

June 23, 1925.

A. W. CRISTIANI

1,543,425

TILE FETTLING MACHINE

Filed Dec. 15, 1922

2 Sheets-Sheet 1

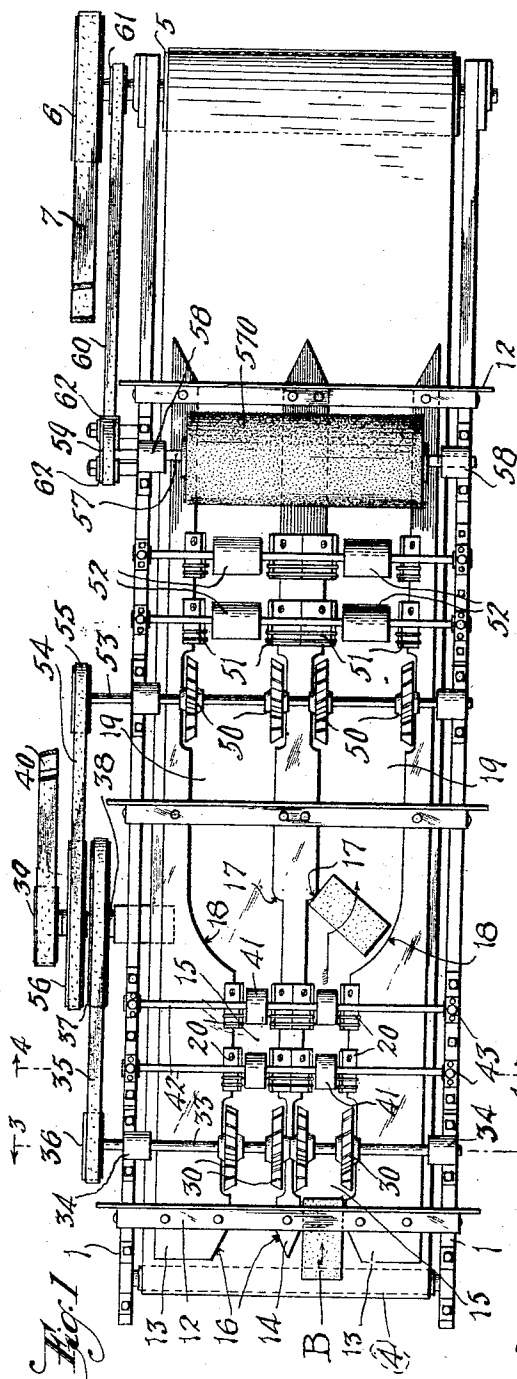


Fig. 1.

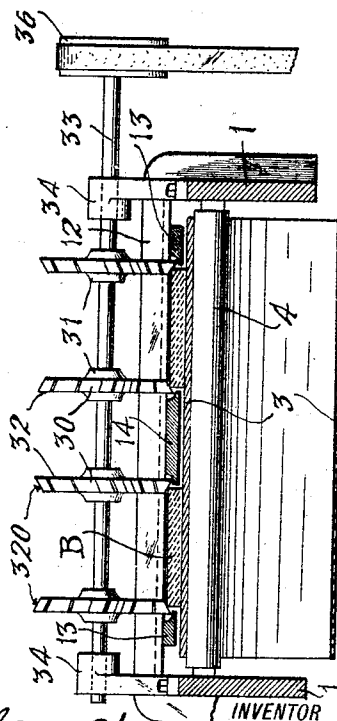
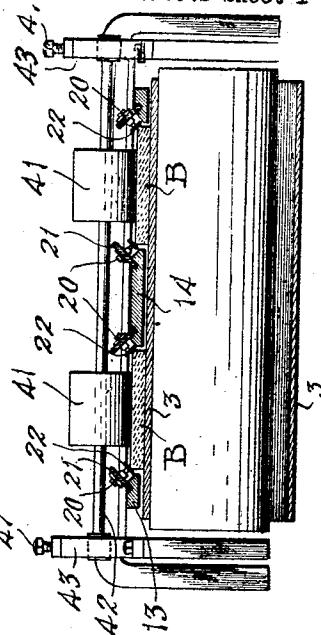


Fig. 3.



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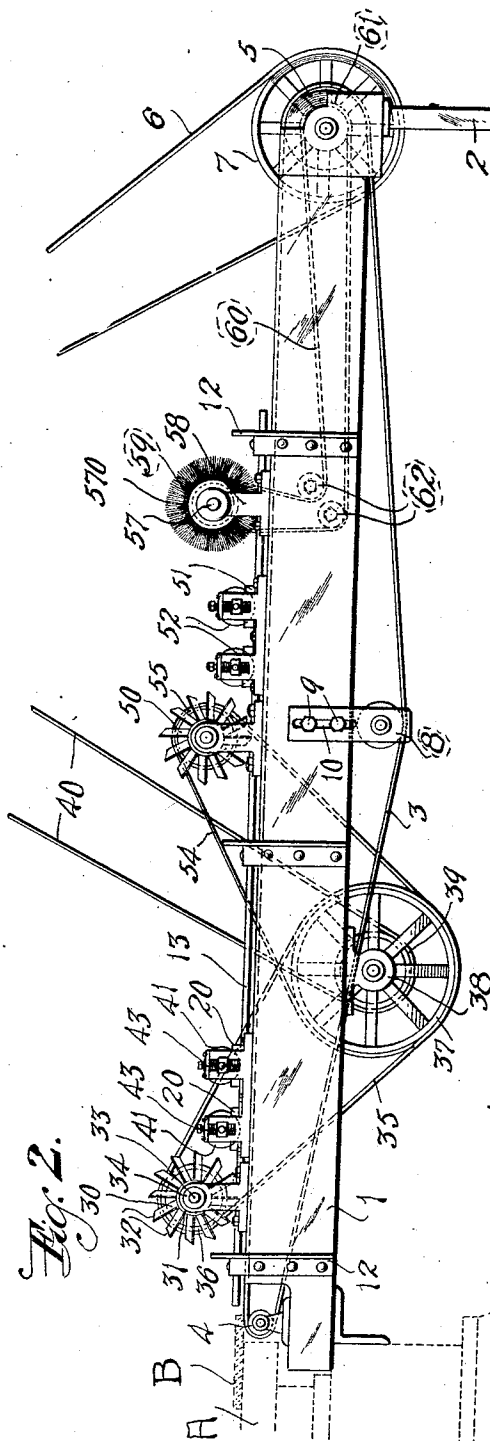


Fig. 6.

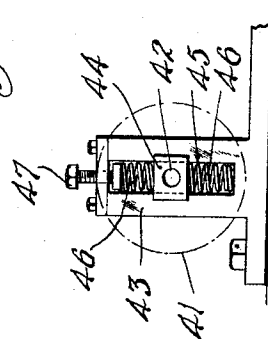


Fig. 7.

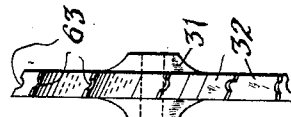
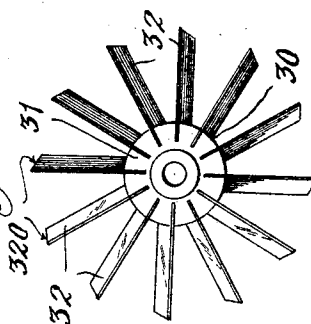


Fig. 5.



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UNITED STATES PATENT OFFICE.

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TILE-FETTLING MACHINE.

Application filed December 15, 1922. Serial No. 607,053.

To all whom it may concern:

Be it known that I, ANTHONY W. CRISTIANI, a citizen of the United States, and a resident of Red Bank, in the county of Monmouth and State of New Jersey, have invented new and useful Improvements in Tile-Fettling Machines, of which the following is a specification.

This invention relates to a machine similar to that described in my co-pending application filed June 15, 1921, Serial No. 477,661 for smoothing the rough edges of a tile which are caused by surplus material adhering to the edges during the pressing operation in a tile press due to the imperfect engagement and wear of the die members which form the tile. The smoothing operation, commonly called "fettling" or edging of tile, has been heretofore done manually by rubbing the edges with sand paper or other suitable abrasive.

This machine includes a frame having an endless conveyor which is adapted to receive tiles and automatically convey them into engagement with abrading devices mounted on said frame which remove excess "dust" from the edges of the tile so as to smooth the same, the tile having only a frictional engagement with the conveyor. In the construction shown in said co-pending application the abrading elements are stationary and the resistance thereof to the passage of the tile beneath them caused by the engagement of the tile with said elements is sometimes such as to overcome the friction of the engagement of the tile with the conveyor so that the conveyor slips beneath the tile and movement of the tile is impeded, and when the upper faces of the tile are warped as is the case in some methods of manufacture, the abrading devices do not effectively and evenly remove surplus dust due to the curved edges of the tile.

One object of this invention is to provide a tile fettling machine including such an endless conveyor for the tile and a plurality of sets of abrading devices for fettling the tiles to which the tiles are successively conveyed, the first set of abrading elements being of a construction to remove the major portion of the excess "dust" on the edge of the tile with a minimum resistance to movement of the tile and the second set of abrading elements serving to remove the remaining portion of the excess "dust" and smooth and finish the edges, whereby the resistance

of each set of abrading elements may be the minimum and ensure against movement of the tile being impeded.

Another object is to provide a novel and improved abrading device which will effectively remove the major portion of the "dust" from the edge of the tile with a minimum resistance to movement of the tile.

Further objects are to provide means for increasing the frictional engagement of the tile with the conveyor as the tile are moved into engagement with the abrading devices to ensure against movement of the tile being impeded as they are operated upon by the abrading devices, to do this by means for exerting pressure on the upper sides of the tile tending to force them into tight frictional engagement with the conveyor; and to utilize the same means for manipulating warped tile so that the curved edges will be evenly fettled throughout their lengths.

Other objects are to provide means for adjusting the said pressure to ensure against injury to the tile, and to obtain other results and advantages as may be brought out by the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several views,

Figure 1 is a top plan view of a tile fettling machine constructed in accordance with my invention, showing the same used in connection with a conventional tile press;

Figure 2 is a side elevation of the machine;

Figure 3 is an enlarged transverse sectional view taken on the line 3—3 of Fig. 1;

Figure 4 is a similar view taken on the line 4—4 of Fig. 1;

Figure 5 is an enlarged detached elevation of one of the revoluble abrading devices;

Figure 6 is a detached enlarged side elevation of one of the mountings for the pressure rollers, and

Figure 7 is an edge elevation of a modified form of revoluble abrading device.

In the embodiment of my invention shown on the drawings, the reference numerals 1 designate the spaced and parallel sides of the frame of the machine which are adapted to be supported in any suitable manner in a substantially horizontal position. In the present instance I have shown one end of the frame supported on the bed of a tile

press A, and the other end of the frame supported by means of posts 2. An endless conveyor is mounted longitudinally of the frame, and in the present instance I have shown the conveyor in the form of a belt 3 which passes around a roller 4 at the press end of the frame and around a drive roller 5 at the other end of the frame, the drive roller 5 being connected by means of a belt 6 and pulley 7 to a suitable source of power. Intermediate the ends of the lower reach of the belt 3 a belt tightener idler roller 8 may be adjustably mounted on the sides 1 of the frame in any suitable manner, as by means of the bolts 9 passing through a slot 10 in the support 11 in which the roller 8 is journaled.

The sides 1 are connected at spaced intervals in their lengths by means of angle iron braces 12 which extend transversely of the frame, as shown in Figures 1 and 2, the said members 12 being spaced from the top of the frame, as shown in Figures 1 and 3. Supported on the said braces 12 are a plurality of guides 13 and 14 spaced transversely of the belt and extending longitudinally thereof. The guides 13 are arranged at opposite edges of the belt 3 and the guide 14 is positioned substantially centrally of the belt between the guides 13. The guides 13 and 14 are slightly spaced above the belt 3, and at the end of the machine connected to the press A the guides are spaced so as to form guideways 15 between their adjacent edges to receive tiles B endwise from the press, as shown in Figure 2. The extremities of the guides are preferably beveled as at 16 to provide a flared mouth for the guideways 15 to direct the tiles into the same. Inwardly of the guideways 15 the guide 14 is provided at opposite sides thereof with shoulders 17, and the adjacent sides of the guides 13 are provided with arcuate portions 18 whose centers are the respective shoulders 17 and which are of a radius slightly greater than the length of the tiles. Inwardly of said shoulders and arcuate portions 13 the edges of the guides 13 and 14 are so spaced as to form guideways 19 between them to receive the tiles sidewise.

Arranged at the adjacent edges of the guides 13 and 14 on opposite sides of the guideways 15 are a plurality of sets of abrading or tile fettling devices 30 and 20 which are adapted to successively engage the tile as they are received from the tile press. The abrading devices 30 are of a construction to remove the major portion of the excess material or "dust" on the edges of the tile with a minimum impedance to the movement of the tile, while the abrading devices 20 are designed to remove the remainder of the dust and smooth and finish the said edges. The devices 30 comprise hubs 31 formed with radially projecting flexible strips 32 of any

suitable material, preferably thin fiber, the said strips being arranged diagonally of the hubs, as clearly shown in Figures 1, 3 and 5, and having their outer ends beveled at 320 so as to engage the edges of the tiles at an angle of substantially 45°. One of said devices is arranged at each side of the guideways 15, as clearly shown in Figures 1 and 3, and are fixedly mounted on a shaft 33 journaled in bearings 34 on opposite sides of the frame of the machine. The shaft 33 is revolved in a direction opposite to that of the movement of the conveyor 3 by means of a belt 35 and pulleys 36 and 37 mounted respectively on the shaft 33 and a counter shaft 38, which is also provided with a pulley 39 driven by a belt 40 from any suitable source of power.

The abrading devices 20 comprise body portions 21 which are secured to the respective guides 13 and 14 in any suitable manner at substantially an angle of 45°, the body portions 21 on opposite sides of the guideways converging inwardly toward each other. Abrasive elements 22 are detachably secured to the undersides of the body portion 21, the said abrasive elements being preferably of laminated construction including strips of hard fiber and sand paper with the sand paper positioned outermost, as described in my above-mentioned co-pending application. Any other suitable tile fettling devices may be used, however, in place of the devices 20. As shown on the drawings there are two sets of devices 20 arranged in spaced relation longitudinally of the guideways 15 and at the rear of the devices 30 so that the tile are engaged by the devices 20 after having been operated upon by the devices 30.

The upper reach of the belt 3 travels in the direction indicated by the arrows on Figure 1 in order to carry the tile B away from the press A. As the tile are carried through the guideways 15 the longitudinal upper edges thereof are brought into engagement with the abrasive devices 30, as clearly shown in Figure 3. These abrasive devices are constantly revolving at a rapid rate, and the beveled ends 320 of the strips 32 scrape with a shearing action the major portion of the excess dust from the edges of the tile. The tile are then carried by the conveyor beneath the abrasive elements of the devices 20, the engagement of said abrasive elements with the tile being extremely light and just sufficient to smooth and finish the edges of the tile. It will be noted that the rapid revolution of the devices 30 enables the said devices to remove a large quantity of the excess dust without impeding the movement of the tile, while the pressure of the abrasive elements 22 on the tile is so light as to in no way affect the movement of the tile.

It may be desirable in some instances to provide means for increasing the frictional engagement of the tile with the conveyor 3 as the tile are passed beneath the abrading devices so as to prevent the resistance caused by the engagement of the abrading devices with the tile from stopping the movement of the tile. For this purpose I may utilize a plurality of soft idle rollers 41 mounted on shafts 42 journaled in bearings 43 at opposite sides of the frame of the machine, these rollers being so positioned above the belt 3 as to engage the tops of the tile as they pass beneath the abrading devices, as clearly shown in Figure 4. The tendency of these rollers is to force the tile into tight frictional engagement with the belt so as to overcome the resistance to the movement of the tile produced by the abrading devices. Some tile manufacturers press their tile with longitudinally concave faces to compensate for warping when the tiles are baked, and these soft rollers 41 have been found to enable such tiles to be as easily fettled as straight edged tiles since the pressure of the rollers serves to force the ends of the tiles downward or tilts the tiles so that the abrading members engage the curved edges of the tiles with even pressure throughout the length of said edges and the edges are evenly fettled from end to end.

It is desirable to enable the pressure exerted by these rollers to be adjusted to ensure against injury to the tile, such as crushing. For this purpose the shafts 42 may be journaled in bearing blocks 44 slidable in guideways 45 in the bearings 43, the blocks 44 being balanced by springs 46. An adjusting screw 47 is provided in each of the bearings 43 for moving the shafts 42 toward the conveyor 3 or permitting the shafts to be moved away from the conveyor by the springs 46. With this construction it will be noted that the rollers 41 exert a yielding pressure through the springs 46 on the tops of the tiles, and that this pressure may be adjusted by means of the screws 47.

After the tile B pass through the guideways 15 they are carried by the belt 3 into engagement with the shoulders 17 on the guide 14. Longitudinal movement of the tiles with the belt is thus interrupted, and the movement of the belt in connection with the engagement of the shoulders 17 with one corner of a tile causes the tile to be swung in its own plane about the shoulder as a pivot, as shown in Figure 1, so that the tile is positioned crosswise of the belt. In this position the tile are conveyed by the belt into the guideways 19, and a plurality of sets of abrasive devices 50 and 51 identical in constructions with the devices 30 and 20 are arranged on opposite sides of the

guideways 19 to smooth the rough end edges of the tile. The revoluble abrading devices 50 are mounted on a shaft 53 and are driven through a belt 54 and pulleys 55 and 56 from the shaft 38, in exactly the same manner as the abrading devices 30 are driven. Idle rollers 52 identical in construction with the rollers 41, are also provided for increasing the frictional engagement of the tile with the conveyor as the tile pass beneath the abrading devices 51.

During the engagement of the edges of the tile with the respective abrasive devices 30, 20, 50 and 51 a portion of the material removed from the edges is deposited on the top of the tiles, and it is necessary that this material be removed before the tile are glazed and baked. For the purpose of removing this dust I mount a revolving brush 570 over the guideways 19 to engage the top of the tile after they have passed between the abrasive members 51. This brush is mounted on a shaft 57 journaled in bearings 58 at opposite sides of the frame of the machine, said shaft being provided with a pulley 59 over which passes a belt 60 driven from a pulley 61 driven from the same source of power as is the conveyor 3. Idler pulleys 62 are provided for guiding the belt 60 downwardly from the pulley 59 along the side of the frame of the machine in an out-of-the-way position. The bristles of the brush are preferably of camel's hair, and the brush revolves in a direction opposite to that of the movement of the conveyor belt 3 so that the bristles effectively remove excess material from the top of the tile which travel beneath the same. It will be understood that the frictional engagement of the tile with the conveyor belt is all that ensures proper movement of the tile through the guideways 15 and 19, and it is therefore necessary to have a lightly engaging brush, such as that above described for removing the material from the tops of the tile without impeding the movement of the tile with the conveyor 3. After the tile pass out of the guideways 19 they are conveyed by the belt 3 to a suitable point where they are removed and carried through the next operation in the manufacture of tile.

In Figure 7 I have shown a slightly modified form of abrading device which is substantially identical with the devices shown in Figures 1 and 5, with the exception that the ends of the strips 32 are provided with curved notches 63 for engaging the edges of the tile so that said edges when finished are rounded instead of angularly beveled. It will be understood that the abrading devices 20 at each side of the guideways may be arranged at different angles to the tile so as to form the edges of the tile with two angularly disposed bevels instead of one bevel at substantially 45°. With more than two of

the abrading devices 20 arranged at different angles the edges of the tile may be substantially rounded.

While I have shown and described one possible embodiment of my invention, it will be understood that this is mainly for the purpose of illustrating the principles of the invention, and that many modifications and changes can be made in the detail construction of the invention without departing from the spirit or scope thereof. For instance, while I have shown a belt conveyor other types of conveyor might be utilized. Also, while I have shown two sets of guideways 15 and 19, the machine may be provided with any number of guideways desired. Therefore, I do not desire to be understood as limiting myself in the construction and use of my invention except as required by the following claims when construed in the light of the prior art.

Having thus described the invention, what I claim is:

1. A machine for fettling tile before they are fired, comprising a support to receive tile and a plurality of tile fettling devices relatively positioned to cause successive fettling engagements of said fettling devices with the edge of said tile upon relative movement of said support and said fettling devices, the said fettling device first engaged by said tile removing the major portion of the surplus material from the edge of the tile and the others of said fettling devices smoothing and finishing said edge, and means for producing said relative movement of said support and said fettling devices.

2. A machine for fettling tile before they are fired, comprising a frame, a support to receive tile, a revolvable tile fettling device mounted on said frame, a second tile fettling device fixedly mounted on said frame, said fettling devices and said support being relatively positioned to cause successive fettling engagement of an edge of the tile with said revolvable fettling device and said second-mentioned fettling device upon relative movement of said support and said fettling devices, said first-mentioned fettling device removing the major portion of the surplus material from said edge of the tile and said second-mentioned fettling device engaging said tile with a rubbing contact to smooth and finish said edge, and means for producing said relative movement of said support and said fettling devices.

3. A machine for fettling tile before they are fired, comprising a support to receive tile and a revolvable tile fettling device relatively positioned to cause fettling engagement of said fettling device with the edge of a tile upon relative movement of said support and said fettling device, said fettling device being revolvable in a plane substantially parallel with said edge of the

tile, means for revolving said fettling device in a direction opposite to that of said relative movement of said support and said fettling device, and means for producing said relative movement of said support and said fettling device.

4. A machine for fettling tile before they are fired, comprising a support to receive tile and a revolvable tile fettling device relatively positioned to cause fettling engagement of said fettling device with the edge of a tile upon relative movement of said support and said fettling device, said fettling device including a hub portion, and a plurality of flat flexible strips fixed in said hub and projecting radially therefrom, said strips being arranged edgewise longitudinally of said hub and transversely of said edge of the tile, means for revolving said fettling device in a direction opposite to that of said relative movement of said support and said fettling device, and means for producing said relative movement of said support and said fettling device.

5. A machine for fettling tile before they are fired, comprising a support to receive tile and a revolvable tile fettling device relatively positioned to cause fettling engagement of said fettling device with the edge of a tile upon relative movement of said support and said fettling device, said fettling device including a hub portion and a plurality of flat flexible strips fixed in said hub and projecting radially therefrom, said strips being disposed diagonally of said hub, means for revolving said fettling device in a direction opposite to that of said relative movement of said support and said fettling device, and means for producing said relative movement of said support and said fettling device.

6. A machine for fettling tile before they are fired, comprising a support to receive tile and a revolvable tile fettling device relatively positioned to cause fettling engagement of said fettling device with the edge of a tile upon relative movement of said support and said fettling device, said fettling device including a hub portion and a plurality of flexible strips fixed in said hub and projecting radially therefrom, said strips having their free ends beveled to bevel the corner edge of the tile, means for revolving said fettling device in a direction opposite to that of said relative movement of said support and said fettling device, and means for producing said relative movement of said support and said fettling device.

7. A machine for fettling tile before they are fired, comprising a support to receive tile and a revolvable tile fettling device relatively positioned to cause fettling engagement of said fettling device with the edge of a tile upon relative movement of said support and said fettling device, said fet-

ting device including a hub portion and a plurality of flexible strips fixed in said hub and projecting radially therefrom, said strips being disposed diagonally of said hub and having their free ends beveled to operate upon the corner edge of the tile with a shearing action, means for revolving said fettling device in a direction opposite to that of said relative movement of said support and said fettling device, and means for producing said relative movement of said support and said fettling device.

8. A tile fettling machine including a frame, a movable tile support mounted on said frame to receive a tile, a guideway above said support to cause said tile to move in a predetermined path, a tile fettling device mounted on said frame at one side of said guideway to have a fettling engagement with the corner edge of a tile as the same is moved by said tile support and revoluble in a plane substantially parallel with said edge, and means for revolving said fettling device in a direction opposite to that of the movement of said support.

9. A tile fettling machine including a frame, a movable tile support mounted on said frame to receive a tile, a guideway above said support to cause said tile to move in a predetermined path, a tile fettling device mounted on said frame at one side of said guideway and including a hub having a plurality of radially projecting flexible strips thereon to engage the corner edge of a tile as the same is moved by said support

and revoluble in a plane substantially parallel with said edge, said strips being disposed transversely of said edge, and means for revolving said fettling device in a direction opposite to that of the movement of said support.

10. A tile fettling machine including an endless belt conveyor to receive tile and convey the same by frictional engagement, means for driving said conveyor, a tile fettling device to engage an edge of said tile as the tile is moved by said conveyor, and a soft idler roller to engage the top of said tile as the same is engaged by said tile fettling device to press said tile against said conveyor belt to tilt a tile having a warped surface so that said tile fettling device fettles the tile edge evenly throughout the length thereof.

11. A tile fettling machine including an endless belt conveyor to receive tile and convey the same by frictional engagement, means for driving said conveyor, a tile fettling device to engage an edge of said tile as the tile is moved by said conveyor, a soft idler roller to engage the top of said tile as the same is engaged by said tile fettling device to press said tile against said conveyor belt to tilt a tile having a warped surface so that said tile fettling device fettles the tile edge evenly throughout the length thereof, and means for adjustably mounting said roller to vary the pressure thereof on said tile.

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