April 29, 1947. E. E. ISGREN ET AL 2,419,559

CONVEYOR FOR HEAT TREATING APPARATUS

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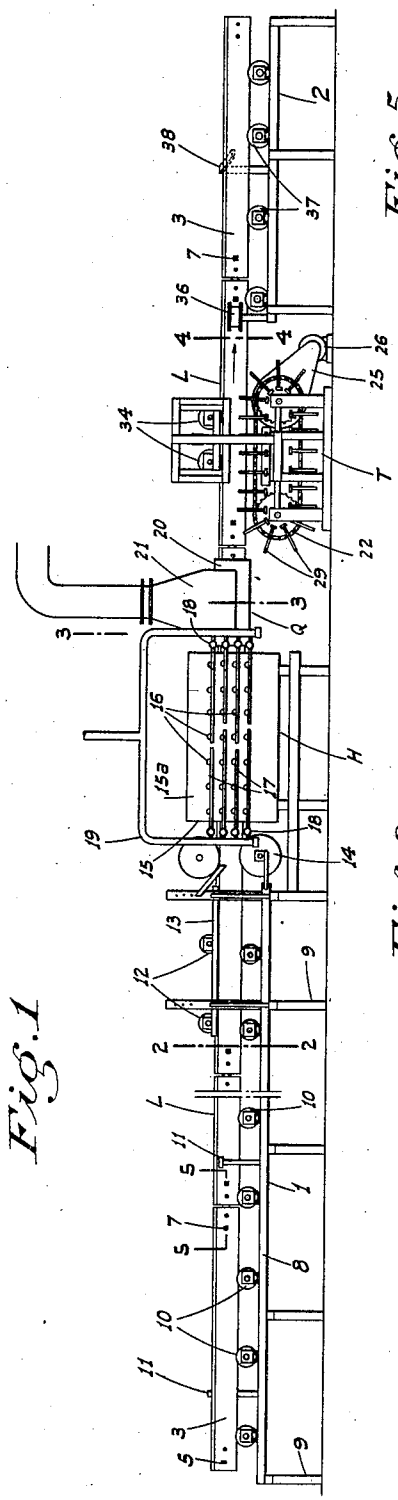


Fig. 1

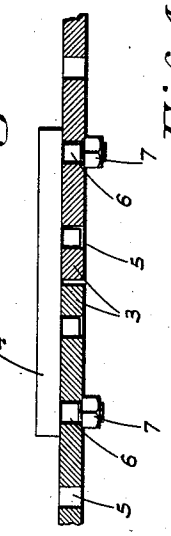


Fig. 5

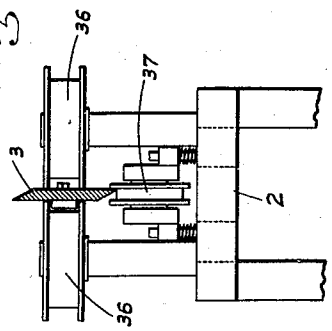


Fig. 4

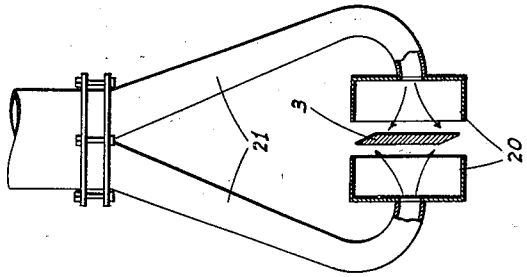


Fig. 3

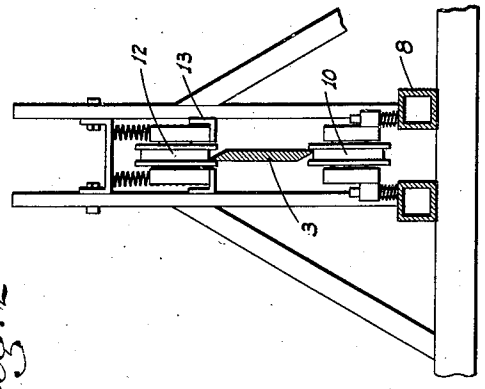


Fig. 2

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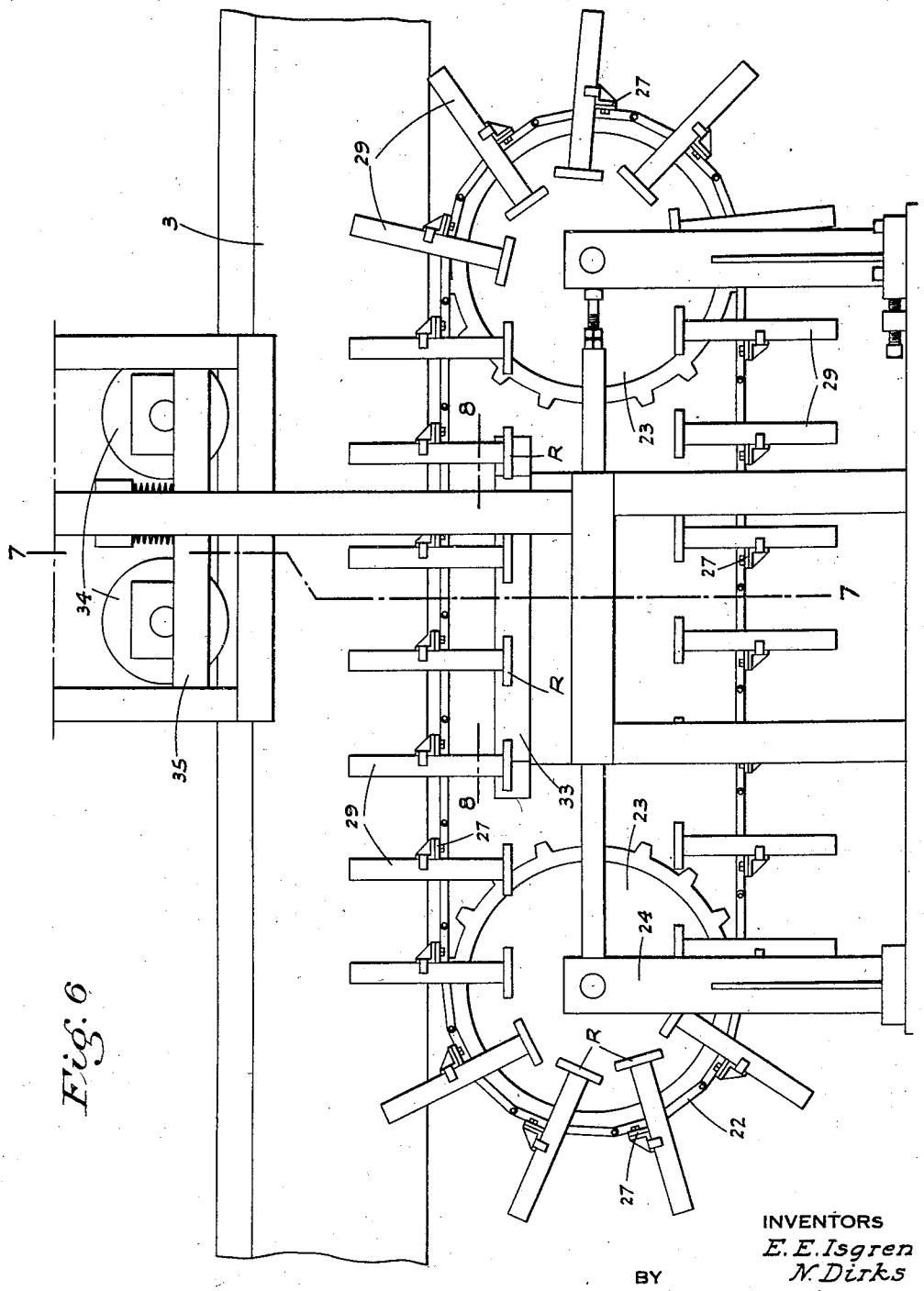


Fig. 6

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Fig. 7

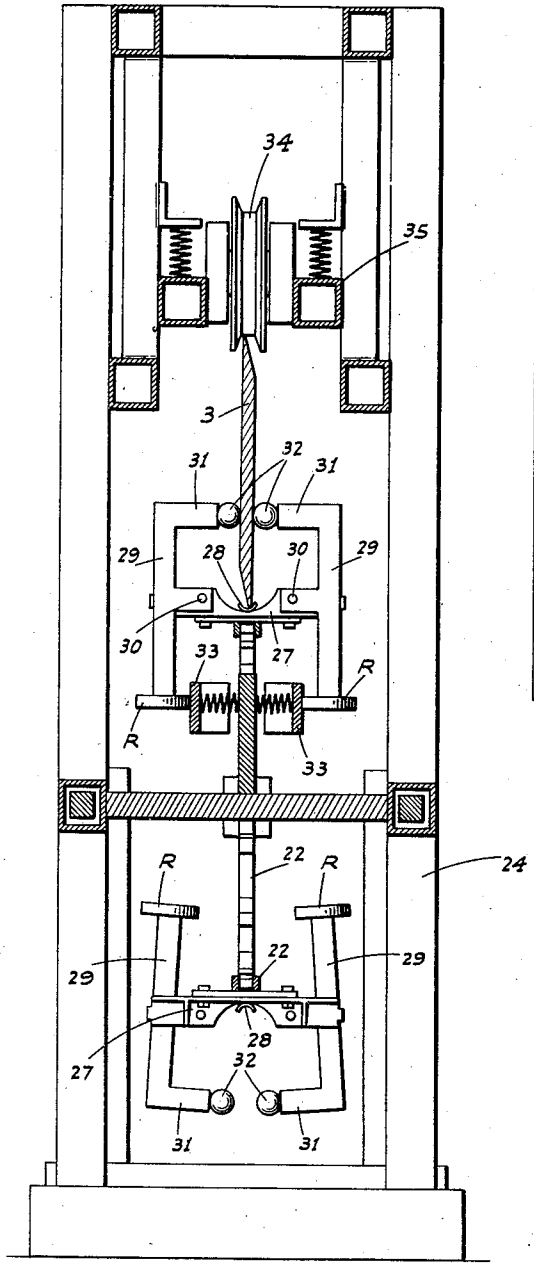
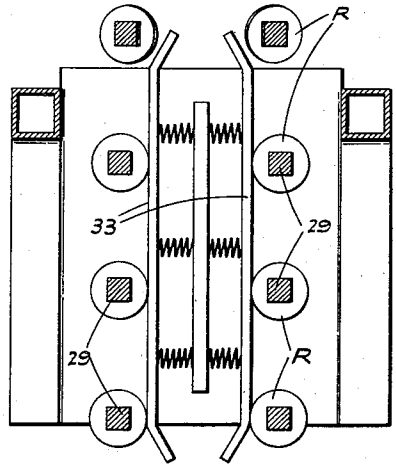


Fig. 8



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CONVEYOR FOR HEAT-TREATING APPARATUS

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Application January 26, 1944, Serial No. 519,750

5 Claims. (Cl. 198—179)

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This invention relates to, and it is an object to provide, an improved apparatus for heat treating of bar or strip stock whereby to impart hardening thereto; the apparatus in its present embodiment being arranged for continuous operation with the bar or strip stock detachably connected together in end to end relation and constantly fed through said apparatus.

Another object of the invention is to provide heat treating apparatus as above wherein the connected-together stock is pulled rather than pushed through heating and quenching zones, whereby to avoid any warping or buckling which pushing and consequent compressive loading might cause.

A further object of the invention is to provide heat treating apparatus which comprises an elongated, anti-friction supporting and guide assembly arranged to support and guide the connected-together stock for movement from end to end of the apparatus, a heating device mounted intermediate the ends of the apparatus in surrounding and heating relation to the supported stock, an air-quench device disposed immediately beyond the heating device and through which quench the stock passes, and a transmission device mounted beyond the air quench device operative to engage an adjacent portion of the connected-together stock and pull the latter through said heating and quenching devices.

An additional object is to provide a transmission device for the connected-together stock, of unique construction and operation, such transmission device being operative to apply a straight line, constant speed pull on the stock being drawn through the heating and quenching zones, whereby to assure smooth operation and uniform hardening of the stock.

A further object of the invention is to produce a simple and inexpensive device, and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a side elevation of the apparatus.

Figure 2 is an enlarged cross-section on line 2—2 of Fig. 1.

Figure 3 is an enlarged cross section on line 3—3 of Fig. 1.

Figure 4 is an enlarged cross section on line 4—4 of Fig. 1.

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Figure 5 is an enlarged fragmentary sectional plan on line 5—5 of Fig. 1.

Figure 6 is an enlarged side elevation of the transmission device.

Figure 7 is a cross section on line 7—7 of Fig. 6.

Figure 8 is a fragmentary sectional plan on line 8—8 of Fig. 6.

Referring now more particularly to the characters of reference on the drawings, the apparatus comprises a horizontal, longitudinally extending feed carrier unit 1 and in spaced end to end relation a similar but receiving carrier unit 2; said carrier units 1 and 2 forming an elongated anti-friction supporting and guide assembly for a longitudinally moving, continuous line L of sections of stock 3 to be processed, said sections of stock being detachably connected together at adjacent ends by a connector 4, as shown in Fig. 5. The sections of stock 3 are here shown as cutting blades for earth scrapers; such blades being disposed on edge vertically and having holes 5 at adjacent ends. Threaded studs 6 on the connectors 4 project through said holes and securing nuts 7 and releasably retain said studs against escape. In the operation of the apparatus, untreated blades 3 are connected to the forward end of the line at the feed carrier 1, while processed blades are detached and removed at the receiving carrier 2.

The feed carrier 1 comprises a horizontal, longitudinally extending base or bed frame 8 supported above the floor by legs 9. A plurality of longitudinally spaced and alined spring supported rollers 10 are mounted on the bed frame 8, with their axes extending in a transverse horizontal plane. The rollers 10 are of like diameter and circumferentially grooved, whereby the line L of blades 3 rides at its lower edge in the grooves of said rollers.

On the feed carrier 1 the line of blades L is held against lateral tipping adjacent the feed end by means of longitudinally spaced, vertical posts 11, and adjacent the discharge and by spring pressed top rollers 12 grooved to engage over the upper edge of said line and carried by a vertically adjustable frame 13. As the line leaves the feed carrier 1 at its discharge end, the line of blades is supported both vertically and horizontally by grooved, relatively large diameter rollers or sheaves 14 which straddle the upper and lower edges of the blade line L.

Beyond the rollers 14, the blade line L passes through the heating device or furnace, indicated generally at H, which includes an open ended housing 15, preferably water-cooled, and suitably

lined on opposite sides with fire resistant material. The sides 15a of housing 15 are transversely spaced and disposed for the passage of line L therebetween, and a vertical bank of gas burners 16 projects through each side of said housing in heating relation to the passing blades 3. The burners of each bank are connected in horizontal rows by separate gas conduits 17, each of which includes a control valve 18 so that the flame intensity in any given row can be selectively controlled and the hardness of a given and corresponding portion of the blades effectively governed. For example, the blades 3 may be hardened along its edges and left relatively soft midway across its width. Gas is supplied to pipes 17 from a manifold 19.

Immediately beyond the heating device H, the blade line L passes through a quenching device, indicated generally at Q, which comprises a pair of air boxes 20 disposed in fixed position on opposite sides of the line, said air boxes being open on the side adjacent the blades 3 and of a height at least equal to the height of line L. An air blast is directed into said boxes 20 by a split conduit 21 leading from a blower (not shown) and as this air blast escapes the boxes 20 it flows over and about the passing blades 3 effectively cooling or quenching the same to the extent necessary. The volume of air fed to boxes 20 can be varied so as to remove from the blades the required B. t. u.'s to obtain a given degree of hardness.

Beyond the air quenching device Q, as above described, and ahead of receiving carrier 2, the line of blades is engaged by the transmission device, indicated generally at T, which pulls said line through the heating and quenching zones; said transmission device T comprising the following structure:

An endless chain 22 is disposed with its upper run adjacent but below and parallel to the lower edge of line L, said chain being carried at its ends on sprockets 23 journaled in a supporting frame 24. One of the sprockets 23 is driven at relatively slow speed by a variable speed drive mechanism, indicated at 25 and including an electric motor 26.

At circumferentially spaced points about the same the chain 22 is fitted with horizontal, transversely extending attachment plates 27 which project in rigid relation laterally on opposite sides of said chain; each attachment plate including an outwardly opening cradle 28 for the reception of the lower edge of line L.

A transversely spaced pair of rocker arms 29 are pivoted intermediate their ends, as at 30, to corresponding outer ends of each attachment plate 27 for swinging movement crosswise of the direction of movement of chain 22; said rocker arms being formed at their outer ends with inturned fingers 31 having heat resistant pressure pads 32 between which the blades 3 are disposed when the rocker arms are in the upper run of the chain.

At their inner ends the rocker arms 29 are fitted with rollers R whose axis is radial of the chain; the arms 29 normally tending to swing in a direction to separate fingers 31 and pads 32. However, for a predetermined distance between the sprockets 23 and when the arms are in the straight line portion of the upper run of chain 22, the rollers engage and ride outwardly and laterally spring pressed corresponding cam plates 33 which are mounted in frame 24 below said upper run of the chain and in side by side longitudinally extending relation. The cam plates 33 are disposed so that when engaged by rollers R the rocker arms 29 are swung apart at their inner ends, causing the pads 32 to move toward each other in clamping relation to the adjacent blade 3 in line L. As a consequence, pairs of rocker arms and pads 32 continuously engage and draw the line L along with movement of the chain 22; the pads escaping or leaving the blades as the rollers face away from the corresponding cam plates 33.

The blades 3 are held in close frictional engagement at the lower edge in cradles 28, by means of a pair of longitudinally spaced, grooved rollers 34 riding the upper edge of the blades above the transmission device T; said rollers 34 being carried in a downwardly spring pressed frame 35.

After leaving the transmission device T, the line L enters the receiving carrier 2, which includes a pair of horizontal guide rollers 36 between which the line L passes in guided engagement, and a plurality of spring supported, longitudinally spaced, grooved rollers 37 in which the lower edge of the blades ride.

As each processed blade 3 reaches the carrier 2, an operator removes the corresponding connector 4 and removes such blade from the slowly moving line; a post 38 engaging the blade to be removed on the side opposite connector nuts 7, and preventing tipping of the same while the operator is removing said connector.

The above described heat treating apparatus lends itself equally well to surface or through hardening of bar or strip stock, depending on the adjustment of the heating and quenching units relative to the speed of advance of the work.

As the operation of the apparatus is continuous, and at constant speed, the output is high and with uniform results, attributable to not only such constant speed, but also the employment of the transmission device, which pulls the work through the heating and quenching devices to eliminate those imperfections, such as buckling, which pushing the work would produce.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described our invention, what we claim as new and useful and desire to secure by Letters Patent is:

1. A transmission device for pulling a line of work along a path, such device comprising a driven endless chain having one run thereof lengthwise of and adjacent the path of travel of the work, a clamping unit mounted on and projecting from the chain, such clamping unit including a pair of rocker arms, such rocker arms being pivoted intermediate their ends on opposite sides of the chain, respectively, for relative swinging movement transversely of the chain, a cam mounted between the runs of said chain adjacent said one run and so positioned as to engage the inner ends of said rocker arms and move the outer ends thereof toward each other in clamping relation as said rocker arms travel along with said one run of the chain.

2. A structure as in claim 1, in which the cam

comprises a pair of elongated spring pressed plates against which the said lower ends of the rocker arms ride with the travel of the chain.

3. A transmission device for pulling a line of work along a path, such device comprising an endless driven chain having one run thereof lengthwise of and adjacent said path of travel of the work, a clamping unit mounted on and projecting from the chain, such unit comprising an attachment member fixed to the chain and projecting beyond opposite sides thereof, a rocker arm pivoted intermediate its ends to each end of the attachment member for relative swinging movement transversely of the chain, work engaging elements on the outer end of the rocker arms, and a cam mounted between the runs of the chain and adjacent said one run and so positioned as to engage the inner ends of said rocker arms and swing such arms on their pivots to move the outer ends thereof toward each other in clamping relation as such arms travel along with said one run of the chain.

4. A transmission device for pulling a line of work along a path, such device comprising a driven endless chain having one run thereof extending lengthwise of and adjacent the path of travel of the work, a clamping unit mounted on

and projecting from the chain, means to cause the clamping unit to frictionally engage and subsequently release work moving along said path, at predetermined points along said one run of the chain, the clamping unit including a cradle in which the work will seat on its lower edge.

5. A device as in claim 4, including a spring pressed roller guide mounted above and in substantial parallelism with said one run of the chain and engageable by the upper edge of the work.

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