Oct. 17, 1939. O. C. ANDERSON 2,176,238

KILN RING CUTTING MACHINE

Filed June 4, 1937

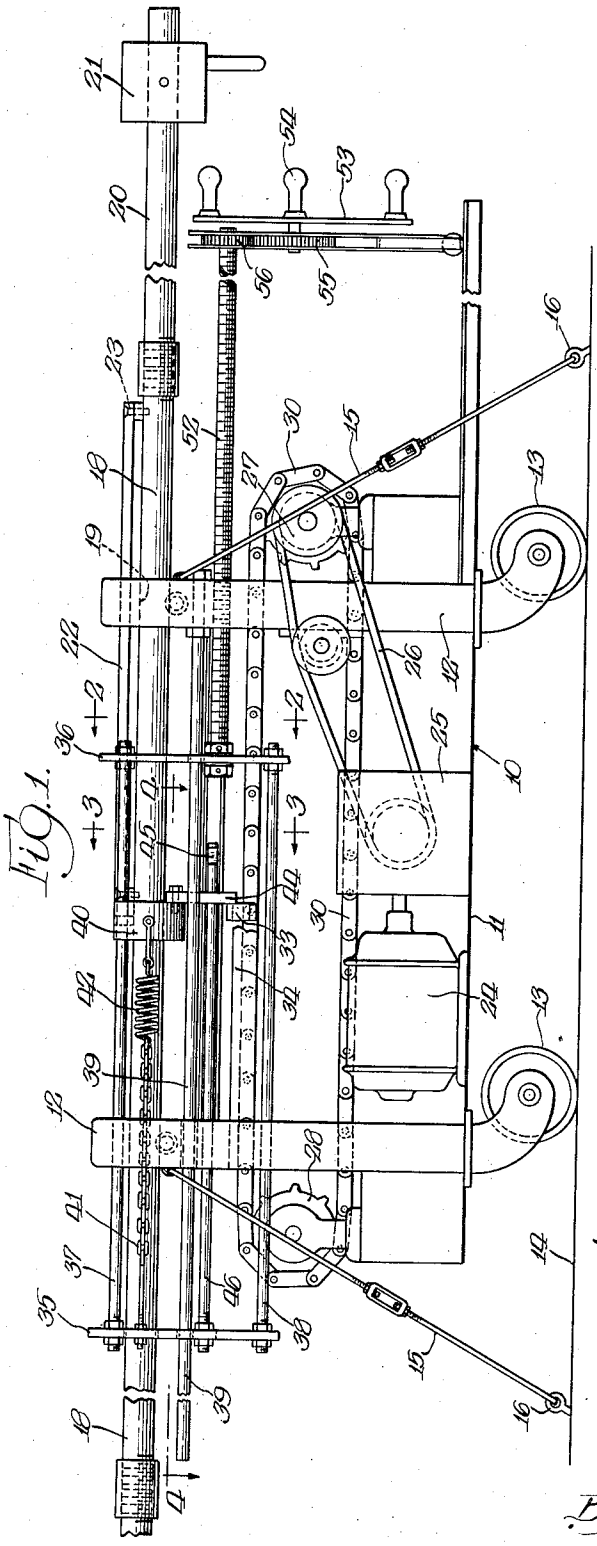


Fig. 1.

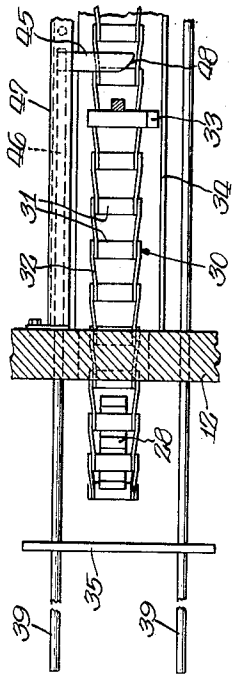


Fig. 4.

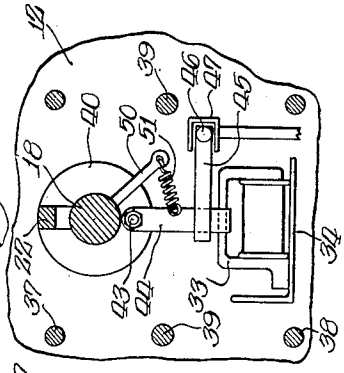


Fig. 3.

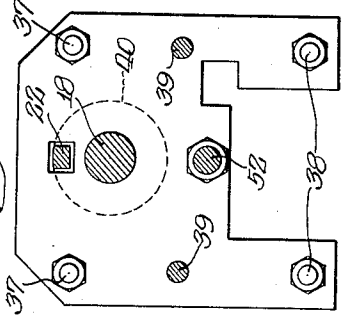


Fig. 2.

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KILN RING CUTTING MACHINE

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1 Claim. (Cl. 15—104.07)

The invention relates to improved apparatus for cutting or loosening the ring of material that builds up within cement kilns and has for its primary object to provide apparatus which will perform efficiently and which will accomplish the cutting of the kiln rings with a minimum of time and effort.

In the progress of raw material through the kiln it changes from the granular or pulverulent condition to the molten condition which it possesses when it leaves the kiln. In the kiln the material passes through an intermediate state in which it is semi-molten and possesses viscous, gummy or sticky characteristics. In this state it readily adheres to the lining of the kiln and grows by accretion as the kiln rotates until it forms a dam or ring in the kiln which interferes with the operation of the kiln by cutting down the amount of combustion gases passing through. Therefore it is necessary that the ring be removed periodically. The apparatus of the present invention accomplishes this removal efficiently and with a minimum of time and effort.

With these and other objects in view the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawing and claim appended hereto.

In the drawing which illustrates an embodiment of the invention and wherein like reference characters are used to designate like parts—

Figure 1 is a side elevational view showing the improved apparatus of the present invention;

Figure 2 is a vertical sectional view taken substantially along line 2—2 of Figure 1 and showing the rear of the feeder carriage;

Figure 3 is a vertical sectional view taken substantially along line 3—3 of Figure 1; and

Figure 4 is a fragmentary plan view taken substantially along line 4—4 of Figure 1.

Referring to the drawing, particularly Figure 1, the ring cutting machine of the invention is embodied in a portable carriage 10 consisting of a base 11 and uprights 12 which journal rollers 13 at their lower ends. The portable carriage is suitably anchored to the foundation 14 in the position desired by the rods 15 secured at their upper ends to the uprights 12 and at their lower end to the foundation by means of eye bolts 16.

The tool for actually cutting the rings of built-up material from the kiln consists of the plunger 18 having a suitably shaped forward end to adapt the plunger for the purposes described and which is mounted for axial reciprocation within openings 19 formed in the uprights 12 respectively. When the forward end of the plunger 18 is lengthened materially it is found desirable to counterbalance the rear end of the plunger by the addition thereto of the portion 20 which at its extreme rear end carries a counterbalancing weight 21. For reasons to be presently described it is necessary to prevent the plunger 18 from rotating and for this purpose a member 22 is suitably fixed at its ends as at 23 to the plunger. Said member has engagement with the rear upright 12 so that said member forms a key with respect to said upright, preventing rotation of the plunger although permitting axial reciprocation of said plunger.

The mechanism for causing reciprocation of the plunger, whereby forward movement of the same will constitute a cutting stroke is driven by an electric motor 24 suitably supported upon the base 11 of the carriage. Said motor drives a reducer 25 which is operatively connected by means of the belt 26 with a sprocket wheel 27. A similar sprocket wheel 28 is mounted at the forward end of the carriage, the said sprocket wheels receiving the endless chain 30 which is thus driven by the electric motor 24 through the instrumentality of the reducer 25 and belt 26. The chain shown in Figure 4 consists of rollers 31 and connecting links 32. At least one lug 33 is suitably fixed to said chain, the function of which will be presently described. Said lug may have a shape such as shown in Figure 3. During horizontal movement of the upper portion of the chain and while the chain is travelling from sprocket 28 to sprocket 27 the same is supported by the bracket 34 suitably supported at its ends by the uprights 12.

The feeder carriage supported by the forward upright 12 consists of forward and rearward plate members 35 and 36, said members being joined by the carriage bolts 37 and 38. These carriage bolts are freely supported by the forward upright 12 and thus movement of said feeder carriage with respect to the upright is possible. Guide rods 39 are provided for the feeder, said rods being suitably secured at their rear end to the rear upright 12 and extending for some distance beyond the forward upright.

At a point substantially intermediate the uprights 12 a collar 40 is fixedly secured to the plunger 18. Each side of the collar is connected to the plate member 35 by means of a flexible chain 41 having interposed between its ends the coil spring 42. It will therefore be seen that when said plunger is moved rearwardly energy will be stored in said coil springs 42 so that upon

release the plunger will spring forwardly to accomplish the cutting operation. Pivoted at 43 to said collar, Figure 3, is a lever 44 which depends into the path of the stop 33 when the same has movement with chain 30 in a direction toward the right. This will impart movement to the plunger in a rearward direction, causing the coil springs 42 to elongate and thus store energy in said spring. It is therefore necessary to release the said plunger from the action of the lug 33 in order to accomplish the desired cutting movement thereof.

The invention contemplates an adjustable release or tripper 45 suitably secured to the rod 46 which is secured at its forward end to the plate member 35. The portion of the rod extending rearwardly of the forward upright 12 is enclosed within a U-shaped guide member 47 which helps to maintain the tripper 45 horizontally disposed. As shown in Figure 4, the tripper 45 is provided with a rounded extremity 48 so that the lever 44 immediately upon striking the tripper will be given rotation in a direction outwardly, that is, clockwise, Figure 3, so as to cause disengagement of lever 44 with respect to the lug 33. As shown in Figure 3, the plunger 16 is provided with an angularly extending arm 50 connected to the lever 44 by means of the spring 51. Said spring tends to maintain the lever in a vertical depending position and yieldingly resists clockwise rotation of said lever, whereby said rotation is effected only as a result of engagement of said lever with the tripper 45.

In operation of the ring cutting apparatus of the invention the motor and reducer can be adjusted so as to result in the proper speed for the chain 30. Movement of the lug 33 along the bracket 34 will eventually result in engagement with the depending lever 44. Continued movement of the lug will axially move the plunger 16 rearwardly, thereby storing up energy in the coil springs 42. When the depending lever engages the tripper 45 the plunger is released and the same will travel forwardly as a result of said stored up energy with sufficient momentum to cut into the ring of built-up material in the kiln, thereby loosening and breaking down said ring.

A plurality of lugs may be applied to said chain 30 or said drive may be speeded up to increase the work of the plunger.

In the event the cutting operations of the plunger do not entirely cut through the ring in the kiln the mechanism can be shifted forwardly as a result of the adjustability of the feeder carriage. Said carriage is suitably connected to the feeder screw 52 which has threaded engagement with the rear upright 12. The screw is rotated to vary the position of the feeder carriage by rotation of the wheel 53 having handles 54, which is operatively connected with said screw by the gears 55 and 56. It will be seen that by varying the position of the feeder carriage the position of the tripper 45 is likewise varied since said tripper is fixed to the rod 46 having securement to plate 35 of said feeder carriage. Thus the changed position of the tripper will conform to the advanced work done by the plunger 18.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawing, as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claim.

What is claimed is:

In a kiln ring cutting machine, in combination, a plunger, a frame non-rotatably mounting said plunger but permitting reciprocation in the direction of its longitudinal axis, a longitudinally adjustable feeder carriage provided by said frame, resilient means associated with said plunger and connecting said plunger to said feeder carriage in a manner whereby movement of the plunger rearwardly will store up energy in said resilient means, power operated means for causing rearward movement of said plunger to take place periodically, and a release member carried by the feeder carriage for releasing said plunger from said means after predetermined extent of rearward movement has taken place, whereby said plunger will have a rapid forward thrust to perform a cutting operation.

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