July 15, 1941. J. R. KNIGHTS 2,249,529

ARTICLE FEEDING MECHANISM

Filed Sept. 20, 1937

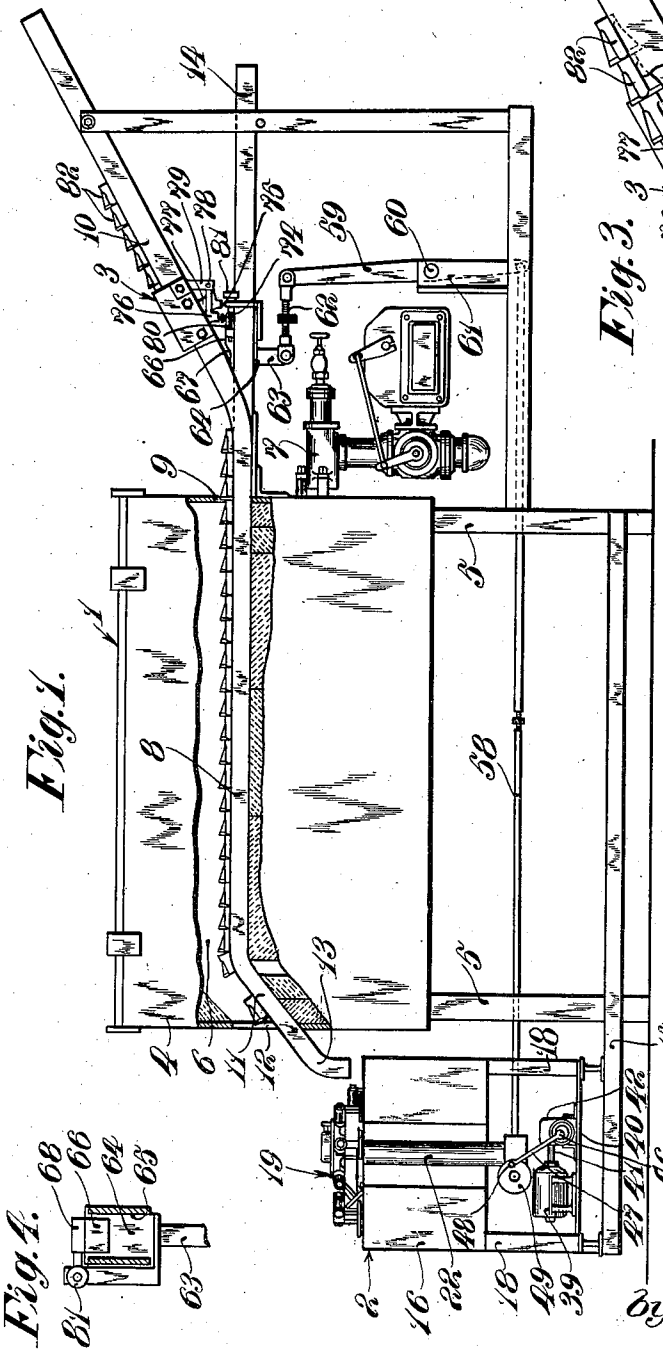


Fig. 1.



Fig. 4.

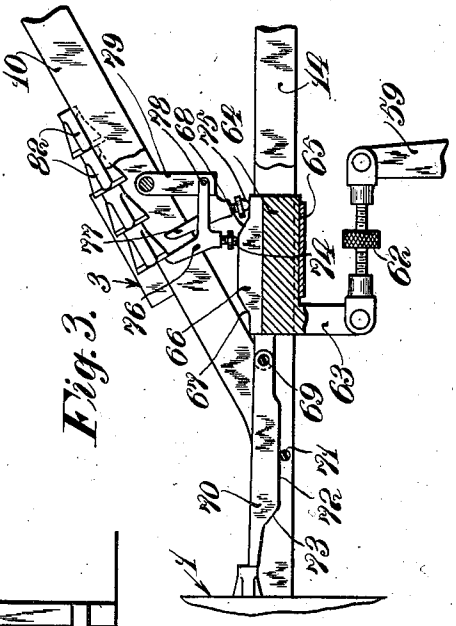


Fig. 3.

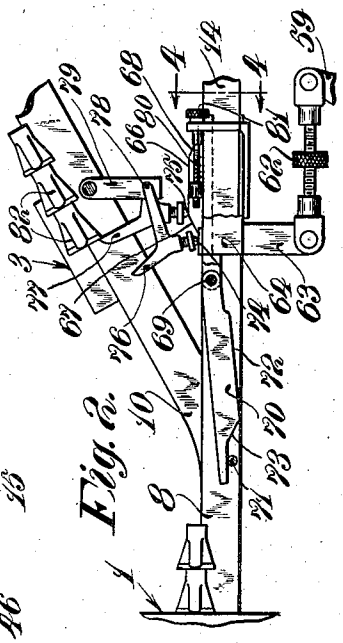


Fig. 2.

Inventor:
John R. Knights.
by Louis A. Maxson.
Atty.

Patented July 15, 1941 2,249,529

# UNITED STATES PATENT OFFICE

2,249,529

## ARTICLE FEEDING MECHANISM

John Russell Knights, Claremont, N. H., assignor to Sullivan Machinery Company, a corporation of Massachusetts

Application September 20, 1937, Serial No. 164,626

7 Claims. (Cl. 198—26)

This invention relates to article feeding mechanism, and more particularly to improvements in a feeding mechanism for feeding rock drill bits or similar articles into a heating furnace.

An object of this invention is to provide an improved article feeding mechanism. Another object is to provide an improved feeding mechanism for feeding rock drill bits or similar articles into a heating furnace. A still further object is to provide an improved automatic feeding mechanism for a heating furnace. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there is shown for purposes of illustration one form which the invention may assume in practice.

In this drawing:

Fig. 1 is a side elevational view of a heating furnace and quenching apparatus in which an illustrative embodiment of the invention is incorporated, a portion of the furnace casing being broken away to show the internal structure.

Fig. 2 is an enlarged fragmentary side elevational view, with parts broken away, of a portion of the improved feeding means.

Fig. 3 is a view similar to Fig. 2, showing the parts in different positions.

Fig. 4 is a detail sectional view taken on line 4—4 of Fig. 2.

In this illustrative embodiment of the invention, there is shown an automatic heating furnace and quenching apparatus comprising a heating furnace generally designated 1 and a quenching apparatus generally designated 2, and associated therewith is the improved feeding mechanism generally designated 3. The heating furnace 1 comprises a casing 4 substantially rectangular in shape, suitably supported as by legs 5 and having a heating chamber 6. A combustible mixture is supplied to the heating chamber 6 of the furnace by a conventional burner 7. Extending longitudinally through the heating chamber of the furnace is a guideway 8 for guiding the articles to be heated through the heating chamber, this guideway extending outwardly through an opening 9 in an end wall of the furnace casing and joined to an inclined chute 10 on which the articles to be heated are placed prior to the feeding thereof within the heating furnace. The opposite end of the guideway 8 has a downwardly inclined portion 11 extending outwardly through an opening 12 in the opposite end wall of the furnace casing, and the lower end of this inclined guide portion preferably terminates in a substantially vertical guide portion 13. The chute 10 and the adjacent portion of the guideway 8 are supported by a frame structure 14 secured to the adjacent end of the furnace.

Now referring to the quenching apparatus 2, it will be noted that supported on a platform 15 secured to the furnace legs is a tank 16 adapted to contain a quenching liquid, preferably water. This tank is suitably supported on legs 18 mounted on the platform 15 at one end of the furnace, in the manner shown in Fig. 1. Mounted at the top of the quenching tank 16 is a rotary carrier, generally designated 19, journaled in bearing sleeves supported by a tubular member 22 secured to the tank.

The mechanism for rotating the carrier 19 comprises a motor 39, preferably supported by a horizontal platform 40 secured to the tank supporting legs. The motor is herein arranged beneath the tank, and has its power shaft 41 journaled in bearings supported within a gear housing 42, likewise supported by the platform 40. The shaft 41 drives through conventional worm gearing a crank pin 46 connected by a connecting rod 47 to a crank 48 secured to an oscillatory frame 49. The oscillatory motion of the frame 49 is transmitted through a conventional intermittent grip device to the rotary carrier 19 of the quenching apparatus.

The improved mechanism 3 for feeding the articles to be heated into the heating furnace comprises a crank mechanism driven by the oscillatory frame 49 and connected by a connecting rod or link 58, extending longitudinally beneath the furnace, to the lower end of a lever 59. The lever 59 is pivotally mounted at 60 on a horizontal axis on a bracket 61 carried by the frame structure 14. The upper extremity of the lever 59 is pivotally connected by an adjustable turnbuckle link 62 to a member 63 depending from the bottom of a slide block 64. This slide block is guided for rectilinear movement in a guideway 65 formed on the frame structure 14, and has supported on the upper face thereof a cam member 66 having oppositely disposed cam surfaces 67 and 68. Pivotally connected at 69 to the slide member 64 is a plunger or pusher bar 70. This plunger or pusher bar is guided by a guide pin 71 secured to the frame structure 14 and has a plane bottom surface 72 and a relatively inclined surface 73, so that when the pusher bar is moved back and forth with the slide block 64, the inclined surface 73, as it engages the guide pin 71, causes the pusher bar 70 to drop down out of the path of movement of the articles

to be heated on the guideway 8, as will later be explained. Engageable with the cam surfaces 67 and 68 of the cam 66 are adjustable abutment members 74 and 75 secured to latch members 76 and 77 respectively, these latch members being pivotally mounted on horizontal axes at 78 on a depending bracket 79 secured to the chute 10. The cam 66 is preferably formed separate from the block 64 and is adjustable rectilinearly with respect thereto by means of an adjusting screw 80 having an operating handle 81, so that the position of the cam may be adjusted with respect to the sliding block 64 as desired. From the foregoing, it will be evident that the feeding means 3 is so coordinated with the driving mechanism for the quenching apparatus that the rotary carrier 19 of the quenching apparatus is always in a position to receive a heated article as it is discharged from the furnace.

The articles to be heat treated may assume various forms, but are herein preferably rock drill bits of the so-called detachable type, designated by the reference character 82, and may be similar to that disclosed in a patent to one Paul H. Nast, No. 2,168,102, granted August 1, 1939.

The general mode of operation of the improved automatic feeding mechanism is as follows: When the burner of the furnace is adjusted to obtain the proper combustion and heating temperature within the heating chamber 6, the operator places a series of juxtaposed, end abutting articles to be heated on the inclined chute 10, with the lowermost article held against downward movement within the chute by the latch 77, in the manner shown in Fig. 2. The motor 39 is then started to effect rotation of the carrier 19 of the quenching apparatus and to drive, through the connecting rod 58 and lever 59, the slide block 64 back and forth along its guideway 65 on the frame structure 14, thereby causing the latch 77 to swing downwardly into its released position to permit downward gravitational movement of the articles to be heated on the chute 10, into engagement with the front latch 76. Upon continued movement of the cam 66, the latch 76 swings downwardly into its released position shown in Fig. 2, thereby permitting the lowermost article to slide downwardly within the chute 10 onto the guideway 8. At the same time, the rear latch 77 has moved up to catch beneath the lowermost article on the chute to retain the same in position thereon. Upon continued movement of the slide block 64, the inclined surface 73 of the pusher bar 70 moves along the guide pin 71 to cause the pusher bar to swing upwardly into its operative position shown in Fig. 3, so that the pusher bar engages the article on the guideway 8 to shove the article inwardly along the guideway into the heating chamber of the furnace. When a series of articles have been fed along the guideway 8 within the heating chamber of the furnace and the articles are properly heated, the outermost article slides downwardly along the inclined portion 11 of the guideway 8 and along the vertical portion 13 onto the carrier 19 of the quenching apparatus. As an article to be heated is fed within the heating furnace, a heated article is discharged from the furnace onto the carrier of the quenching apparatus; and the driving mechanism for the carrier is so coordinated with the driving mechanism for the feeding means that the carrier is always in a position underlying the discharge portion 13 of the guideway to receive the heated article as it drops from the guideway. When the slide block 64 moves rearwardly from the position shown in Fig. 3 to the position shown in Fig. 2, the pusher bar 70 is moved rearwardly, and as the inclined surface 73 is guided over the guide pin 71, the pusher bar moves into the position shown in Fig. 2, so that when the latch 74 is released, an article to be heated may slide by gravity downwardly along the chute 10 onto the guideway 8; the pusher bar having moved out of the path of movement of the article at that time. When the slide block 64 is moved forwardly from the position shown in Fig. 2 to the position shown in Fig. 3, the pusher bar 70 moves upwardly into its operative position so that it may engage the article to be heated to effect feed thereof along the guideway 8 into the heating chamber of the furnace. By provision of the two latches 76 and 77, the lowermost article on the chute 10 is relieved of the weight of the articles above the same on the chute, so that when the latch 76 is released, the lowermost article may slide freely downwardly along the chute by gravity, while the other articles on the chute are held in position thereon by the latch 77. As the heated articles are discharged from the furnace onto the carrier and as the carrier rotates, the same is first submerged into the water in the quenching tank so that the portions to be quenched are lowered within the water, and upon continued rotary motion of the carrier, the latter is elevated to raise the quenched articles from the water in the tank. Upon further continued rotary motion of the carrier, the articles thereon are discharged therefrom.

As a result of this invention, it will be noted that an improved feeding mechanism is provided whereby the articles to be heated are automatically fed into the heating chamber of the furnace, and the heated articles are caused to be discharged from the furnace onto the carrier of the quenching apparatus. It will further be noted that by the provision of the improved article-feeding mechanism the articles to be heated are uniformly fed within the heating furnace and the heated articles are automatically discharged from the furnace. It will further be evident that by the provision of the improved latch mechanism movement of the articles into feeding position is controlled in an extremely effective manner. Other uses and advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. An article-feeding mechanism comprising, in combination, a feeding element having an article-engaging portion movable laterally with respect to the direction of feed into and out of operative article-feeding position, said article-engaging portion of said feeding element being out of alinement with the direction of feed of the articles when in its inoperative position, driving means for said feeding element for moving the latter to effect feed when said element is in its operative feeding position, and means for controlling the movement of the articles into

feeding relation with respect to said feeding element and embodying means for permitting movement of an article into feeding position when said feeding element is in its laterally located inoperative position and for preventing movement of other articles towards feeding position when said feeding element is in operative feeding position in alinement with the direction of feed.

2. An article-feeding mechanism comprising, in combination, a feeding element having an article-engaging portion movable laterally with respect to the direction of feed into and out of operative article-feeding position, said article-engaging portion of said feeding element being out of alinement with the direction of feed of the articles to be fed when in its inoperative position, driving means for said feeding element for moving the latter to effect feed when said element is in its operative feeding position, and means for controlling the movement of the articles into feeding relation with respect to said feeding element, said movement controlling means embodying an article-receiving chute, means for releasing the lowermost article in said chute for movement by gravity into a position to be engaged by said feeding element, said article-releasing means being effective when said article-engaging portion of said feeding element is in its laterally located inoperative position, and means for preventing movement of the articles remaining in said chute towards feeding position when said feeding element is in operative feeding position in alinement with the direction of feed.

3. An article feeding mechanism comprising, in combination, a chute along which the articles move toward feeding position, a reciprocable driving member, a pivoted pusher bar actuated by said driving member for engaging an article as the latter is discharged from said chute and for feeding the article, and means for effecting swinging of said pusher bar into and out of its article-engaging position as said driving member is reciprocated, said pusher bar swinging means being actuated by said driving member.

4. An article feeding mechanism comprising, in combination, a chute along which the articles move toward feeding position, a reciprocable driving member, a pivoted pusher bar actuated by said driving member for engaging an article as the latter is discharged from said chute and for feeding the article, means for effecting swinging of said pusher bar into and out of its article-engaging position as said driving member is reciprocated, and a pair of relatively movable latches actuated by said driving member for controlling the movement of the articles along said chute, one of said latches being movable into a position to release the lowermost article in said chute for engagement by said pusher bar while said other latch concurrently holds the remaining articles in the chute against movement.

5. An article feeding mechanism comprising, in combination, means for feeding the articles and associated means for controlling the movement of the articles into feeding relation with respect to said feeding means comprising an inclined chute along which the artcles are adapted to be moved by gravity and a latch mechanism for controlling movement of said articles along said chute comprising a pair of relatively movable latches, and a reciprocable cam member having spaced cam surfaces for swinging said latches about their pivots, said cam surfaces being so arranged that one latch is released while the other is concurrently held in its operative article-engaging position.

6. An article-feeding mechanism comprising, in combination, a horizontally movable feeding element movable in a vertical direction into and out of operative article-feeding position, driving means for said feeding element for horizontally moving the latter to effect feed when said element is in its operative feeding position, and means for controlling the movement of the articles into feeding relation with respect to said feeding element and embodying means for permitting movement of an article into feeding position when said feeding element is moved out of operative feeding position and for preventing movement of other articles to be fed towards feeding position when said feeding element is in operative feeding position.

7. An article-feeding mechanism comprising, in combination, a horizontally movable feeding element movable in a vertical direction into and out of operative article-feeding position, driving means for said feeding element for horizontally moving the latter to effect feed when said element is in its operative feeding position, and means for controlling the movement of the articles into feeding relation with respect to said feeding element, said movement controlling means embodying an article-receiving chute, means for releasing the lowermost article in said chute for movement by gravity into a position to be engaged by said feeding element, said article-releasing means being effective when said feeding element is moved out of its operative feeding position, and means preventing movement of the articles remaining in said chute towards feeding position when said feeding element is in operative feeding position.

JOHN RUSSELL KNIGHTS.

CERTIFICATE OF CORRECTION.

Patent No. 2,249,529. July 15, 1941.

JOHN RUSSELL KNIGHTS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 28, for the word "into" read --within--; and line 30, for "within" read --into--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of December, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)