April 15, 1952 E. T. PETERSON 2,592,948

ROLLER LEVELER

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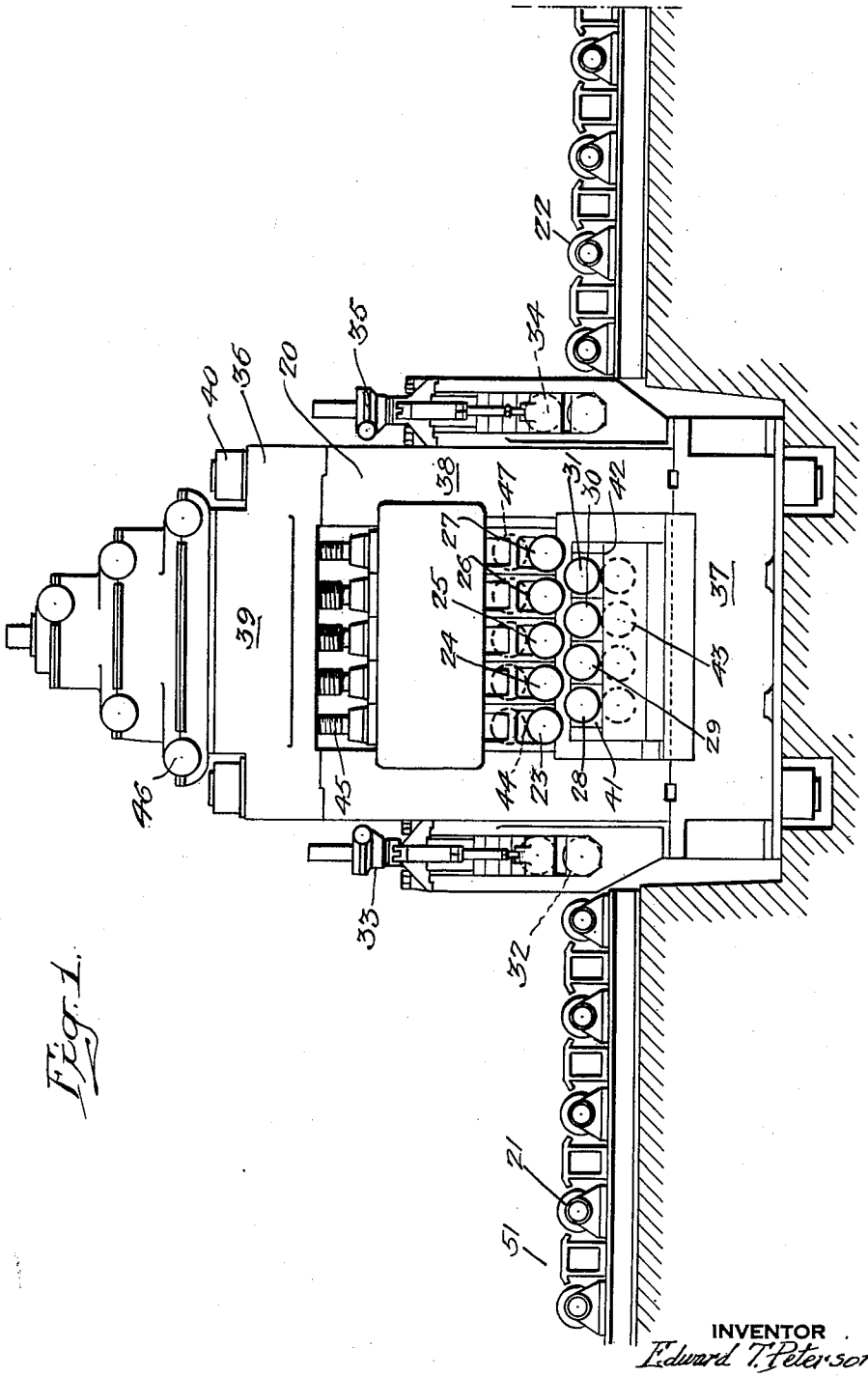


Fig. 1.

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Fig. 2

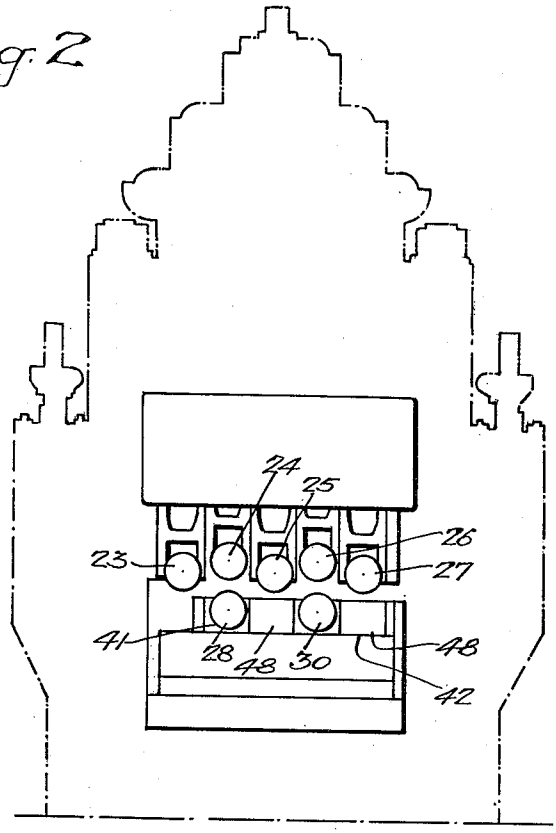
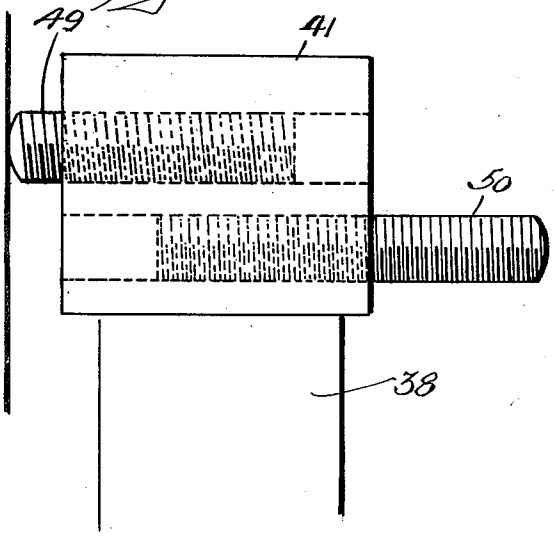


Fig. 3.



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Fig. 4.

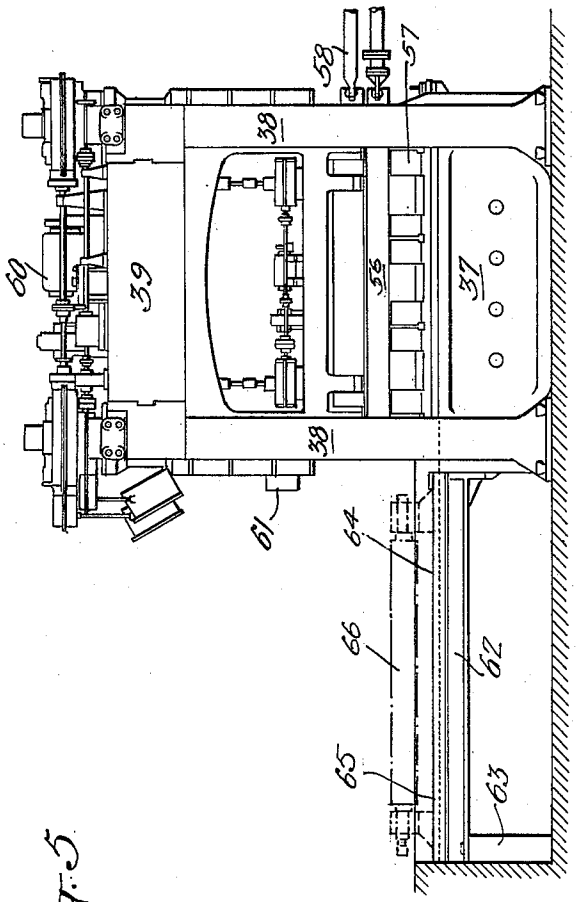


Fig. 6.

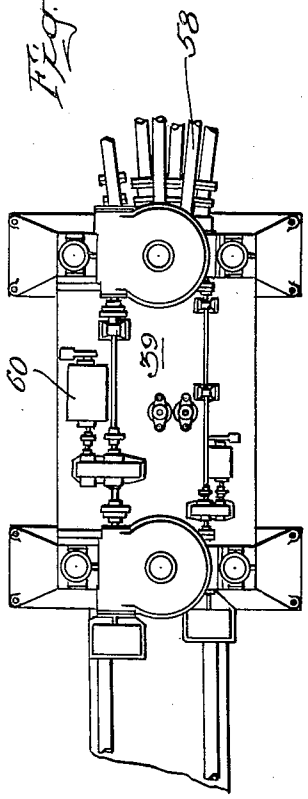
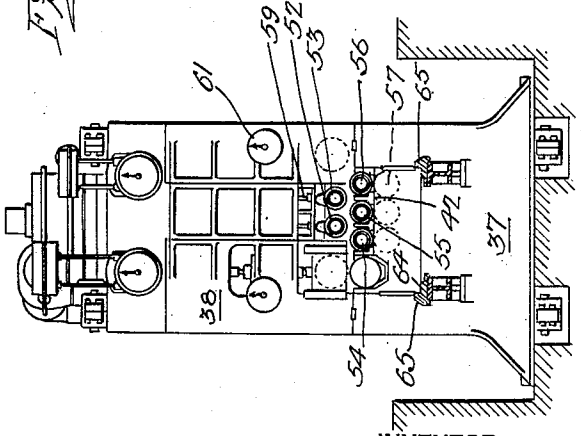


Fig. 5



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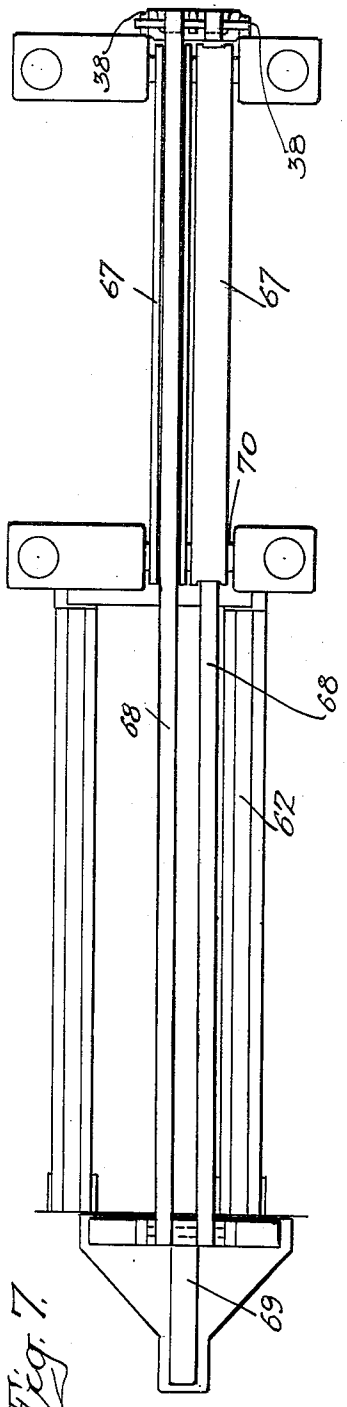


Fig. 7.

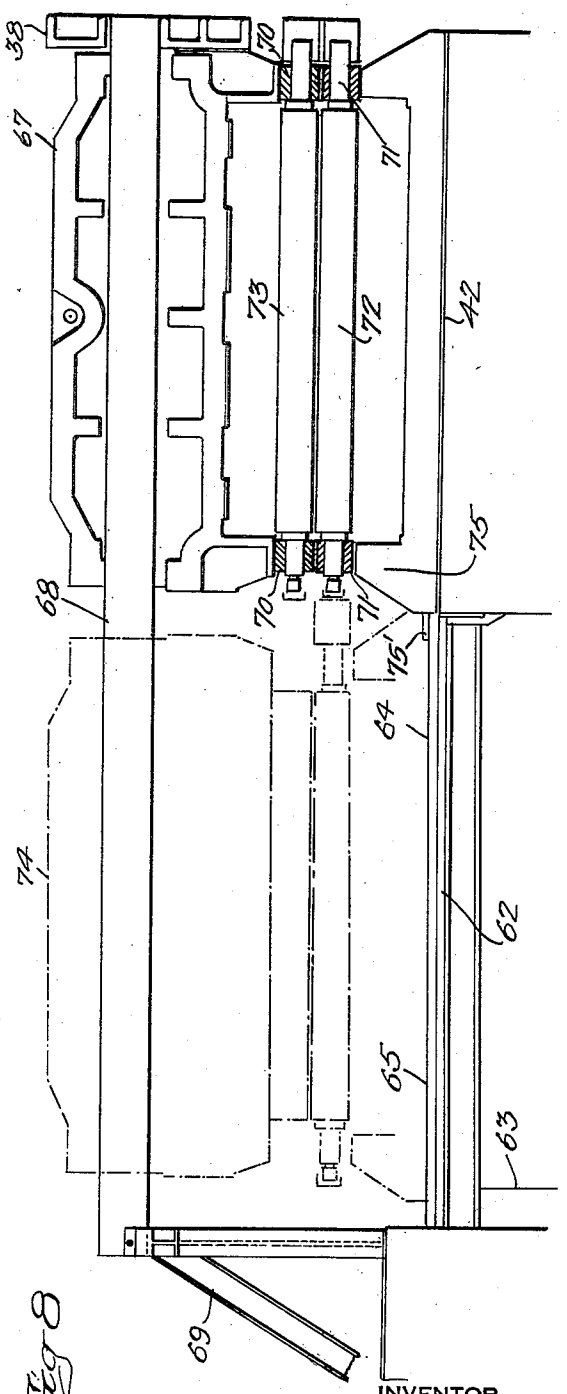


Fig 8

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UNITED STATES PATENT OFFICE

2,592,948

ROLLER LEVELER

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Application November 26, 1947, Serial No. 788,273

1 Claim. (Cl. 153—104)

1

The present invention relates to roller levelers of the character which are employed in straightening metallic plate.

A purpose of the present invention is to broaden the range of thicknesses on which a roller leveler can operate effectively and improve the effectiveness of operation on certain size ranges.

A further purpose is to permit conversion of a roller leveler from a form best suited to operation on one size of plate to that best suited for operation on plate of another size.

A further purpose is to permit removal of upper and lower rolls from a roller leveler and reorienting of lower rolls with respect to upper rolls.

A further purpose is to facilitate withdrawal of lower rolls bodily axially for the purpose of changing the orientation of the rolls and for inspection and repair of the rolls and journals.

A further purpose is to mount rolls of a roller leveler from chucks mounted on heads which are movable axially of the rolls.

A further purpose is to suspend a roller leveler roll from a head which is movable endwise with respect to the roll.

Further purposes appear in the specification and in the claim.

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

All of the drawings are intended as diagrammatic illustrations of the subject matter.

Figure 1 is a side elevation of one embodiment. The journal mountings are omitted from the near ends of the rollers and shown in Figure 3.

Figure 2 is a fragmentary skeletonized illustration showing the rolls in Figure 1 placed for straightening of a different gage.

Figure 3 is a fragmentary top plan view of a journal mounting.

Figures 4 to 6 illustrate a variation in the invention.

Figure 4 is a front elevation omitting the approach table.

Figure 5 is a side elevation of Figure 4.

Figure 6 is a fragmentary top plan view.

Figures 7 and 8 illustrate a further variation.

Figure 7 is a top plan view.

Figure 8 is a side elevation of the structure of Figure 7.

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

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In the prior art the conventional roller levelers have usually had nine rolls, five at the top and four at the bottom. These are widely used in steel mills and the like for straightening of plate gage steel and similar materials. In certain thickness ranges devices of this character perform admirably, but the range of thickness over which effective leveling is obtained is somewhat limited.

It has been discovered by the present inventor that the same leveler can be made effective on much thicker gages by removing rolls from the top and bottom set and reorienting the rolls of the bottom set. By this procedure it is possible to cover a very much wider range of plate gages on the same leveler.

The removal of rolls can be accomplished effectively in a number of ways. One convenient procedure is to arrange a table axially of the leveler so that rolls preferably with their associated journals may be skidded out axially onto the table. This has the additional advantage of permitting inspection and repair in a comparatively accessible position.

In some instances it is desirable to remove an upper roll axially, and this can be conveniently accomplished by supporting the upper roll from a head and sliding the head out axially.

In Figure 1 a roller leveler 20 is illustrated having an approach table 21 and a run-out table 22 for introducing and removing plate to be straightened. The leveler proper includes a series of parallel laterally spaced upper rolls 23, 24, 25, 26 and 27 cooperating with a series of normally staggered parallel lower rolls 28, 29, 30 and 31. In the embodiment for normal operation on plate of relatively thicker gage, five upper rolls and four lower rolls, or a total of nine rolls, are preferably employed as in the prior art.

The rollers are supported at a level corresponding to the tops of the approach table and run-out table, in line with in-take feed rolls 32 adjustable at 33 and with discharge feed rolls 34 adjustable at 35.

The rollers are mounted in a frame 36 consisting of a base 37, uprights 38 and a cap 39 suitably united by tension bolts 40.

The bottom rollers 28 to 31 are mounted at each end in journal supports 41 (only one end being shown) supported on a horizontal journal bed 42 and are suitably backed up if desired by backing up rolls 43 conveniently placed below the appropriate lower rolls.

The upper rolls 23 to 27 inclusive are individually journaled in chucks 44, each of which is

adjustable vertically by a screw jack 45 at each end. The mechanism for driving the screw jacks is not important to the present invention, but is suggested at 46 on the cap 39. It will be evident that the screw jacks may be operated by hand or otherwise, as desired. Each of the upper rollers may conveniently be backed up by backing up rollers 47 supported from the same chuck.

As seen in Figure 1 the leveler is equipped for operation in the conventional manner, using five rolls, 23 to 27, in the upper set and four rolls, 28 to 31, in the lower set. When a limit is reached in the gage thickness at which the plate cannot be straightened on the machine, it is necessary to abandon the use of the equipment. An important feature of the invention involves the arrangement which permits removal of rolls and regrouping of roll spacing to handle the leveling of thicker gages.

Referring to Figure 2 it will be evident that rolls 24 and 26 have been effectively removed by raising the corresponding screw jacks 45 so that, as shown in Figure 2, the rolls 24 and 26 cannot engage the plate. Likewise, lower rolls 29 and 31 have been removed and rolls 28 and 30 have been moved laterally, sliding their journals 41 at each end on the bed 42, achieving the desired spacing. In the form shown the center of rollers 28 is equally spaced between the centers of rollers 23 and 25, and the center of roller 30 is equally spaced between the centers of rollers 25 and 27. This is, however, a matter of choice and other roller spacers may be used, for example, with the lower roll closer to the forwardly positioned adjoining upper roll than to the rearwardly positioned adjoining upper roll.

With the rolls in the position as shown in Figure 2 suitable spacer blocks may be interposed at 48 to prevent misplacement of the rolls, if desired.

In the form of Figure 3 the lateral spacing between the journals 41 is achieved by laterally extending screw jacks at 49 and 50 on each journal which can be moved out to engage the adjoining journals of the bottom set.

In operation of the form of Figures 1 to 3, the plate 51 traveling on the approach table 21 may pass through the leveler employed in the conventional manner as shown in Figure 1, if the gage is sufficiently small, moving from left to right through the feed rolls and the leveler rollers and emerging at the right on the discharge table 22.

If the plate is too thick for satisfactory leveling with the structure of Figure 1, the device will be converted to the form of Figure 2 by effectively removing two upper rolls 24 and 26, removing two lower rollers 29 and 31, and rearranging the spacing of the lower rolls, thus making them substantially equidistant between the adjoining effective upper rollers.

When the arrangement as shown in Figure 2 is achieved, the lower rollers may be laterally spaced by spacer blocks 48, as shown in Figure 2, or by screw jacks 49 and 50 engaging the adjoining journals and resting on the bed 42 at each end of the rolls.

The manner of removing the lower rolls has not been specifically considered in connection with Figures 1 to 3 inclusive and will be best understood by reference to the variant form as shown in Figures 4, 5 and 6.

In this form a somewhat different roller arrangement is shown, employing two upper rollers 52 and 53 and three lower rollers 54, 55 and 56, with suitable backing up rollers 57. The respective rollers are driven by shaft connections 58 and the upper rollers are adjusted for gage by jacks 59 supporting the upper rollers suitably driven by automatic mechanism 60 forming no part of the present invention, the gage being indicated by suitable indicators 61, as well known. The remaining parts of the leveler proper are substantially identical with those seen in Figure 1.

On a level with the bed 42 supporting the journals of the lower rolls at each end and axially beyond the leveler is a horizontal table 62 having supports 63, a skid top surface 64 and guard rails 65 at the ends. Using the power from a crane or any other suitable source, an individual lower roll with its journals is slid out endwise onto the table 62. The roll and journal assembly 66 on the table can be conveniently inspected or repaired, or can be retained on the table for the purpose of reducing the number of rolls, as discussed in reference to Figures 1, 2 and 3. Thus the table 62 is intended to be an adjunct of the roller leveler of Figures 1 to 3.

It is in some cases important also to remove the individual upper rolls. Figures 7 and 8 show mechanism for accomplishing this, which can be applied to the form of Figures 1 to 3, or of Figures 4 to 6 respectively.

Inside the leveler in the space between the cap and between the uprights, heads 67 are located, preferably one for each upper roll (although permissibly each head may support a group of upper rolls), being mounted on horizontal removable rails 68 mounted in the uprights 38 at one end and extending axially of the rolls to a position outside the leveler where external support is provided at 69. The rails are removed by lifting them out of their supports. Each head 67 has its own rail 68. Depending from each head and supported at each end therefrom by bearing chucks 70 is an upper roller 73. Thus whenever removal of an upper roller is required for purposes of inspection, repair or to reduce the number of rollers in the leveler, the heads 67 and the depending rollers 73 held thereon by the chucks 70 can be slid on the rails to the position 74 at the left in Figure 8. There is no inconsistency between the use of the rail for sliding out the upper rollers and the use of the table 62 for skidding out the lower rollers, and accordingly in this illustration the table 62 is shown with a journal support 75 for chucks 71 for a lower roller 72, both in its position in the roller leveler supported on the bed 42 and in its position removed therefrom supported on the table 62. The journal support 75 not only slides axially as shown, but whereas in this preferred form, it supports only one lower roller on each journal support (rather than a set or group of lower rollers), the journal support also slides laterally on the bed 42 to respace the lower rolls, and may be provided with spacer adjustment as in Figure 3. A pull-out handle or crane-hook grip is shown at 75'.

It will be evident that the mechanism for sliding the upper rolls and lower rolls longitudinally, as shown in Figures 7 and 8, can be applied to levelers of the types of Figures 1 to 3 inclusive and 4 to 6 inclusive, both for inspection and repair and also to remove rollers to permit effective operation on thicker gages.

In view of my invention and disclosure varia-

tions 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 roller leveler, a head having a rail-engaging opening, a bearing chuck depending from the head at each end, a roll journalling in the chucks, and a rail extending through the rail engaging opening in the head from a position in the leveler to a position axial of the roll and to one side of the leveler.

EDWARD T. PETERSON.

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