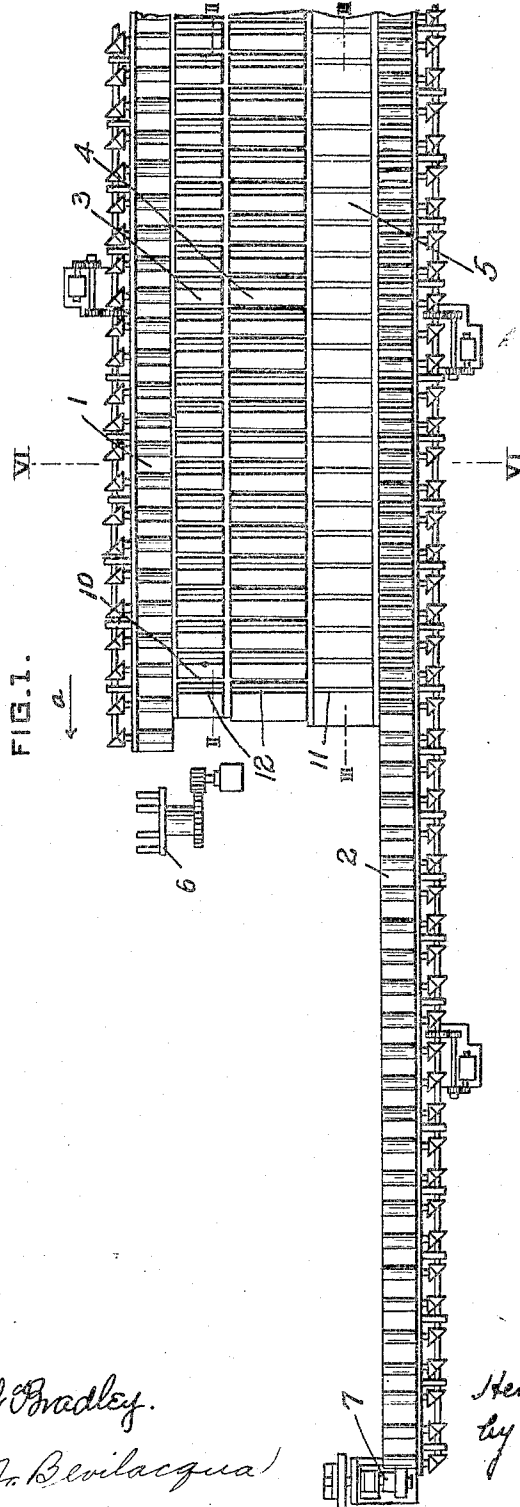


H. G. O'BRIEN.
TRANSFER TABLE FOR ROLLING MILLS.
APPLICATION FILED JULY 30, 1919.

1,362,845.

Patented Dec. 14, 1920.

4 SHEETS—SHEET 1.



WITNESSES
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4 SHEETS—SHEET 2.

FIG. 2.

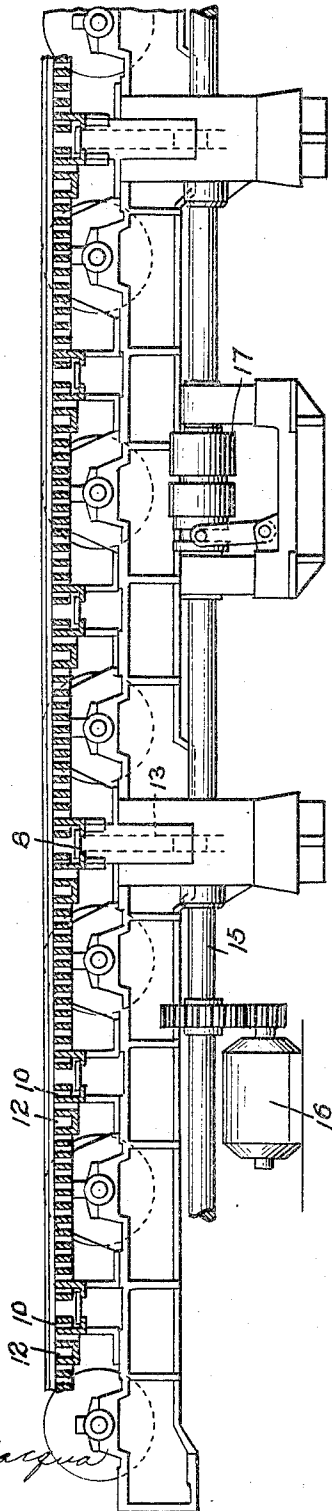


FIG. 3.



WITNESSES

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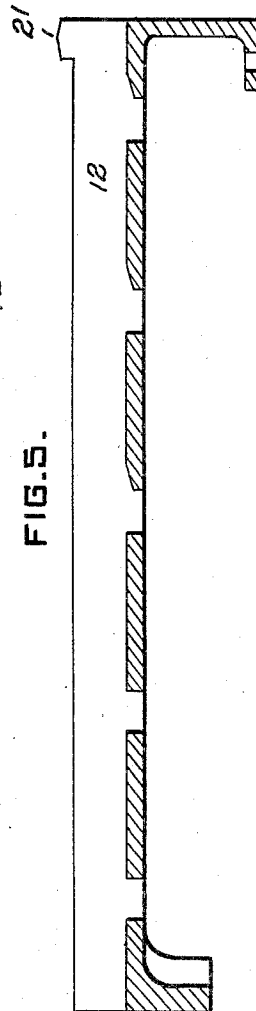
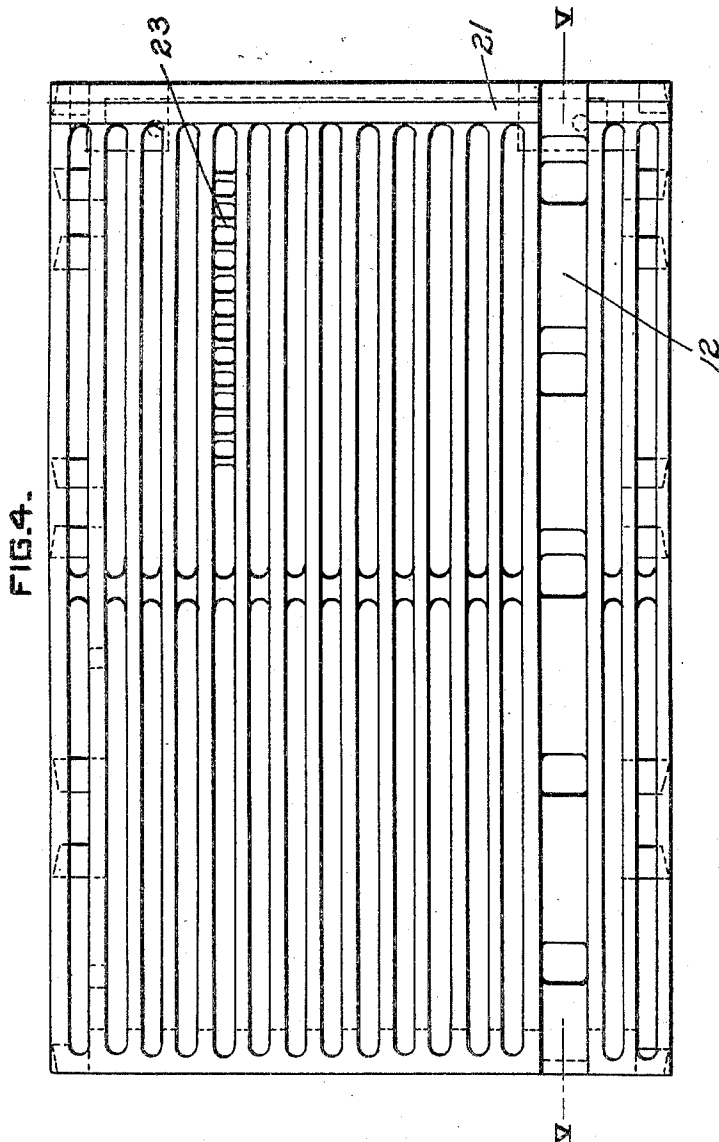
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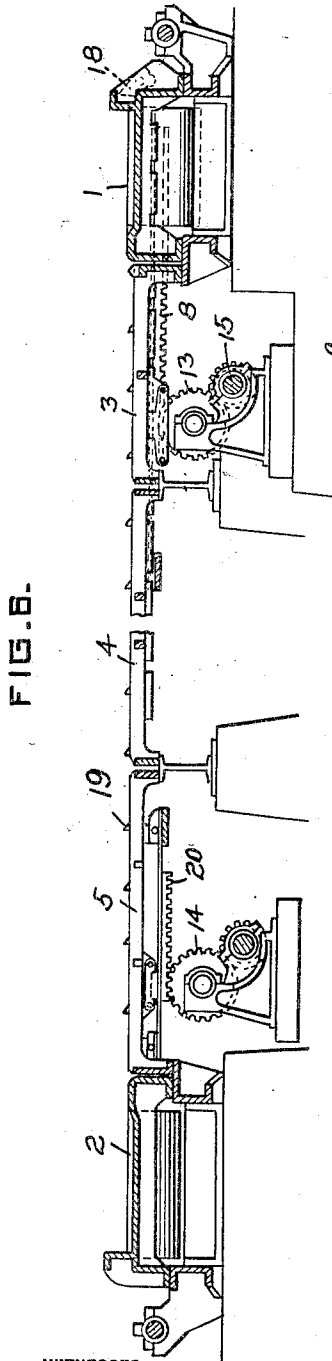
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4 SHEETS—SHEET 4.



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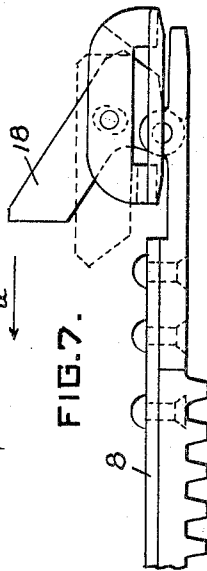
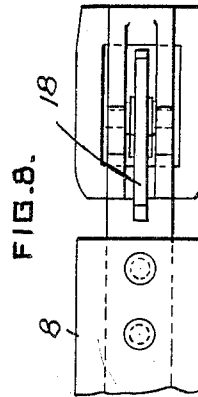
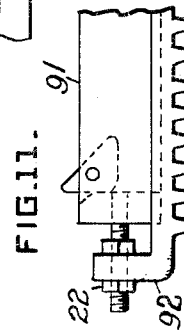


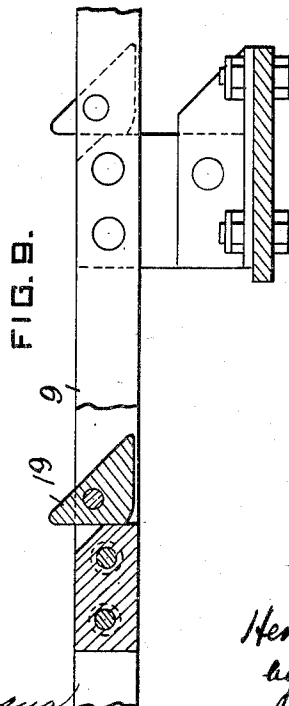
FIG. 7.



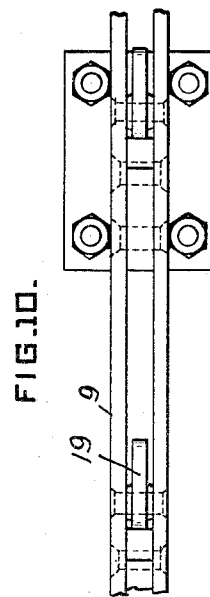
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UNITED STATES PATENT OFFICE.

HENRY G. O'BRIEN, OF WARREN, OHIO.

TRANSFER-TABLE FOR ROLLING-MILLS.

1,362,345.

Specification of Letters Patent.

Patented Dec. 14, 1920.

Application filed July 30, 1919. Serial No. 314,276.

To all whom it may concern:

Be it known that I, HENRY G. O'BRIEN, residing at Warren, in the county of Trumbull and State of Ohio, a citizen of the United States, have invented or discovered certain new and useful Improvements in Transfer-Tables for Rolling-Mills, of which improvements the following is a specification.

My invention relates to improvements in transfer tables for rolling mills; it consists in mechanism peculiarly adaptable to varying conditions of service; and, while not so limited, it is applicable with notable advantage to the cooling-table of a strip-mill. I shall show and describe it in this particular application, but the fact of wider applicability will be apparent to one who reads through this specification.

In the accompanying drawings Figure 1 shows in plan the cooling-table of a strip mill in which my invention is embodied; Fig. 2 is a fragmentary view in vertical section and to larger scale, on the plane indicated by the line II—II, Fig. 1; Fig. 3 is a second such view, on the plane indicated at III—III, Fig. 1; Fig. 4 is a view in plan and to still larger scale showing one of the grids detached, which in Fig. 1 are shown assembled; Fig. 5 shows the grid in vertical section, on the plane indicated at V—V, Fig. 4; Fig. 6 is a view in vertical section (and to substantially the same scale with Figs. 2 and 3), on the plane indicated by the line VI—VI, Fig. 1; Figs. 7 and 8 are views in side elevation and in plan, and to larger scale, of a detail termed the "push off"; and Figs. 9 and 10 similarly illustrate a co-operating detail, termed the "pull over." Fig. 11 is a fragmentary view in side elevation of the pull over and illustrating a refinement in structure.

Referring first to Fig. 1, the table-top will be seen to be flanked by two runways, 1 and 2, composed each of a succession of positively driven rolls, and to consist of a succession of series, 3, 4, and 5, of grids, arranged between the runways. Both runways carry the material in the direction indicated by the arrow *a* and the transfer mechanism presently to be described carries the material across the table, downwardly, as shown in Fig. 1, that is to say from runway 1, over grids 3, 4, 5, in the succession enumerated, to runway 2. Opposite the end of runway 1, as shown in Fig. 1, stands a

reel 6, and opposite the end of runway 2 (which extends in the direction of travel a considerable distance beyond runway 1 and beyond the table) stands a shear 7. This is a convenient arrangement; and, although in these respects my invention is not circumscribed nor limited, explanation should be made of these features: The newly rolled material, strip, rod, or of other shape, comes hot from the rolling mill, advancing upon runway 1. If desired, this material may advance directly to the reel 6 and be there coiled and thence carried away. In that case the cooling table does not come into play. But if strip material, for example, is to be produced in quantity and in specified lengths, the strip coming hot from the mill passes along runway 1 till it comes opposite the cooling table. The driving rolls of the runway are then stopped and the length of material comes to rest. It is then transferred laterally, by apparatus presently to be described, to the cooling table. It lies on the cooling table until it is brought more nearly to atmospheric temperature, and at length comes to runway 2. When the length of strip material has been carried to runway 2 and rests upon the rolls which form that runway, the rolls are set in rotation, and the strip is carried along to the shears. It is there cut into the lengths desired, and since when cut it is at relatively low temperature, allowance for thermal contraction may be kept within narrower limits, and the waste incident to ultimate trimming may be less, or further trimming may be rendered unnecessary.

The number of series of grids is not a vital matter; I have shown three series, but it will be understood that I might have shown any other number. The individual grids are, as actually built, 33 inches wide, but this is a matter of structural convenience. It is convenient to arrange the transfer mechanism in part at least in spaces between adjacent grids, and the interval of 33 inches is a proper interval between successive fingers to bear upon the material and to drive it transversely across the table. This interval of course is not invariable.

There are conveniently two series of transfer mechanisms, termed the "push off" and the "pull over"; the first carries the material from runway 1, the other delivers it to runway 2, and the two mechanisms in their range of movement overlap, after the man-

ner and to the ends to be described. Again it should be said that the multiplicity of series of transfer mechanisms does not go to the essence of the invention; two such series are found convenient, but as will be understood in the sequel there might be a single series, or three series or more.

Referring to Figs. 6, 7, and 8, the "push off" consists of a series of slides 8, each armed with a dog 18 presently to be described, and reciprocatory between adjacent grids of series 3 (*cf.* Fig. 1); and, referring to Figs. 6, 9, and 10, the "pull over", consists of a series of slides 9, armed each with a series of dogs 19 and reciprocatory between adjacent grids of series 5. Referring to Figs. 1 and 2 it will appear that the grids of series 5 are not alined with those of series 3 and 4, but are arranged in staggered relation thereto; the push off reciprocates in slideways 10 formed by and between the individual grids of series 3, and slideways 11 for the pull over are similarly formed between the grids of series 5; and, further to provide for extended traverse of slides 9, the individual grids of series 3 and 4 are provided with channels 12 which, when the grids are assembled, are alined with and form continuations of the slide-ways 11. This is shown in Fig. 1. Fig. 4 shows in plan a single grid of series 3, and Fig. 5 is a vertical section along the mid-line of the channel 12 (*cf.* Figs. 2 and 3).

The slides of the two series are caused to reciprocate in their several slide-ways by means of racks formed on their under sides, and pinions 13 and 14 engaging each a slide of one of the two series. For each series of slides there is a series of pinions, driven conveniently from common power-shafts—a shaft for each series—and each power-shaft is driven by a separate motor. Fig. 2 shows in elevation the power-shaft 15 for driving the pinions 13 for the "push off," and a motor 16 is shown driving shaft 15. A clutch 17 indicates that shaft 15 may be made in section, to the end that a longer or shorter series of "push off" slides may be operated, according to the conditions of work.

The slides 8 carry each a single dog 18, pivoted to swing to alternate positions shown in full and in dotted lines in Fig. 7. This dog 18 is provided with means (the details of which form no part of my present invention) which effect its turning at proper times and to proper degree: when the slide advances in the direction indicated by the arrow *a*, the dog is by such means brought to full-line position, ready to engage upon its vertical face a strip of material resting on runway 1 and to carry it to the table-top, and when the slide 8 recedes, the dog is brought to the dotted-line position and passes beneath any material which may then

be resting on runway 1. Comparing Figs. 6 and 1, it will be seen that the slide 8 has a range of movement across the series 3 of grids, and the dog moves from a position on the farther side of runway 1 (the right-hand side, Fig. 6; the upper side, Fig. 1) across the runway and across the table-top from its margin toward the middle. Of course it will be understood that the extent of traverse of the dogs 18 across the table-top may be greater or less, as may be desired, but it is requisite that the dogs 18 in their range overlap the ranges of dogs of the pull over, presently to be described.

The slides 9, movable in slide-ways 11 and channels 12, are equipped each with a series of dogs 19. These slides are reciprocatory by the rack and pinion mechanism already described. The dogs 19 are spaced at intervals throughout the extent of each slide and the interval between successive dogs is less than the range of permissible movement of the slide. The position of the end dog (nearest the runway 2) is such that at one end of its range of movement it will carry a piece of material until it rests on the runway.

The dogs 19 are pivoted in the slides 9; they present forward vertically disposed faces and rearward inclined faces; rotation clockwise (*cf.* Fig. 9) is suitably prevented; they are so weighted that when free to rotate they stand in the position shown in Fig. 9; when the slides 9 are retracted work lying on the table to rearward of a dog 19, engaging the dog upon its inclined face, turns it so that it passes beneath the work; when free again, the dog resumes its normal position by gravity.

Referring to Fig. 6 it will be observed that, whereas the table-top and the runway 2 are at a common level, the level of runway 1 is somewhat higher; the dogs 18 stand correspondingly higher than the dogs 19; and it will further be observed (*cf.* Fig. 5) that the grids of series 3 (which are arranged next runway 1) are provided along their edge adjacent the runway 1 with a step 21. Over this step the material falls as it is pushed by dogs 18 from runway 1.

The grids of series 3 may be provided in their recesses with rungs 23, these may be set at intervals, for a distance of say 20 inches from step 21. Their function will presently be explained.

One further structural feature remains to be explained; it is shown in Fig. 11. The slides 9, or some of them, may advantageously be formed as compound members; bars 91 which carry the dogs being mounted in frames 92 which carry the racks, and these two slide parts may be made longitudinally adjustable, by the screw-thread adjustment indicated at 22, or its equivalent. It will be understood that by such provision the dogs

of adjacent slides 9 may be brought into exact alinement longitudinally of the table.

The operation will readily be understood. Material that is to be reeled passes down
5 runway 1 to reel 6, without bringing into play the mechanism in which this invention resides. Material which is to be handled in extended form—and particularly material that is to be sheared to specified length,
10 is carried across the table, and, if sheared, is not sheared until relatively cold and contracted. The operator, by suitable control (conveniently electric) stops the rolls of runway 1 when the material has advanced
15 to the desired point. He then operates the "push over"; and dogs 18, engaging the material at intervals, push it transversely from the runway, over step 21, until it rests on grids 3 of the table top. Attendants may then, should the length of material lie obliquely on the grids, by means of crowbars thrust through the grids and finding
20 purchase against the rungs 23, true the material against the face of step 21. The dogs 19 pick the material up where the dogs 18 have left it, or, perhaps, where it lies, trued up against step 21.

The dogs 19 take the material and pull it step by step across the table, at such speed
30 as the operator may determine, to afford the necessary cooling and to take care of the output of the mill. The range of movement of the slides 9 being greater than the interval between the dogs 19, proper movement of the slides will cause the successive
35 dogs to pick the material up and push it along, until at last it is delivered to runway 2. Furthermore, the extent of the traverse of the slides (both of slides 8 and
40 slides 9) is under the control of the operator, by virtue of the motor drive of pinions 13, 14 which engage the racks of slides 8 and 9, and in this respect too the operation of the table is adaptable to the occasion. It is desirable, as has been intimated,
45 to have the drive of the rolls of the two runways 1 and 2 also wholly within the control of the operator.

The alinement of the dogs 19 of the succeeding series of "pull over" devices has
50 already been explained. Such alinement is a preliminary matter, preparatory to the handling of material.

I have shown and described my invention
55 with all the minutiae of an actual installation. It will be understood that details may be varied as desired; my invention

consists in the general features of mechanical construction defined in the ensuing claims, and so long as these features are
60 present the invention is present, regardless of details.

I claim as my invention:

1. In a transfer table structure, the combination, with a table-top, of a plurality of
65 slides provided each with a work-engaging dog and with a driving rack, means for operating the slides in unison transversely of the table-top such operating means including pinions engaging the racks with
70 which the slides are provided, one of said slides including a frame carrying the rack and a bar carrying the dog, and frame and bar being adjustable one relative to the other, substantially as described. 75

2. In a transfer table for a rolling-mill the combination of a runway, a grid-formed table-top arranged adjacent the runway, and at a lower level than the runway, the
80 step-down from runway to table-top affording a vertical bounding wall to the table-top, and a rung arranged in a grid recess in said table-top, substantially as described.

3. In a transfer table for a rolling-mill the combination of a runway, a table-top
85 adjacent the runway, a slide reciprocable transversely of the runway and provided with a dog and with means for swinging the dog to active or inactive position according as the slide reciprocates in one direction
90 or the other, a second slide reciprocable transversely of the table, also provided with a dog, the range of movement of the dogs on the two slides overlapping, substantially as described. 95

4. A transfer table composed of a plurality of grid-plates and provided with a slide for transferring material across the grid-plates, two of said plates being arranged side by side and spaced apart, forming a
100 slideway by and between them, and a third plate being arranged end to end, relatively to the two plates first named, and being provided with a channel forming a continuation of the runway between the
105 two plates first named, substantially as described.

In testimony whereof I have hereunto set my hand.

HENRY G. O'BRIEN.

Witnesses:

JOHN W. HUGHES,
LAURA M. JONES.