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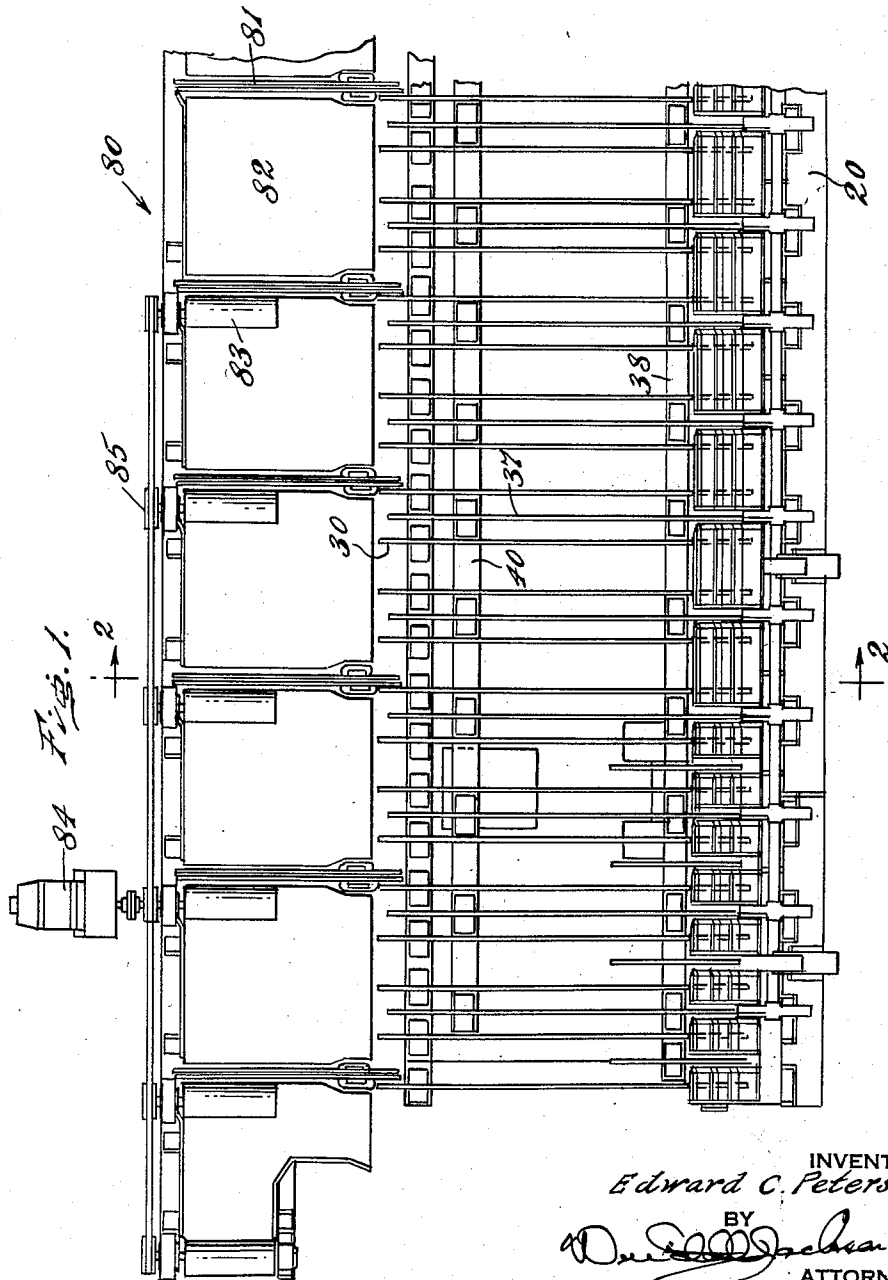
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2,907,236

COOLING BED

Filed Oct. 14, 1957

3 Sheets-Sheet 1



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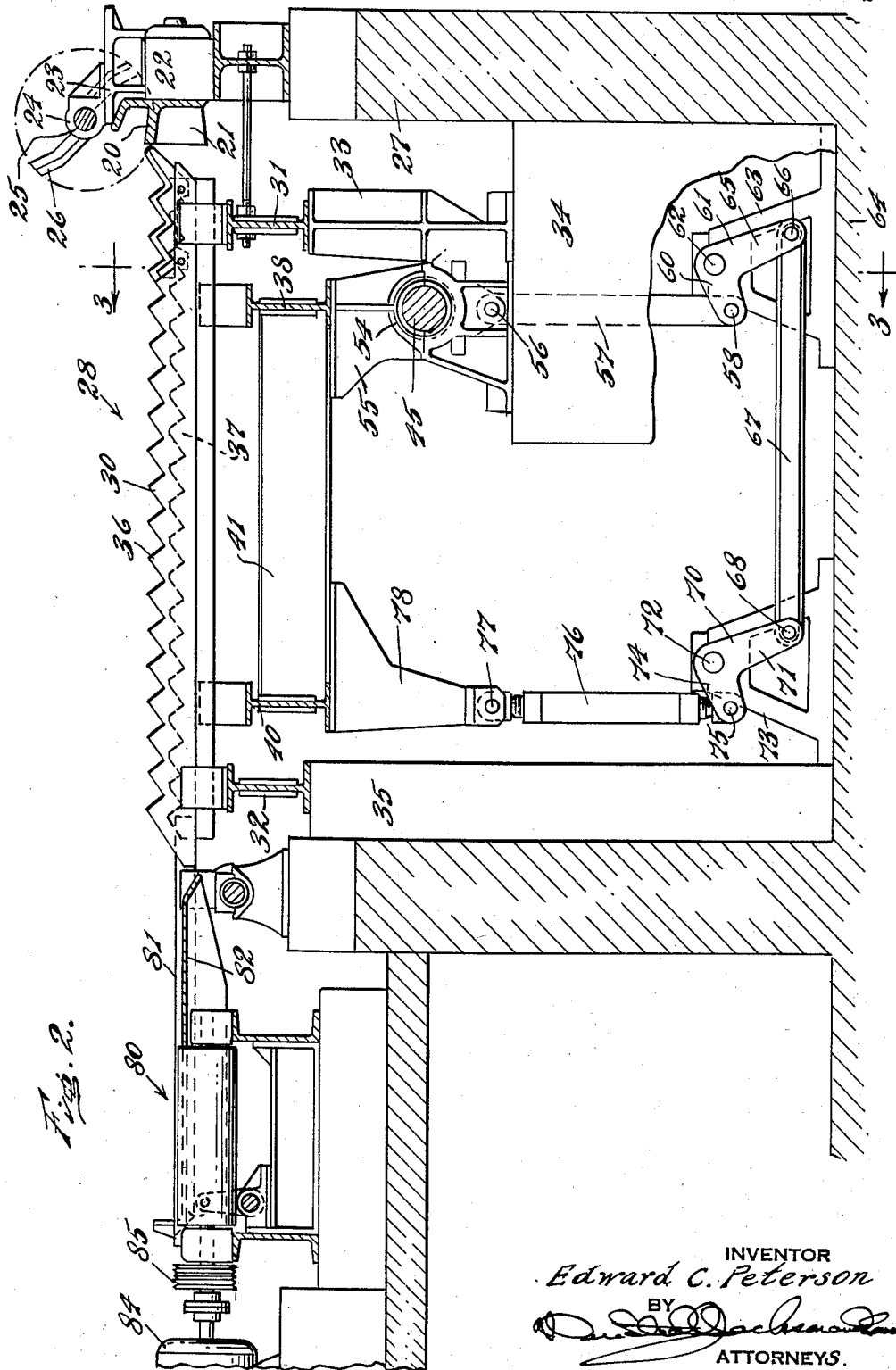
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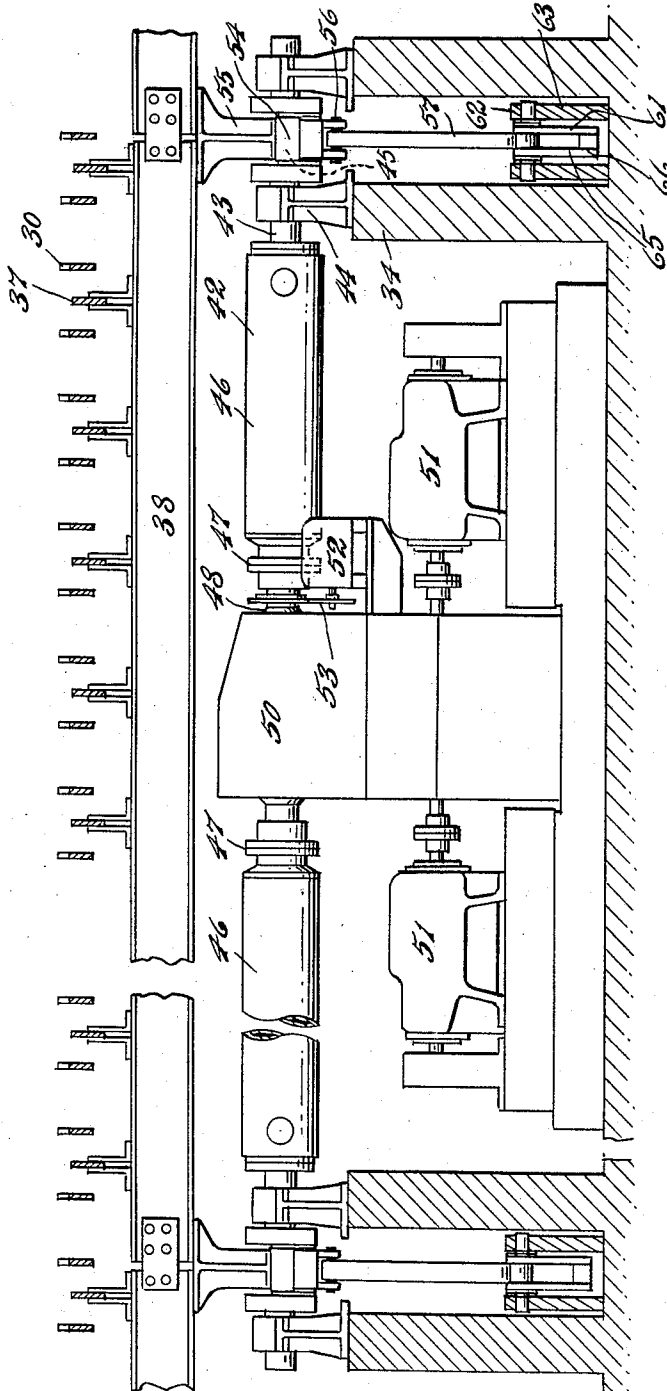
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Fig. 3.



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COOLING BED

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1 Claim. (Cl. 80—42)

The present invention relates to cooling beds or hot beds for cooling metal bars in connection with rolling mills.

A purpose of the invention is to simplify the construction of cooling bed operating mechanism and reduce the cost.

A further purpose is to avoid the necessity of employing eccentric shafts at both ends of the cooling bed, with synchronizing gearing or other mechanism between such eccentric shafts.

A further purpose is to avoid the necessity for horizontally and also vertically operating bellcranks in a cooling bed drive.

A further purpose is to operate a set of moving cooling bed bars in horizontal motion entirely from an eccentric, in vertical motion from the same eccentric at one end of the cooling bed, and at the other end of the cooling bed by a system of links and bell cranks.

Further purposes appear in the specification and in the claim.

In the drawings I have chosen to illustrate one only of the numerous embodiments in which my invention may appear, selecting the forms shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a fragmentary top plan view of a cooling bed in accordance with the invention.

Figure 2 is an enlarged section of Figure 1 on the line 2—2.

Figure 3 is a fragmentary section of Figure 2 on the line 3—3.

Describing in illustration but not in limitation and referring to the drawings:

In rolling mill practice, rolling mill stock such as bars, rods, shapes and the like are frequently brought from the rolling mill on a table and transferred to a cooling bed to accomplish cooling, straightening, and in some cases heat treatment by controlling the cooling rate.

In prior art practice it has been common in many cooling beds to employ a system of bellcranks and links which manipulate the cooling bed bars horizontally, and another set of bellcranks and links at each end which accomplish the vertical manipulation. This leads to a complex and expensive drive.

In other cooling bed designs, movable bars are manipulated by eccentric shafts at both ends which must be intergeared or otherwise correlated to maintain proper phase relation of the eccentrics.

In accordance with the present invention, the driving mechanism for a cooling bed is greatly simplified, using only one lateral eccentric shaft which accomplishes both the entire horizontal motion of one set of cooling bed bars and the vertical motion of such set of cooling bed bars at one end.

The vertical motion of the said cooling bed bars at the other end is provided by a system of bell cranks and links which interconnect with the eccentric straps.

Considering now the drawings in detail, I illustrate a

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table 20 of any suitable well known character, which is adapted to bring the stock into the cooling bed, having table rollers 21 driven by motors 22, and provided with a kick-off supporting frame 23 providing journal blocks 24 for a kick-off shaft 25 which supports suitably spaced rotatable kick-off arms 26, well known in the art. The table is supported on a foundation support 27.

Along one side table 20 extends cooling bed 28 which has a stationary set of cooling bed bars 30, which are supported on beams 31 at the rear end and beams 32 at the forward end. The beams 31 rest on brackets 33 on a foundation support 34 and the beams 32 rest directly on a foundation support 35.

In the preferred embodiment the stationary cooling bed bars 30 are provided with notches 36 and the bars extend generally horizontally. The bed may be notched or smooth as preferred.

Interspersed among cooling bed bars 30 and extending generally horizontally, there are moving cooling bed bars 37 which are supported at the rear end on frame beams or supports 38 and at the forward end on frame beams or supports 40, the beams 38 and 40 being interconnected by cross beams 41.

At the rearward end of the bed beneath the supporting structure provided by the beams 38, 40 and 41, an eccentric shaft 42 extends generally horizontally, and consists of bearing units 43, journaled in bearings 44 supported on the foundation support 34, which are interconnected at intervals to eccentric units 45. The bearing units are connected to one another by tubular shaft extensions 46.

At a suitable position along the eccentric shaft it connects through universal joints 47 with a driving shaft portion 48 which extends through opposite ends of speed reducer 50, which is driven in a suitable manner by electric motors 51. In order to control the extent of motion of the drive as desired, suitable limit switch means are shown at 52 operated by a limit switch operator 53 well known in the art.

Each of the eccentrics is surrounded by an eccentric strap 54 which has resting thereon and secured thereto a saddle 55 which is anchored to the bottom of the frame consisting of the beams 38, 40 and 41. The bottom of the eccentric strap makes pivotal connection at 56 in each case with the top of a link 57, the lower end of which pivotally connects at 58 with an arm 60 of a bellcrank 61, the bellcranks being pivoted on stub shafts 62 which are mounted on bearing supports 63 resting on foundation support 64. The opposite lever arms 65 of the bellcranks 61 pivotally connect at 66 with one end of links 67 which extend generally horizontally forward and at the forward ends pivotally connect at 68 with arms 70 of bellcranks 71 which are symmetrical to the bellcranks 61. Bellcranks 71 are pivoted by shaft 72 on bearings 73 which rest on the foundation support 64.

Each bellcrank 71 has an opposite lever arm 74 which is pivotally connected at 75 to the lower end of an adjustable link 76 at each of the positions laterally of the bed and the link 76 at the top pivotally connects to pivot brackets 78 depending from and secured to the frame consisting of the beams 38, 40 and 41.

At the discharge end the cooling bed feeds the stock to run-out table 80, which may be of any suitable type consisting of carry-over bars 81 operated by any suitable shuffle mechanism and extending above aprons 82 to place the work on run-out table rolls 83, which are driven by motor 84 through suitable belt and pulley mechanism 85.

The detail of the run-out table forms no part of the present invention.

In operation, the work runs in on table 20 and is discharged on to the cooling bed 28 in the usual manner. To advance the work across the cooling bed, the motors 51 are started, turning eccentric shaft 42 to drive the eccentric 45. The eccentrics cause any point on the movable set of cooling bed bars to move through a circular orbit which by virtue of the relative positions of the stationary and movable bars is substantially half above and half below the fixed bars. Accordingly the supports consisting of the beams 38, 40 and 41 for the movable bars move through a path which carries the movable bars above the stationary bars, the path having a horizontal component which is contributed entirely by the eccentric. The vertical support and movement at the rear end of the movable bars is also contributed entirely by the eccentrics, while the vertical support and vertical motion at the forward end of the movable bars is contributed by the eccentric straps to the links 57 and then to the bellcranks 61, then to the links 67, next to the bellcranks 70 and finally to the links 76.

The operator is free to turn off the operation of the cooling bed after the advance of a single step or several steps as desired, or can run the cooling bed continuously or can set the limit switches 52 to turn off the operation after a predetermined number of steps. The cooling bed discharges to a run-out table in the usual way and the stock is suitably carried by the run-out table to the shear or otherwise as desired.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention

without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claim.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

In a cooling bed, a first set of bars, a second set of vertically and longitudinally movable bars cooperating with the first set, a support extending beneath and supporting the bars of the second set, saddles adjacent to and beneath one end of said support mounting said support, an eccentric shaft having eccentrics thereon extending beneath the saddles, eccentric straps on the eccentrics securing the saddles to the eccentrics, first links at one end pivotally connected to the eccentric straps beneath the eccentric shaft and extending downwardly, first bellcranks positioned adjacent the lower ends of the first links and each having one arm pivotally connected to the lower ends of the first links, second links pivotally connected at one end to the other arms of the first bellcranks and generally extending horizontally, second bellcranks located beneath the support adjacent the opposite ends of the second bars, the second bellcranks each having one arm pivotally connected to the ends of the second links remote from the first bellcranks, and third links extending generally vertically, having their lower ends pivotally connected to the other arms of the second bellcranks and having their upper ends pivotally connected to said support.

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