

June 23, 1925.

1,542,812

A. J. ALLISON

ROLL FOR BEATING ENGINES

Filed June 16, 1924

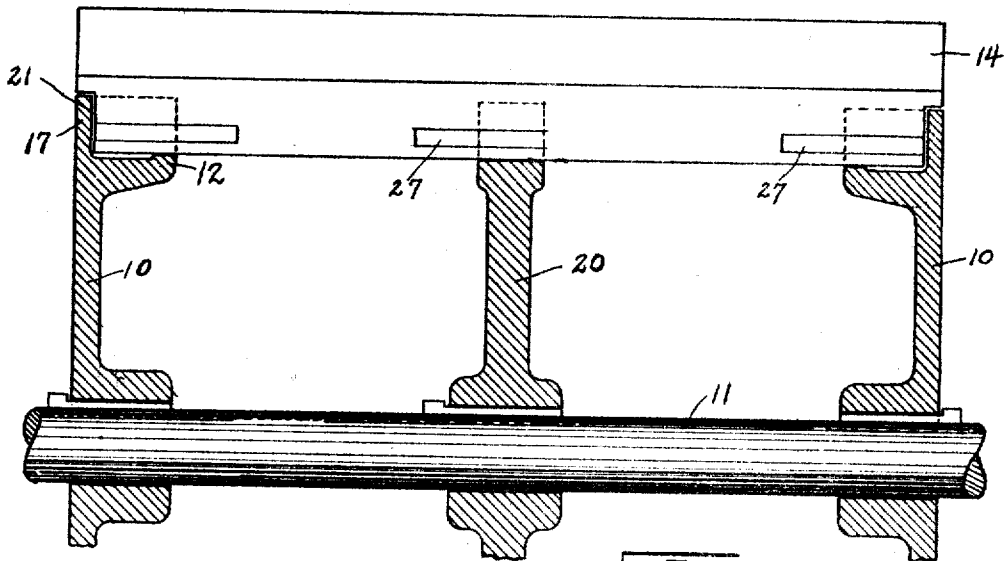


FIG. 1.

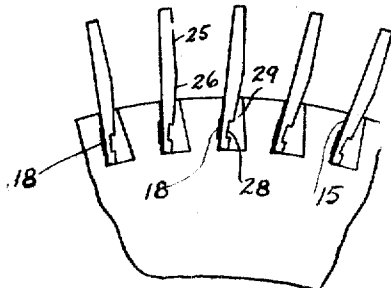


FIG. 2.

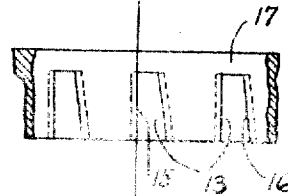


FIG. 3.

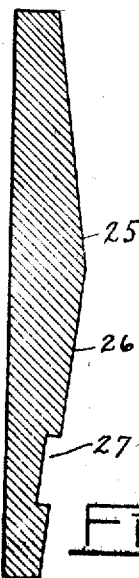


FIG. 4.

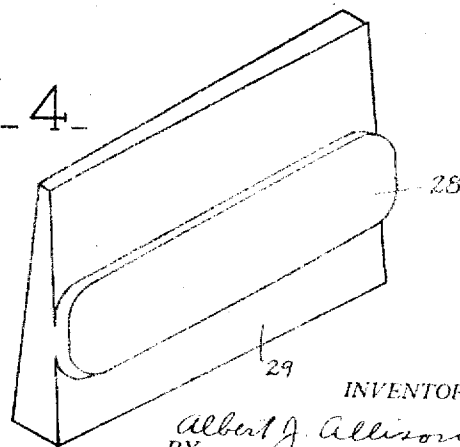


FIG. 5.

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1,542,812

UNITED STATES PATENT OFFICE.

ALBERT J. ALLISON, OF DAYTON, OHIO, ASSIGNOR TO THE A. A. SIMONDS-DAYTON COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

ROLL FOR BEATING ENGINES.

Application filed June 16, 1924. Serial No. 720,274.

To all whom it may concern:

Be it known that I, ALBERT J. ALLISON, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented new and useful Improvements in Rolls for Beating Engines, of which the following is a specification.

This invention relates to rolls for beating engines used in refining paper pulp, and it pertains to securing the knives or bars to the rolls in such manner that not only are the bars not liable to work loose, but should it be necessary to remove a bar it may be done without disturbing the other bars in the roll. The merits of the invention will be more readily appreciated after it has been described, so I shall proceed with a detailed description of one embodiment, illustrating the description with the accompanying drawing, in which,

Figure 1 is a longitudinal section of a portion of a beater roll;

Figure 2 shows a portion of one head of a roll, seen from the inside of the roll;

Figure 3 shows a fragment of the periphery of the head, looking toward the axis of the roll;

Figure 4 is a view of the wedge used for securing a bar in a slot on the periphery of the head, and

Figure 5 is sectional view of a fly bar.

The roll comprises two heads 10 secured to a shaft 11. Each head has a heavy annular rim 12 in which a series of radial slots 13 is formed (see Fig. 3), adapted to receive the corners of fly bars 14. One wall of each slot, the wall 15, is parallel to the axis of the roll. This is shown in Figure 3, where the line 12^a represents the axis of the roll. But as is seen in Figure 2, this wall is not radial. It lies in a plane tangent to a circle having the axis of the head as a center. Being parallel to the axis of the roll this wall 15 is perpendicular to the face of the head. The opposite wall of each slot, 16, leans with reference to the axis of the head, as does the wall 15, and it also leans with reference to the face of the head, so that the slots are broader at one side of the head than at the other, while the walls diverge inwardly, so that the slots are broadest at the bottom. Between the heads I place one or more spiders 20, which spiders have slots similar to the slots 13 in the heads, except that the slots extend clear across the

periphery of the spider, while the slots of the heads are closed at the outer faces of the heads by webs 17, which give the heads a smooth exterior. In order to allow the fly bars to extend to a point flush with the outer faces of the heads the bars are notched as at 21, to provide for the webs 17.

Referring to Figure 5, it will be seen that in cross section one side of the fly bar is flat. For convenience I shall call this the back of the bar. At a point near its center the bar is thickest, and from this central point the thickness of the bar gradually diminishes. Thus the bar has two faces, 25 and 26, each of which is at an angle to the back. As the thickest part of the bar is not quite at the center, one edge of the bar is slightly thicker than the other edge; in practice this difference is about one sixteenth of an inch. The reason for making the bar with edges of unequal thickness is that some users of beater bars, or in certain classes of work, a thin edge is desired to cooperate with the stationary blades of the beating engine, in which case the thick edge of the bar is set in the slots in the heads. For other purposes a thicker working edge is desired; if so the thin edge of the bar is set in the slots, leaving the thick edge for work.

Having decided which edge of the bar is to lie in the slots in the heads and spiders, a channel 27 is milled in each bar to receive the splines 28 on the wedges 29. It is not necessary to mill the channel the full length of the bar; it suffices to mill the portions of the bar which are to be confined in slots, plus a length about equal to the length of the wedges. The wedges taper endwise as well as radially. In other words, they are of a form to fill the space in the slots unoccupied by the bar. After a bar is set in place a wedge is driven into each slot, thus securing the bars firmly. It is customary to fill a portion of the space between the bars of a beater roll with strips of wood. This being common practice and well understood in the art it is not necessary to illustrate these or explain them farther.

One function of the channel 27 in the fly bar is to receive the spline 28 on the wedge, thereby tying the bar and wedge together, while leaving the wedge free to be driven tightly into the slot in the head. Another function of the channel is to facilitate the securing of the bar with the wedge. In prac-

tice the slots 13 in the heads are formed with cores when the heads are cast, and the wedges are malleable iron castings. Made in this way the parts may not always fit perfectly. Therefore, when a wedge is driven home it may become tight near the bottom of the slot, while it is still loose at the upper part of the slot. Or it may tighten first at the upper part or even in the middle of the slot. The channel in the bar divides the area on which the wedge bears into two parts, separated by the median area occupied by the channel, and in order to preserve this separation the depth of the channel is made greater than the height of the spline, so the spline will not bottom in the channel. Being made of malleable iron the wedges are capable of compressing as they are driven home, enabling them to conform to the conditions which obtain. If one portion of the wedge tightens before other portions, compression of the tight portion permits the wedge to be driven farther in, without undue strain on the parts, until all portions of the wedge, except that opposite the channel, have become tight. Thus a result is obtained analogous to that which would be produced were two independent wedges used, one in the lower part and the other in the upper part of the slot. If desired, the wall 15 of each slot may be depressed slightly in the middle, so that the back of the bar will lie against the wall of the slot only at the top and bottom. This is shown at 18, in Figure 2, but it is not essential in the carrying out of my invention, because unless the wall of the slot is very unlevel the bar will flex enough as the wedge is driven in to insure the required bearing of the bar against the top and bottom of the slot.

The advantage of having the wedge tight at both the upper and lower part of the slot, notwithstanding it is not tight in the median area, will easily be understood. For then the leverage of reaction to a lateral strain on the bar is always the whole depth of the slot. Should the wedge be tight only at the top of the slot, the reaction to a lateral strain on the bar in one direction would be comparatively slight, as the inner edge of the bar could vibrate in the slot, with the tight part of the wedge as a sort of neutral axis. If the wedge were tight at the bottom only a similar tho opposite condition would obtain. In each case the bar would be able to resist strain in one direction, but unable to resist strain in the opposite direction. With the wedge tight in the middle only, the leverage of reaction would never be more than half the depth of the slot. Maximum security for the bar against lateral strain, which is the principal strain imposed upon the bar, would be obtained if two separate wedges were driven in, one at the bottom and the other at the top of the slot. This

is not only impracticable, and would involve additional channels for tying the wedges to the bar, but by my expedient of relieving the median portion of the wedge I secure practically the same result with much less trouble and expense, and less liability of the wedges becoming loose. The malleable wedges may be driven until a substantially uniform pressure is obtained in the two active areas of the wedge.

Fly bars of the cross section of that shown in Figure 5, but without the channel 27, are well known. Bars of this form are so much used that they are rolled in long lengths by various steel mills and all that is necessary to prepare them for use in beater rolls is to cut the bars into pieces of the required length and then make whatever other preparation is needed to fit them for the roll they are to go into. In the present case this consists in milling the channels 27. But the channels might be rolled in the bars at the steel mill, and then nothing would remain but to cut the bars to the required length. The advantage of milling the channels is that either the thin or the thick edge may be retained for the working edge. While I prefer fly bars of the section shown, my invention is not limited in its application to bars of this form, as the principles I have described are applicable to bars of other forms. Nor is my invention limited to the described embodiment in other particulars. Having described the purpose and preferred embodiment of the invention, I claim:

1. In a beater roll, in combination: a head having slots on its periphery for the reception of fly bars, the walls of said slots diverging inward, making the slots broadest at the bottom, one wall of each slot being perpendicular to the face of the head while the other wall leans with reference to said face, making the slot broader at one side of the head than at the other; a fly bar, one side of which is adapted to lie against said perpendicular wall and having a longitudinal channel in the other side, and a wedge adapted to drive into the space between the bar and said leaning wall, having a spline on one side which lies in said channel in the bar, tying the wedge and bar together, the width of the wedge being equal to the depth of the slot.

2. In a beater roll, in combination: a head having slots on its periphery for the reception of fly bars, the walls of said slots diverging inward, making the slots broadest at the bottom, one wall of each slot being perpendicular to the face of the head while the other wall leans with reference to said face, making the slot broader at one side of the head than at the other; a fly bar, one side of which is adapted to lie against said perpendicular wall and having a longitudinal channel in the other side, and a wedge

adapted to drive into the space between the bar and said leaning wall, having a spline on one side which lies in said channel but does not reach to the bottom thereof, the spline being in a median position on the side of the wedge, leaving areas above and below the spline adapted to clamp the bar as the wedge is driven home.

3. In a beater roll, in combination: a head having slots on its periphery for the reception of fly bars, the walls of said slots diverging inward, making the slots broadest at the bottom, one wall of each slot being perpendicular to the face of the head while the other wall leans with reference to said face, making the slot broader at one side of the head than at the other; a fly bar, one side of which is adapted to lie against said perpendicular wall, a wedge to drive between the other side of the bar and the apposed wall of the slot, said wedge being as wide as the slot is deep, and means for relieving the pressure between the wedge and bar over a median area, thereby dividing the pressure into two areas, one area extending inward from the top and the other extending outward from the bottom of the slot.

4. In a beater roll, in combination: a head having slots on its periphery for the reception of fly bars, the walls of said slots diverging inward, making the slots broadest at the bottom, one wall of each slot being perpendicular to the face of the head while the other wall leans with reference to said face, making the slot broader, at one side of the head when at the other; a fly bar, one side of which is adapted to lie against said perpendicular wall, a wedge to drive between the other side of the bar and the apposed wall of the slot, said wedge being as wide as the slot is deep, and means for relieving the pressure between the wedge and bar over a median area, thereby dividing the

pressure into two areas, one area extending inward from the top and the other extending outward from the bottom of the slot, the wedge being malleable, thereby enabling the wedge to compress in an area which becomes tight too soon, so other areas may be made tight by further driving.

5. In a beater roll, in combination: a head having slots on its periphery for the reception of fly bars, the walls of said slots diverging inward, making the slots broadest at the bottom, one wall of each slot being perpendicular to the face of the head while the other wall leans with reference to said face, making the slot broader at one side of the head than at the other; a fly bar, one side of which is adapted to lie against this perpendicular wall and having a longitudinal channel in the other side, said perpendicular wall having a median area which is slightly depressed with reference to the remainder of the wall surface, thereby causing the bar to lie against two separate areas, one extending outward from the bottom of the slot and the other extending inward from the top of the slot, and a wedge adapted to drive into the space between the bar and the apposed wall, having a spline which fits in said channel but does not reach to the bottom thereof, said wedge being as wide as the slot is deep.

6. In a beater roll, in combination: a head having slots on its periphery adapted to receive fly bar, one side wall of each slot having a bearing area for the bar at the bottom and another bearing area at the top of the slot, the median area of the wall being depressed; a wedge adapted to drive between the bar and the other wall of the slot, said wedge being as wide as the slot is deep, and means for limiting the effective pressure of the wedge to said bearing areas.

ALBERT J. ALLISON.

adapted to drive into the space between the bar and said leaning wall, having a spline on one side which lies in said channel but does not reach to the bottom thereof, the spline being in a median position on the side of the wedge, leaving areas above and below the spline adapted to clamp the bar as the wedge is driven home.

3. In a beater roll, in combination: a head having slots on its periphery for the reception of fly bars, the walls of said slots diverging inward, making the slots broadest at the bottom, one wall of each slot being perpendicular to the face of the head while the other wall leans with reference to said face, making the slot broader at one side of the head than at the other; a fly bar, one side of which is adapted to lie against said perpendicular wall, a wedge to drive between the other side of the bar and the apposed wall of the slot, said wedge being as wide as the slot is deep, and means for relieving the pressure between the wedge and bar over a median area, thereby dividing the pressure into two areas, one area extending inward from the top and the other extending outward from the bottom of the slot.

4. In a beater roll, in combination: a head having slots on its periphery for the reception of fly bars, the walls of said slots diverging inward, making the slots broadest at the bottom, one wall of each slot being perpendicular to the face of the head while the other wall leans with reference to said face, making the slot broader, at one side of the head than at the other; a fly bar, one side of which is adapted to lie against said perpendicular wall, a wedge to drive between the other side of the bar and the apposed wall of the slot, said wedge being as wide as the slot is deep, and means for relieving the pressure between the wedge and bar over a median area, thereby dividing the

pressure into two areas, one area extending inward from the top and the other extending outward from the bottom of the slot, the wedge being malleable, thereby enabling the wedge to compress in an area which becomes tight too soon, so other areas may be made tight by further driving.

5. In a beater roll, in combination: a head having slots on its periphery for the reception of fly bars, the walls of said slots diverging inward, making the slots broadest at the bottom, one wall of each slot being perpendicular to the face of the head while the other wall leans with reference to said face, making the slot broader at one side of the head than at the other; a fly bar, one side of which is adapted to lie against this perpendicular wall and having a longitudinal channel in the other side, said perpendicular wall having a median area which is slightly depressed with reference to the remainder of the wall surface, thereby causing the bar to lie against two separate areas, one extending outward from the bottom of the slot and the other extending inward from the top of the slot, and a wedge adapted to drive into the space between the bar and the apposed wall, having a spline which fits in said channel but does not reach to the bottom thereof, said wedge being as wide as the slot is deep.

6. In a beater roll, in combination: a head having slots on its periphery adapted to receive fly bar, one side wall of each slot having a bearing area for the bar at the bottom and another bearing area at the top of the slot, the median area of the wall being depressed; a wedge adapted to drive between the bar and the other wall of the slot, said wedge being as wide as the slot is deep, and means for limiting the effective pressure of the wedge to said bearing areas.

ALBERT J. ALLISON.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,542,812, granted June 23, 1925, upon the application of Albert J. Allison, of Dayton, Ohio, for an improvement in "Rolls for Beating Engines," errors appear in the printed specification requiring correction as follows: Page 3, line 35, claim 4, after the word "broader" strike out the comma, and line 36, for the word "when" read *than*; same page, line 77, claim 6, for the word "bar" read *bars*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of July, A. D. 1925.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.

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Acting Commissioner of Patents