March 13, 1934. M. S. ALLEN 1,950,377

APPARATUS FOR HANDLING PACKED METAL STOCK

Filed Aug. 18, 1932 2 Sheets-Sheet 1

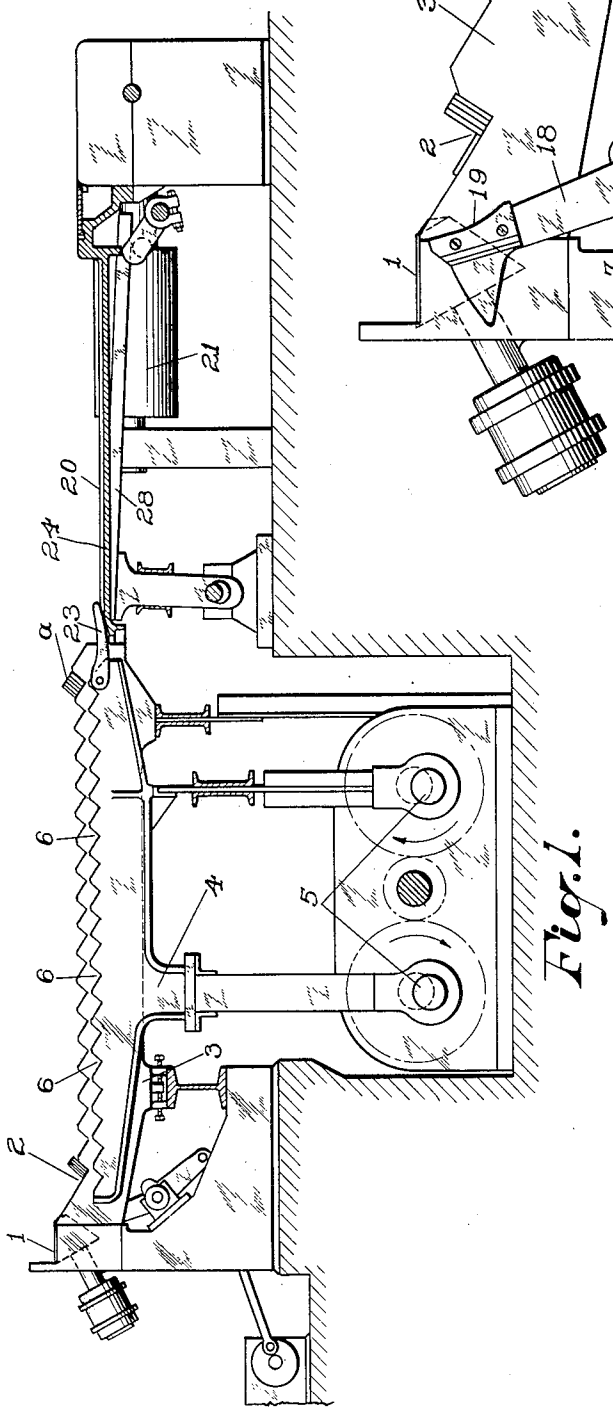


Fig. 1.

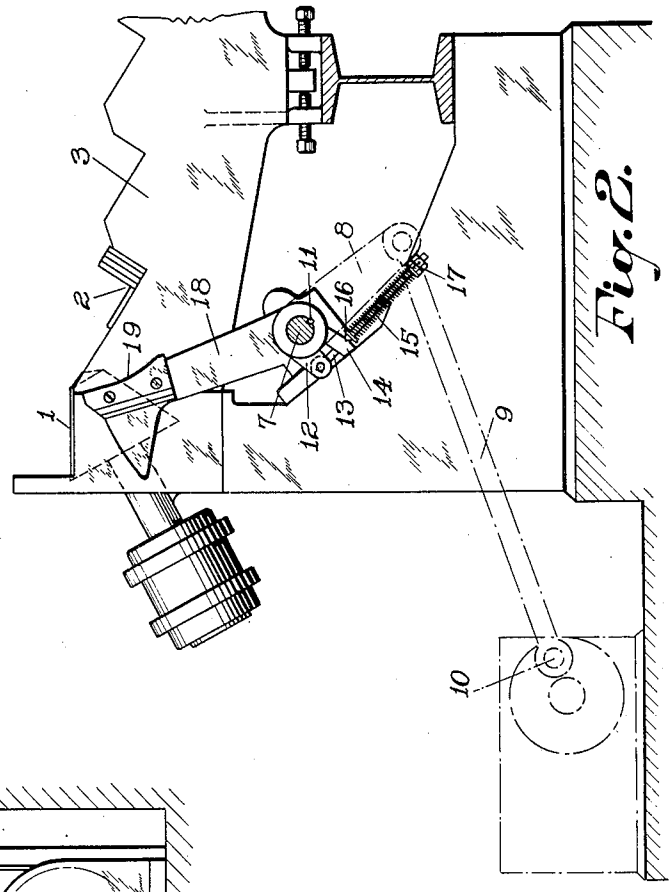


Fig. 2.

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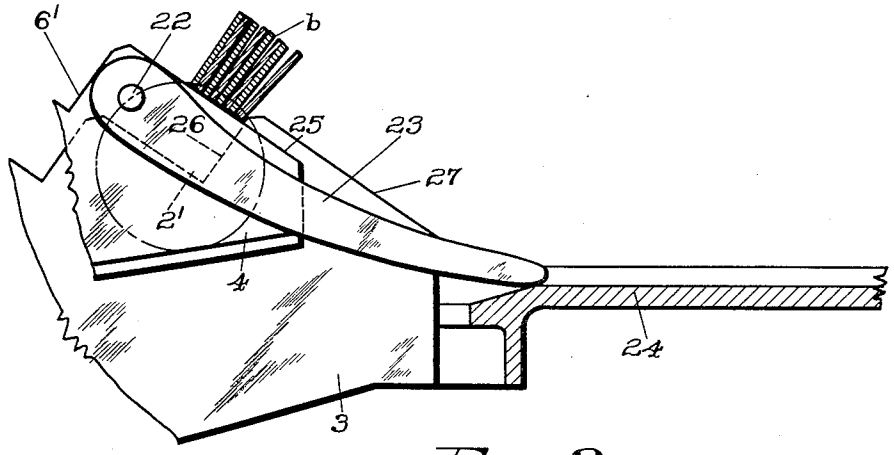


Fig. 3

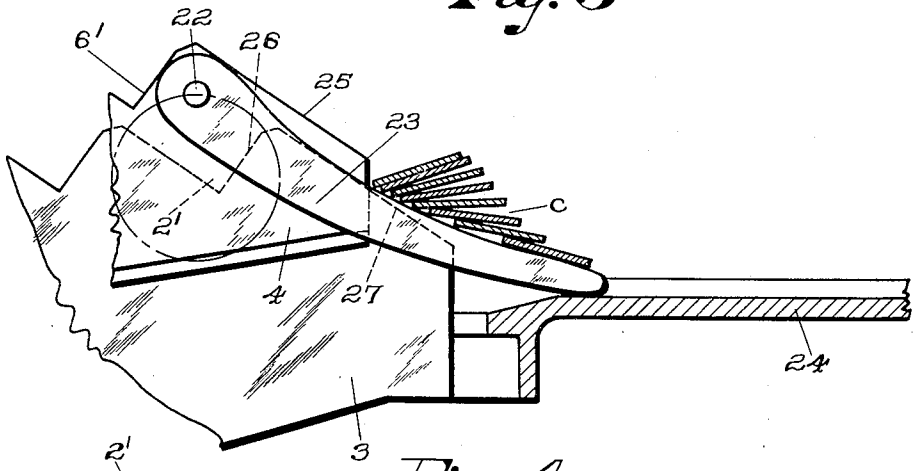


Fig. 4

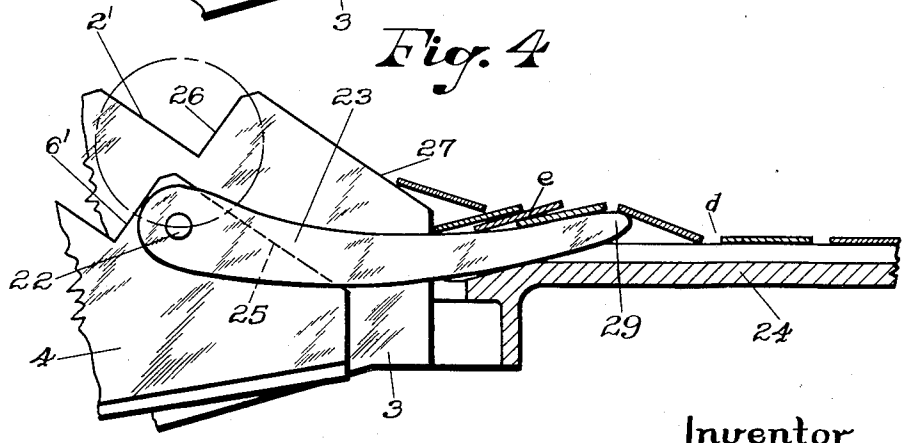


Fig. 5

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UNITED STATES PATENT OFFICE

1,950,377

APPARATUS FOR HANDLING PACKED METAL STOCK

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Application August 18, 1932, Serial No. 629,342

8 Claims. (Cl. 80—42)

The present invention relates in general to the mechanical handling of metal stock and the like. More particularly, the invention relates to the separation or unpacking of flat metal bars (such as spring flats or the like) which have been subjected, in pack formation, to slow cooling or annealing on a cooling bed,—of the type, for example, shown in George Patent No. 1,536,205, dated May 5, 1925.

In the aforesaid George patent, disclosing a notched shuffle bar cooling bed, the flat bars are so packed as to rest edgewise against the forward sides of the notches, whereby the pack on its discharge from the bed is disintegrated and spread out by gravity on the run-off table or other receiving device provided for the support and subsequent conveyance of the individual pieces of stock. However, it is oftentimes desirable, on beds of this type, to pack the bars so that they rest flatwise against the forward sides of the notches, and under these conditions, the final discharge of the pack onto the run-off table or other receiving device does not procure the desired spreading out of the individual pieces of the pack,—the latter instead being deposited in shingle formation, with the pieces overlapping each other. The present invention provides simple and effective means, connecting the cooling bed with the run-off table, by which the pieces of such a pack, formed to rest edgewise against the rear sides of the notches, are delivered one by one to such table. Other and further objects and advantages of the invention will appear from the following detailed description thereof, reference being had to the accompanying drawings, in which—

Fig. 1 is a view in side elevation, partly in section, of apparatus embodying the invention.

Fig. 2 is a larger scale view in side elevation of the pack-forming mechanism.

Fig. 3 is a fragmentary large scale view in side elevation, partly in section, of the pack disintegrating means.

Figs. 4 and 5 are views similar to Fig. 3, showing the parts in different positions.

Like reference characters refer to like parts in the different figures.

Referring first to Figs. 1 and 2, each hot bar, as carried out longitudinally from the mill on a series of conveyor rolls 1 (only one of such rolls being shown) is transferred broadside, by the usual kick-off devices, not shown, to the first notch 2 provided by the stationary racks 3 of the cooling bed. The latter consists, as is well known, of a set of such stationary notched racks 3, 3, alternating with a similar set of movable notched racks 4, 4. The movable racks 4, 4 are connected at each end to eccentrics 5, 5, so as to be movable bodily in a circular path, all the time maintaining their parallelism with the stationary racks, and performing substantially half their movement above and the other half below the plane of said stationary racks. The throw of the eccentrics 5, 5 is such that each notch 6 of the movable racks, after coming into registry with a notch 2 of the stationary racks, is carried into registry with the next notch of the stationary racks, so that the stock, at each operation of the movable racks, is lifted out of a stationary notch and carried forward and deposited in the next stationary notch, being thus movable step-by-step across the cooling bed.

Referring now to Fig. 2, each piece of flat stock, as kicked off sidewise from the roller 1, 1, slides down in the first stationary notch 2 until its advancing edge strikes the forward side of said notch; thereupon, according to the usual practice, said piece is tipped or turned upwardly until its upper surface rests against said forward side of the notch, the mechanism for doing this, as shown in Fig. 2, comprising a suitably journalled shaft 7, whose operating arm 8 is connected by a link 9 to an actuating crank or eccentric 10. The shaft 7 also has secured thereto, as by a key 11, a short arm 12, the latter carrying a pivoted rod 13 which extends through an aperture in the arm 14 which is journalled on shaft 7. A spring 15 on the rod 13 is confined between a washer 16, abutting the under side of arm 14, and the retaining nuts 17 at the outer end of said rod, said spring thus serving to transmit yieldably to the arm 14 the rocking movements imparted to the shaft 7 and arm 12. Said arm 14, journalled on the shaft 7, has an upward extension 18, terminating in a shoe 19 that normally lies just below the rear side of the first stationary notch 2; following the delivery, as above described of a piece of stock to said notch, the clockwise rocking of shaft 7 produced by a revolution of the crank 10 causes the shoe 19 to swing upwardly, thereby tipping the piece against the forward side of the notch into a position of edgewise support upon the rear side of the notch, following which the shoe 19 resumes its normal position so as to be out of the way of the next piece delivered to said notch from the rollers 1. Such next piece and those successively following it are operated upon in the same manner by the shoe 19, in consequence of which there is accumulated in said notch a pack of pieces lying face to face with their bottom edges in contact

with the rear side of the notch,—it being understood that the resilient connection provided by the spring 15 permits such progressive shortening of the swing of shoe 19 as is required by the progressive increase in the thickness of said pack.

The movable racks 4, 4 secure the transfer of each pack so accumulated to the next stationary notch, and so on step by step across the cooling bed, and meanwhile, in periods when the movable racks remain inoperative, the above described packing action is proceeded with in the first stationary notch. When a pack finally reaches the last stationary notch, as indicated at *a* in Fig. 1, the annealing of the stock in said pack is completed, and the subsequent handling of said stock requires the disintegration and spreading out of the individual pieces of said pack, for example, on a run-off table, here indicated generally by the numeral 20; the latter may comprise a flat-surfaced conveyor of the well-known shuffle-bar type, arranged to procure the broadside delivery of individual pieces thereon to a set of conveyor rolls 21, or said rolls 21 may receive the pieces directly from the devices, now to be described, which effect the disintegration and spreading out of each pack that arrives in the last stationary notch 2′ of the cooling bed.

The particular carry-over operation of the movable rack that causes a pack in the last movable notch 6′ to be deposited in the last stationary notch 2′ is terminated shortly after such deposit by the arrival of the stationary racks in their lowermost or rest position, as indicated in Figs. 1 and 5. Certain of said movable racks 4, 4, just beyond their last notches 6′, provide studs 22, the latter forming pivoted supports for a series of arms 23, 23, whose free ends project forwardly a sufficient distance to ride or float, in all positions of the movable racks, on the stationary plates 24 of the run-off table 20. Assuming that the pack occupies the last stationary notch 2′, as indicated at *a* in Fig. 1, the next ensuing carry-over operation of the movable racks 4, 4 brings up beneath said pack the inclined end surfaces 25 of the movable racks, which surfaces, as they move upwardly, elevate the pack, as shown at *b* in Fig. 3, until finally it is carried clear of the support afforded by the forward side 26 of the last stationary notch 2′. When this occurs, the elevated pack *b* topples forwardly, the several pieces thus assuming a more or less shingled relation to each other, with the rearward edge of each piece underlying the forward edge of the succeeding piece of the pack, and such pieces slide by gravity down the incline 25 and onto the slightly concave supporting surfaces of the arms 23, 23, as indicated at *c* in Fig. 4. From this position of maximum inclination of the arms 23, 23, the latter, during the remainder of this particular carry-over operation of the racks 4, 4 have their pivots 22 moving downwardly, the first part of said movement carrying said pivots to the right, and the final part carrying said pivots to the left. This initial right hand movement carries with it the forwardly-disposed pieces of the shingled assemblage, but those pieces that are rearwardly disposed do not partake, at least to the same degree, of such movement, because the simultaneous lowering of the arms 23, 23 engages such pieces with the inclined end surfaces 27, 27 of the stationary racks 3,—thereby effecting a still further spreading out and separation of the individual pieces. As long as the supporting surfaces of the arms 23 have a sufficient downward inclination, the farthest-advanced pieces thereon will slide down onto the plates 24, as shown at *d*, Fig. 5, being there acted upon by the shuffle bars 28, 28 of the table which serve, in the well known manner, to convey said pieces sidewise individually to the rolls 21. Afterwards, as the arms 23, 23 move into the position shown in Fig. 5, this movement being accompanied by a retraction of the tips 29 of said arms along the plates 24, the pieces resting on said arms are pulled back, as shown at *e*, Fig. 5, away from those pieces that may lie partly across said tips and partly on the plates 24, —this movement also effecting an appreciable raising of said tips 29, thereby to form, in effect, an appreciable hump in supporting relation to such of the shingled pieces that overlie said tips, with the result that the shingled mass is still further broken up and spread out, partly on the plates 24 and partly on the arms 23. After the movable racks 4, 4 come to rest in the position shown in Fig. 5, any pieces remaining on the arms 23, 23 beyond reach of the shuffle bars 28, 28 of the table 20 are left there until the next operation of said movable racks, at which time the elevation of the trunnioned ends of said arms so inclines the latter that said remaining pieces slide by gravity, individually, onto the plates 24, while the disintegrating devices are operating on the next succeeding pack deposited in the last stationary notch 2′ of the cooling bed, in the manner above described.

It will be noted that each pack is disintegrated to a considerable degree as the result of its tipping over and sliding down the inclined end surface 27 of the stationary racks and the inclined supporting surface of the arms 23 (Figs. 3 and 4). A further disintegration results from the lowering of the pivotal supports of said arms 23, 23. A still further separation of the shingled pieces results from the relative movement of said pieces toward the right on said arms 23, 23, which is obtained by the final left hand movement of said arms relative to said pieces.

I claim:

1. The combination with a carry-over cooling bed having notches for the support and movement of pieces in pack formation, each of said notches having a forward and rear surface, the former being in advance of the latter in the direction of movement of said packs, and a support at the delivery end of the bed, said support having a horizontal surface, of means at the receiving end of said bed for packing said pieces to rest edgewise against the rear side of a notch of said bed, and means at the delivery end of said bed for procuring disintegration of said packs, said means comprising a member arranged in supporting relation to a pack delivered from said bed, the delivery end of said member being slidable along the substantially horizontal surface on said support, and the other end of said member having a substantially rotary movement.

2. The combination with a notched carry-over cooling bed for the support and movement of pieces in pack formation, each of the notches having a forward and rear surface, the former being in advance of the latter in the direction of movement of the packs, of means at the receiving end of said bed for packing said pieces to rest edgewise against the rear side of a notch of said bed, a support at the delivery end of said bed, and means at the delivery end of the bed for positioning the pieces in shingled relation with the rearward edge of each piece underlying the forward edge of the adjacent piece

and for subsequently delivering said pieces individually to said support, said last means including a member onto which the pieces are delivered in shingled relation and from which the pieces are delivered individually to the support, said member having its delivery end slidable on the support, and the other end of said member having a substantially rotary movement.

3. The combination with a cooling bed comprising stationary and movable members, each having notches for the support and movement of pieces in pack formation, and a support at the delivery end of said bed, of means at the delivery end of said bed for receiving the packs from said bed, said means comprising a member pivotally mounted on the movable member of the bed and slidable on said support, said member receiving the pieces of each pack in substantially shingled relation, with adjacent edges of successive pieces overlapping, and delivering said pieces individually to said support.

4. The combination with a cooling bed comprising stationary and movable members, each having notches for the support and movement of pieces in pack formation, each of said notches having a forward and rear surface, the former being in advance of the latter in the direction of movement of said packs, a support at the delivery end of said bed, and means at the receiving end of said bed for packing said pieces to rest edgewise against the rear side of a notch of said bed, of means at the delivery end of said bed for receiving the packs from said bed, said means comprising a member pivotally mounted on the movable member of the bed and slidable on said support, said member receiving the pieces of each pack in substantially shingled relation, with adjacent edges of successive pieces overlapping, and delivering said pieces individually to said support.

5. The combination with a cooling bed for the support and movement of packs of pieces, said bed comprising stationary and movable members, and a support at the delivery end of the bed, of disintegrating means for said packs comprising supporting members onto which the pieces of each pack are delivered from said bed in substantially shingled relation, said supporting members being pivotally connected to the movable members of the bed and slidable on the support, and means for advancing the pieces on said supporting members relative to said member to withdraw the delivery end of said member from beneath each of the shingled pieces successively.

6. The combination with a cooling bed for the support and movement of packs of pieces, said bed comprising stationary and movable members, and a support at the delivery end of the bed, of disintegrating means for said packs comprising supporting means onto which the pieces of each pack are delivered from said bed in substantially shingled relation, the delivery end of said members being slidable on said support and the other end of said members having a substantially rotary movement, and means comprising part of the cooling bed for moving the pieces relative to said members for withdrawing the support of the delivery end of said members from each of the shingled pieces successively.

7. The combination with a cooling bed for the support and movement of packs of pieces, said bed comprising stationary and movable members, the latter being movable in a substantially circular path, and a support at the delivery end of the bed, of disintegrating means for said packs comprising supporting members onto which the pieces of each pack are delivered from said bed in substantially shingled relation, the delivery end of said members being slidable on said support and the other end of said members being pivotally mounted on said movable members.

8. The combination with a cooling bed for the support and movement of packs of pieces and a support at the delivery end of the bed providing a substantially horizontal surface, of means at the delivery end of said bed for distintegration of said packs comprising supporting members onto which the pieces of each pack are delivered from said bed in substantially shingled relation and from which the pieces are delivered individually to said support, the delivery end of said members being slidable on said horizontal surface, and the other end of said members having a substantially rotary movement.

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