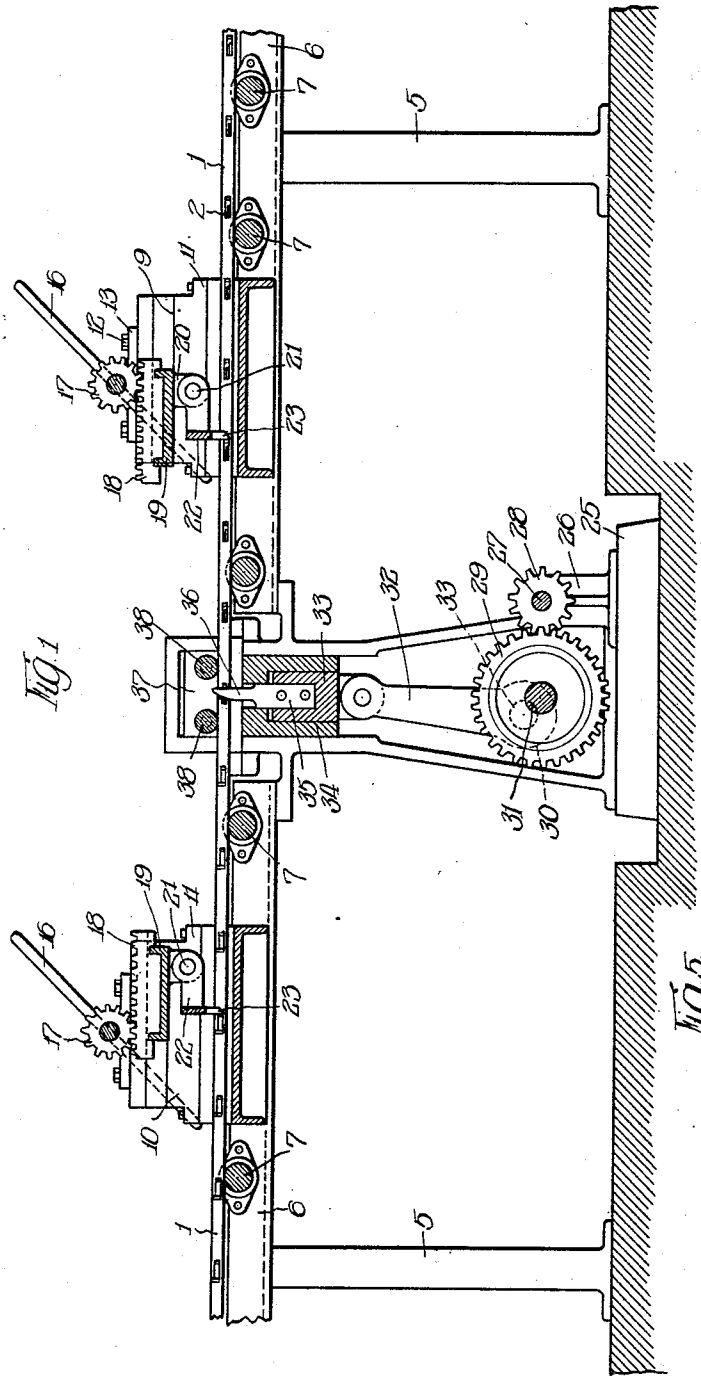


Fig. 1

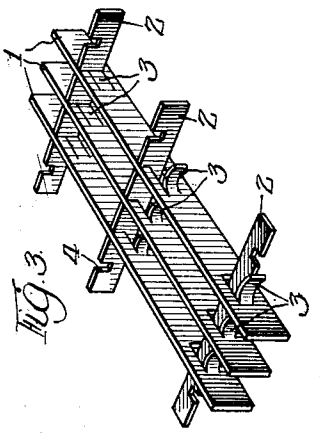


Fig. 3.

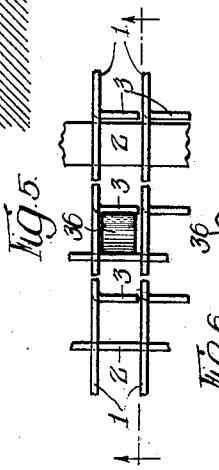


Fig. 5.

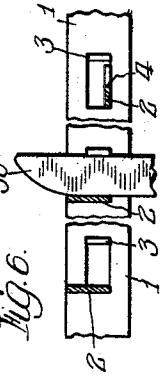


Fig. 6.

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Fig. 4

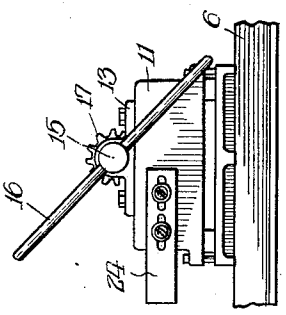
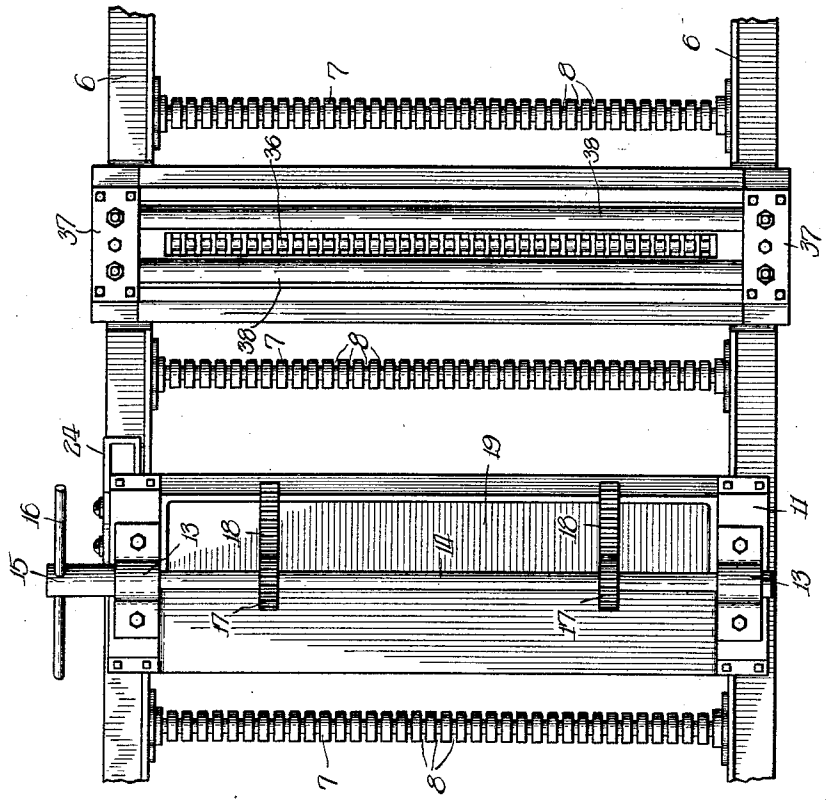


Fig. 2.



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UNITED STATES PATENT OFFICE

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GRATING TURNING MACHINE

Application filed May 15, 1929. Serial No. 363,283.

This invention relates to improvements in manufacturing a novel design of floor grating and particularly has relation to performing one of the several operations involved in the construction of the grating.

The completed grating is composed of a plurality of longitudinal bars supported in spaced relation and in vertical edgewise positions, and a plurality of transverse bars which are usually spaced apart a greater distance than the space between the longitudinal bars and extend through the longitudinal bars. The top edges of the transverse bars are in the same horizontal plane as the top edges of the longitudinal bars. The transverse bars rest on uncut portions of the longitudinal bars and are provided with slots downwardly extending from the top edges to receive the upper edges of the longitudinal bars. In forming such a grating slugs or slots are first cut out of the longitudinal bars in which slots the transverse bars are finally positioned, but in order to allow the transverse bars to be inserted through the longitudinal bars and arranged in the desired position, it is necessary to cut out a tongue or finger from the longitudinal bars which may be bent at an angle normal thereto to provide a wide opening, thus allowing each transverse bar to be inserted through the several wide openings of the longitudinal bars in a horizontal position. The transverse bar is then turned up to a vertical postion and the bent tongue is turned back into the plane of the longitudinal bar and presses against the vertical side of the transverse bar. In this manner a very strong and rigid grating is formed having no parts which will become loosened through vibration, and giving a long period of life in use.

This specification discloses a machine which has been developed to perform the operation of turning the transverse bars from a horizontal to a vertical position. It is, therefore, the purpose of my invention to provide a machine by which the operation of turning the transverse bars of the partially completed grating from a horizontal to a vertical position, may be efficiently performed.

It is an object of my invention to support the grating and intermittently feed it forward through the machine which is designed to intermittently turn each transverse bar into place while the grating is in a stationary position.

It is further an object of my invention to use a plurality of upwardly moving fingers which will engage the transverse bar as it is supported in a horizontal position and turn it to a vertical position and in which the backs of the fingers are guided by the tongues which have been bent out of the longitudinal bars, thus preventing any longitudinal movement of the grating during the turning operation.

As additional features of my invention I may support the grating on rollers and provide rollers above the grating, at the point where the transverse bars are turned, which contact with the upper surface of the grating and prevent any upward movement thereof. Also, I may use a friction coupling as a part of the means which force the turning fingers into engagement with the grating, thus preventing any breakage should the transverse bars not be in proper position to be readily turned in place.

Additional objects and advantages of my improved construction will be more clearly evident as a preferred embodiment is fully described in connection with the attached drawings in which—

Figure 1 is a vertical sectional elevation of the central portion of my improved machine.

Figure 2 is a plan view showing a portion of the top of the machine.

Figure 3 is a perspective view illustrating the steps involved in manufacturing the grating.

Figure 4 is a detail view of a portion of the feeding means.

Figure 5 is a diagrammatical sketch showing the three positions of the grating as it moves through the machine.

Figure 6 is a vertical sectional elevation on line 6—6 of Figure 5.

First having reference to Figure 3 which fully illustrates the manner of forming my improved grating, the bars 1 forming the

longitudinal members are shown somewhat wider than the cross bars or transverse members 2. The first operation to be performed involves the slotting of the longitudinal members 1 by cutting out a transverse slug at spaced points. In the slots which are formed, the traverse bars 2 are finally held. Longitudinal cuts are then made in the bars 1 extending from the initial slots, thus forming tongues 3 which are bent into positions normal to the longitudinal members, as shown at the lower end of the bars 1 in Figure 3. The transverse bars are formed with downwardly extending slots 4 according to the desired spacing of the longitudinal bars. After the longitudinal bars have been arranged in correctly spaced positions, the transverse bars 2 are inserted through the wide openings provided by the bending of the tongues 3. It will be noted that, due to the short vertical height of the openings, the bars 2 can only be inserted in horizontal flatwise position, as shown at the lower end of Figure 3. After the bars 1 and 2 have been correctly lined up, the grating is ready to have the operation of turning the bars 2 performed thereon, thus it is necessary to turn the bars 2 from a flatwise position to a vertical edgewise position in such a manner that the top uncut edge of the bars 1 will extend through the slots 4 of the transverse bars 2. This position is shown by the middle bar 2 in Figure 3. As a final operation it is necessary to bend the tongues 3 back into the plane of the longitudinal bars 1, as shown at the upper end of Figure 3. The grating is then completed and it will be noted that the end of tongue 3 abuts against the transverse bar 2 and holds it tightly in place. It will also be noted that the bars 2 rest upon uncut portions of the longitudinal bars 1. Therefore, there is no opportunity for the grating to become loose due to loading vibration or other causes.

In forming a support for the grating so that it may be operated upon, I provide standards 5 supporting a table 6 along which the grating is longitudinally moved. Supporting rolls 7 are shown having a plurality of radial circular slots 8. The table, partially shown in Figure 1, extends farther to the right and allows the longitudinal main bars of the grating, after the slots have been cut out and the tongues bent therefrom, to be placed longitudinally of the table in properly spaced relation. The longitudinal bars seat in the respective slots 8 of a plurality of the rolls 7 which maintain bars in spaced relation as they move forward. As shown in the plan view of the table, I provide a sufficient number of slots 8 so that thirty-six main bars may be placed on the table. Of course it is understood that the whole width of the table need not be utilized if it is desired to manufacture a narrower grating. If it is desired to manufacture a grating having a different spacing of the longitudinal bars, a different set of supporting rolls 7 may be substituted having the desired spacing of slots 8. After the bars 1 have been placed in the proper relation on the table, the transverse bars 2 are inserted through the openings provided by the bending out of the tongues 3, as previously described. The grating is then ready to be moved forward and operated upon to have the transverse bars turned into vertical positions. I, therefore, provide two independent sets of feeding means 9 and 10. The construction of each set of feeding means is similar and therefore I will only describe the detail construction of the feeding means at the forward end of the machine.

I show bases 11 bolted to each side of the table 6 and to the tops of which are secured by bolts 12 bearing brackets 13. A transverse shaft 14 is journalled in bearings 13 and is provided with an extension 15 to which is secured a handle 16 for manually turning the shaft 14. It is apparent that power operated means could be used if so desired. Upon the shaft 14 are secured spaced pinions 17 which cooperate with racks 18. The racks 18 are mounted on a sliding table 19. The table 19 is adapted to slide longitudinally of the table 6 in guideways formed in the side bases 11. The table 19 is provided with downwardly extending pivot ears 20 forming supports for a shaft 21 to which are secured a plurality of pivot fingers 22. The fingers 22 have downwardly extending extensions 23 which are adapted to engage behind the bent tongues 3 of the longitudinal bars 1. The manual rotation of the shaft 14 will cause the racks 18 together with the fingers 23 to move longitudinally of the table and thus by the cooperation of the extensions 23 with the bent tongues 3 the grating is moved.

It is my purpose to intermittently move the grating forward a distance equal to the space between the transverse bars 2 and since I may use this machine in manufacturing grating having different spaces between the transverse bars 2, I provide an adjustable stop 24. The stop 24 is designed to cooperate with the movement of the sliding rack table 19 and prevent movement of the grating beyond the desired position. Upon operating the feeding means in the reversed direction it will be apparent that the pivoted arrangement of the fingers 22 will allow the extensions 23 to ride over the transverse bars 2 and tongues 3 whereby the feeding means may be positioned to again engage and feed the grating.

I provide at the center of my machine operating means for turning the transverse bars and therefore show a base 25 to which is secured a bearing bracket 26 for a power shaft 27, to which is secured the pinion 28, which meshes with a larger gear 29, which is secured by a friction coupling, to an internal crank collar 30, pivoted on shaft 31. A connecting

rod 32 is pivoted to the crank collar 30. The other end of the connecting rod 32 is pivoted to a horizontal vertically slidable bar 33. The bar 33 slides in guides 34. To the vertically slidable bar 33 are secured in spaced slots a plurality of upwardly extending fingers 35 having tapered upper ends 36. An upward movement of the fingers 36 will cause the tapered ends to engage the transverse bar 2 and turn it from a horizontal position into the desired vertical position.

I also provide rollers 38 which are supported by the side flanges 37 and extend over the top of the grating. The rollers 38 prevent any upward movement of the grating as the transverse bar 2 is being turned. Any suitable clutch may be used preferably operated by a foot lever so that gear 29 will make one revolution thus causing an operating stroke of the fingers 36. Between successive operating strokes of the turning fingers the grating is moved forward by operation of the feeding means. The provision of the friction coupling between the crank 30 and the gear 29 allows the movement of the fingers 36 to be prevented if the resistance is too great due to any inaccuracies in the spacing of slots 4 of the transverse bars 2 or other reasons which prevent the bars 2 from being readily turned in place, thus any breakage of the parts is prevented.

The different positions of the grating and its cooperation with the fingers 36 are shown in Figures 5 and 6. The initial horizontal position of the bar 2 is shown at the right hand end, while the center position shows bar 2 turned to a vertical position by the tapered fingers 36. It will be apparent from this view that the fingers 36 fill the space between the bar 2 and the bent tongue 3. Thus any longitudinal movement of the grating is prevented during the turning operation. The left hand view of Figures 5 and 6 shows the grating as it is delivered from the machine. The grating is then ready to have a further operation of turning the tongues 3 back into place performed. It is apparent that the double set of feeding means allows the grating to be initially fed by the forward feeding means and when the last transverse bars are being operated upon, the rearward feeding means 10 may be used to progress the grating.

Many modifications and changes might be made in the particular design or arrangement of parts but intend to include all such changes which fall within the spirit of my invention as expressed in the appended claims.

I claim:

1. In a machine for forming grating, means for supporting a plurality of longitudinal bars in horizontally spaced edgewise positions and a plurality of transverse bars supported in openings formed in said longitudinal bars in horizontal flat positions and means for turning each of said transverse bars to a vertical edgewise position.

2. In a machine for forming grating, means for supporting a plurality of longitudinal bars in horizontally spaced edgewise positions and a plurality of transverse bars supported in horizontal flat positions in openings formed in said longitudinal bars, means for progressing the longitudinal bars together with the transverse bars and means for turning each of said transverse bars to a vertical edgewise position, said last named means comprising upwardly moving fingers.

3. In a machine for forming grating composed of a plurality of longitudinal bars and a plurality of transverse bars extending through openings in the longitudinal bars, said transverse bars being initially in horizontal flat positions, means for progressing the grating and means for turning each of said transverse bars relative to said longitudinal bars to a vertical edgewise position.

4. In a machine for forming grating composed of a plurality of longitudinal bars and a plurality of transverse bars extending through openings in the longitudinal bars, said transverse bars being initially in horizontal flat positions, means for intermittently progressing the grating a distance equal to the space between the transverse bars and means for successively turning each transverse bar relative to said longitudinal bars to a vertical position.

5. In a machine for forming grating composed of a plurality of longitudinal bars and a plurality of transverse bars extending through openings in the longitudinal bars, said transverse bars being initially in horizontal flat positions, means for intermittently progressing the grating a distance equal to the space between the transverse bars and means for successively turning each transverse bar to a vertical position, said last named means comprising upwardly moving fingers.

6. In a machine for forming grating composed of a plurality of longitudinal bars and a plurality of transverse bars extending through openings in the longitudinal bars, said transverse bars being initially in horizontal flat positions, means for supporting the grating, means for intermittently progressing the grating a distance equal to the space between the transverse bars, means for turning each of said transverse bars to a vertical edgewise position and means for preventing movement of the grating away from the supporting means as each of said transverse bars are turned into position.

7. In a grating forming machine, means for progressing the grating and means transversely movable relative to the path of said

grating for turning the transverse bars of said grating through a right angle.

8. In a grating forming machine, means for horizontally progressing the grating and means transversely movable relative to the path of said grating for turning each of the transverse bars of said grating through a right angle.

9. In a grating forming machine, means for progressing the grating and means comprising a plurality of tapered fingers transversely movable relative to the path of said grating, said fingers being adapted to turn the transverse bars of said grating through a right angle.

10. In a grating forming machine, means for horizontally progressing the grating, means for preventing upward or downward movement of said grating and means transversely movable relative to the path of said grating for turning the transverse bars of said grating through a right angle.

11. In a grating forming machine, means for supporting the grating comprising a plurality of grooved rollers, means for intermittently progressing the grating, a plurality of tapered fingers adapted to move across the path of said grating and means for moving the fingers, said means including a friction coupling to allow movement of the fingers to be prevented if excessive resistance is encountered.

12. A machine for forming grating composed of a plurality of longitudinal bars and a plurality of transverse bars extending through openings in the longitudinal bars, said transverse bars being initially placed in the openings of the longitudinal bars in horizontal flat positions, means for moving the grating in one direction and means for successively engaging each of said transverse bars to turn said transverse bars through a right angle to vertical edgewise position.

13. A machine for forming grating composed of a plurality of longitudinal bars having spaced slots therein extending lengthwise, a plurality of transverse bars initially extending in flat horizontal positions through said slots, said transverse bars having spaced slots cut therein from one longitudinal edge and means for successively turning each of said transverse bars through a right angle to vertical edgewise positions with the longitudinal bars extending through the slots of the transverse bars.

Signed at Gary, Indiana, this 11th day of May, 1929.

WALTER A. BATES.