No. 848,323. PATENTED MAR. 26, 1907.

A. RIDD.

METHOD OF PREPARING ROLLS FOR ROLLING.

APPLICATION FILED AUG. 1, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

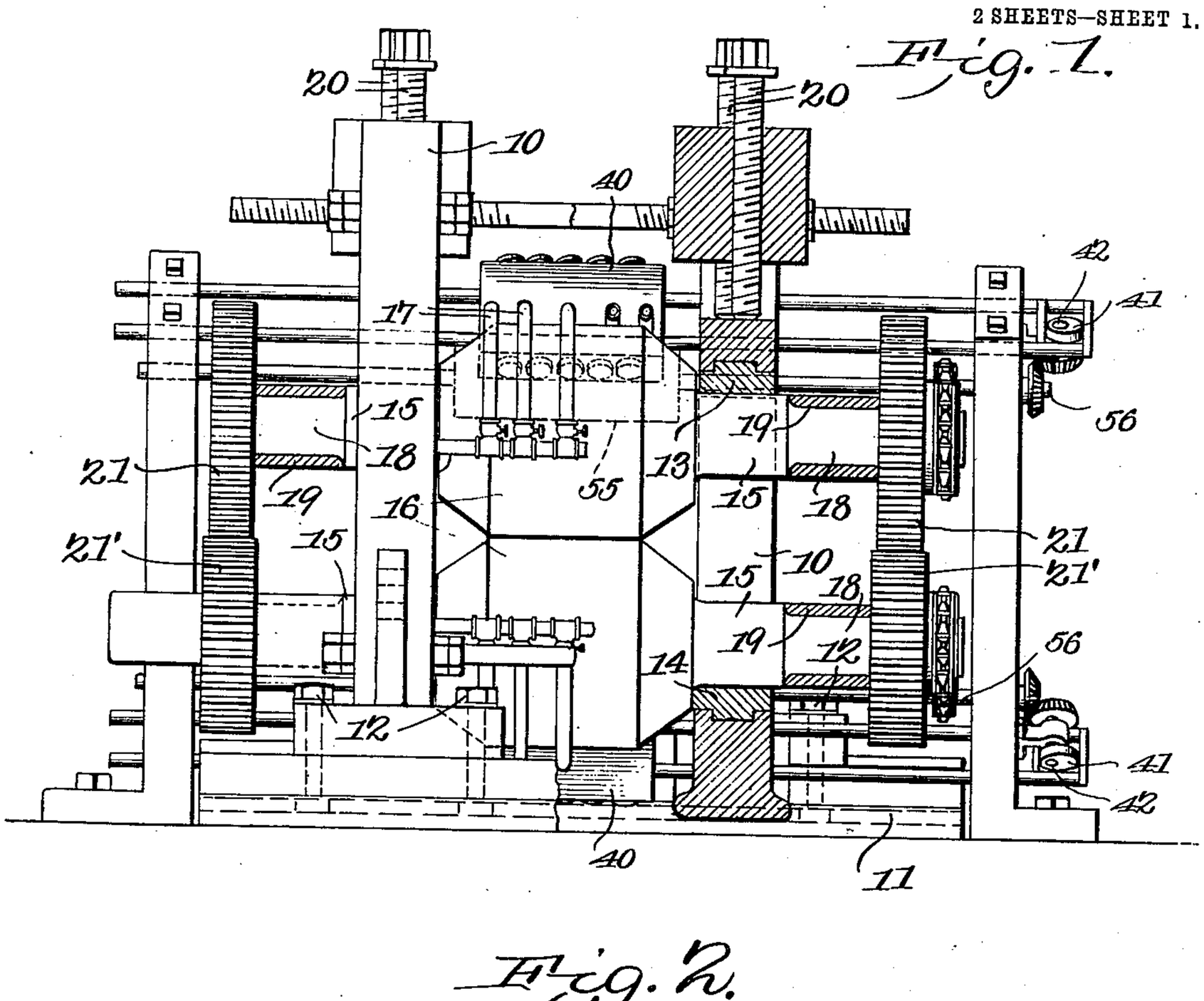
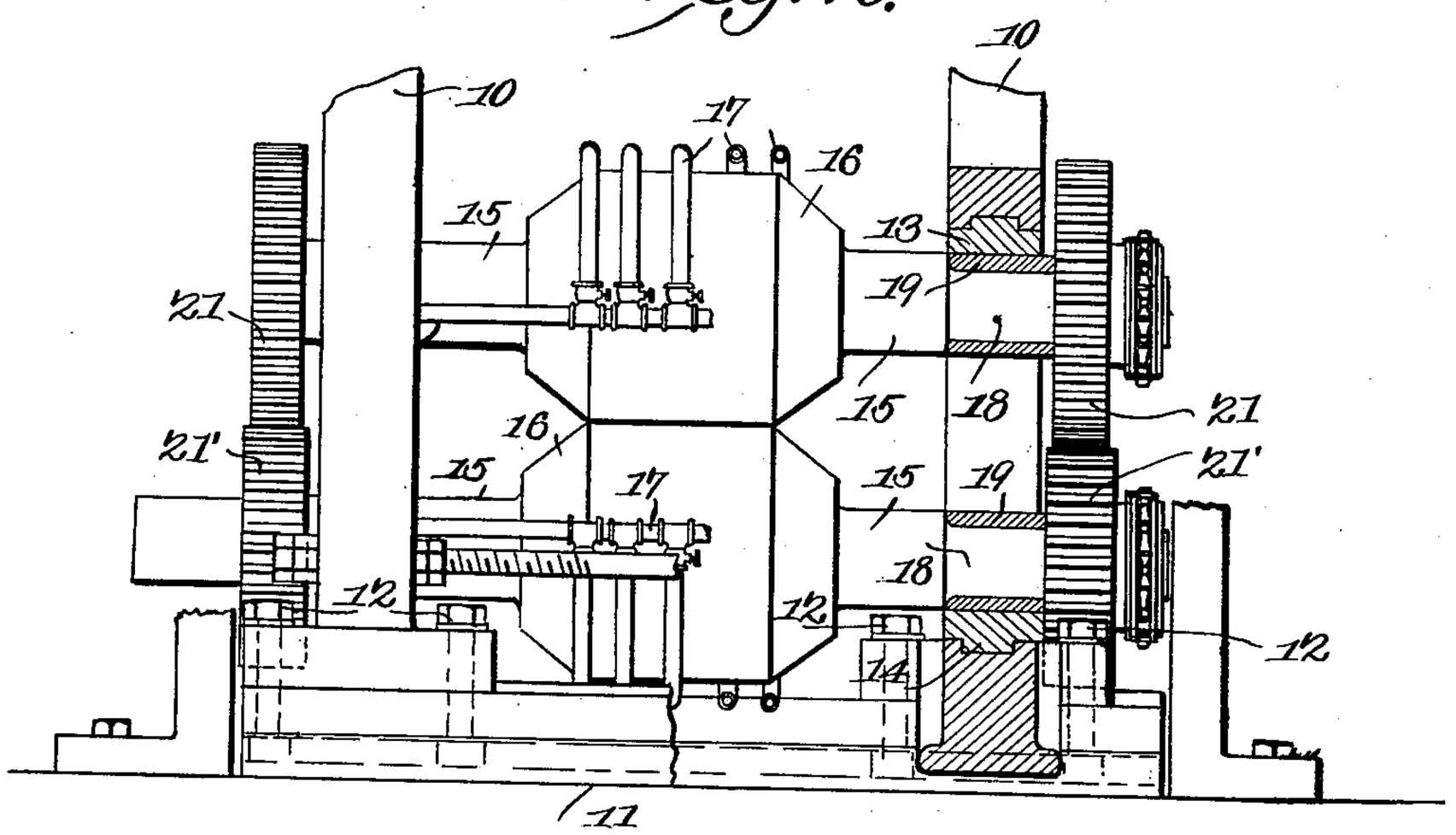


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

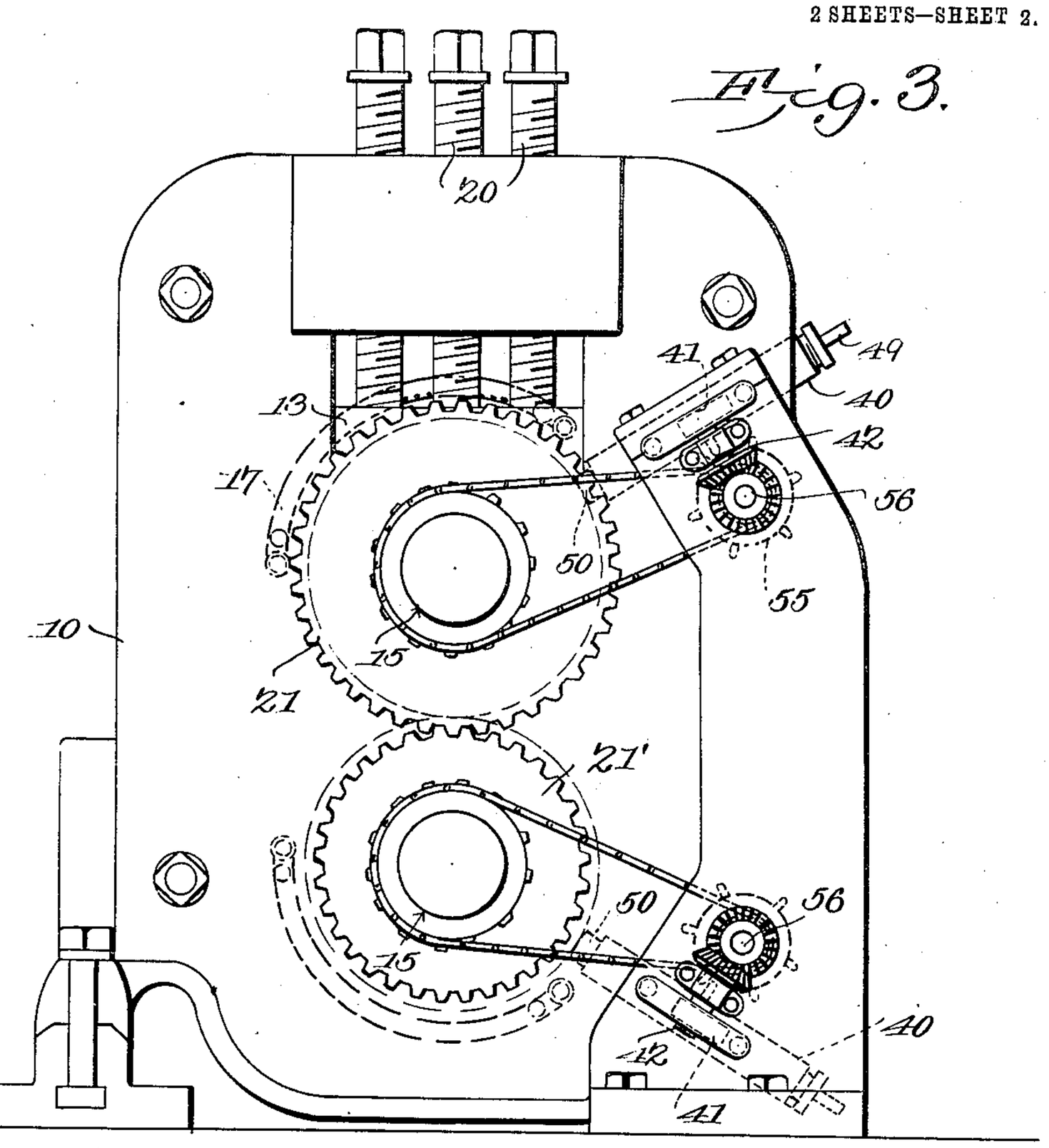
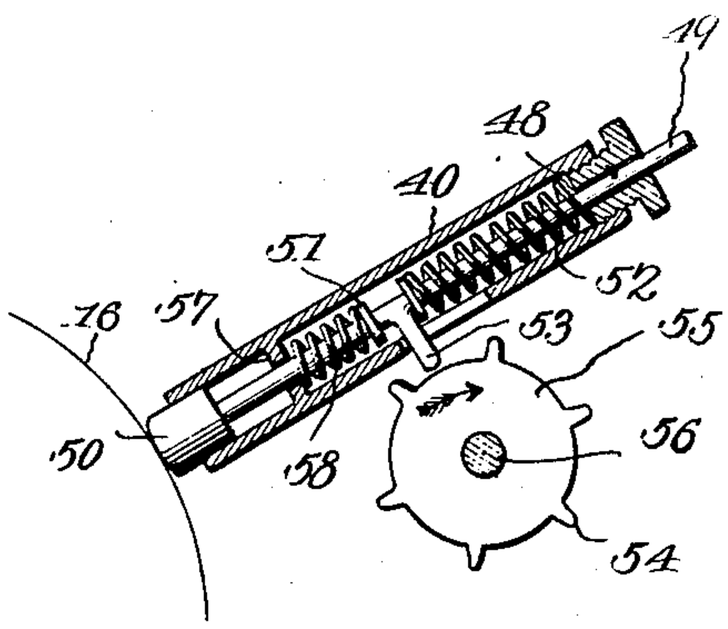


Fig. 4.



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UNITED STATES PATENT OFFICE.

AMBROSE RIDD, OF NEWPORT, KENTUCKY.

METHOD OF PREPARING ROLLS FOR ROLLING.

No. 848,323. Specification of Letters Patent. Patented March 26, 1907.

Application filed August 1, 1905. Serial No. 272,206.

To all whom it may concern:

Be it known that I, AMBROSE RIDD, a citizen of the United States, residing at Newport, in the county of Campbell and State of Kentucky, have invented a new and useful Method of Preparing Rolls for Rolling, of which the following is a specification.

This invention relates to rolling-mills, and especially to mills for the production of thin sheet-plates, such as tin and terne plates, or that class of sheet metal known as "Russian sheet-iron."

In the manufacture of thin sheet metal considerable difficulty is experienced in maintaining the rolls in proper working condition. If the surfaces of the rolls are pitted, grooved, or otherwise marked, all the imperfections will be reproduced in the sheets, and the rolls are very easily injured, owing to the fact that they are kept comparatively soft by heat, and if a plate is buckled or squeezed, so that portions of the same sheet interlap during the rolling operation, one or both rolls will be grooved and all of the following sheets will be provided with ribs. This results in considerable loss, and it becomes necessary to stop the rolling operation and repolish the rolls. In ordinary practice abrading members in the form of emery coated or carrying blocks are forced firmly against the surfaces of the rolls, and the latter are rotated until the surfaces are smooth and highly polished. The rolls, moreover, must be reheated before the rolling operation can be carried on. These polished surfaces are not always true, and when the rolls are brought together there may be considerable difference in the pressure at different points in the lengths of the rolls.

In carrying out the present invention the rolls are quickly trued, and the surfaces of the rolls are condensed in such manner as to remove all imperfections and produce a tough relatively hard surface for contact with the sheets.

A further and important object of the invention is to produce Russian sheet-iron having the desirable mottled effect found in the higher grades of imported Russian iron.

With these and other objects in view the invention consists in the method of preparing and treating the rolls and in the apparatus hereinafter described, and illustrated in the accompanying drawings, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a sectional elevation of a rolling-mill by which the invention may be carried into effect, the parts being shown in operative position ready for the rolling of a sheet or sheets. Fig. 2 is a similar view illustrating the positions to which the housings are adjusted with respect to the rolls during the preparation of the rolls for work. Fig. 3 is a side elevation of the rolls. Fig. 4 is a detail sectional view showing one of the hammering devices.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The mill is provided with a pair of housings or cheek-plates 10, that are adjustably mounted on grooved sills 11 to permit of the adjustment of the space between them, and when so adjusted said housings may be locked in place by suitable bolts 12.

The housings are provided with upper bearings 13 and lower bearings 14 for the reception of the journals 15 of a pair of rollers 16, the journals being of greater length than usual and the peripheries or working faces of the rolls being of larger diameter than usual, while the ends of the rolls taper from the bearings to the journals in order to gradually reduce the quantity of metal and the tendency to conduct heat from the bearings to the journals, so that while the working surfaces of the rolls may be maintained at the high temperature the journals will be comparatively cool.

The working surfaces of the rolls are maintained at the proper temperature in the present instance by means of a plurality of perforated gas-pipes 17, which are arched over the top roll and under the lower roll, the pipes being so arranged as to permit uniform heating of the rolls throughout their entire length or for heating one portion of the roll to a higher temperature than the other portions.

The outer end of each journal is reduced in diameter, as indicated at 18, and on this reduced portion is placed a bushing 19, formed of brass or other suitable metal, the external diameter of the bushing being approximately the same as the diameter of the main portion of the journal.

In preparing the rolls for the rolling operation the housings are moved out from the normal position shown in Fig. 1 to the posi-

tion shown in Fig. 2, or until the bearings 13 rest against the bushings 19. The compression-screws 20 are then tightened until the rolls are in contact with the entire length of the working surface, after which the rolls are heated by forcing a burning mixture through the perforated tube 17 or by other suitable heating means. As the rolls are heated they naturally expand, and as the screws 20 cannot yield the pressure between the rolls will be greatly increased. Before the heating operation is started the rolls are revolved and are kept revolving during and after the heating operation, so that as the rolls are pressed tightly against each other their surfaces will be condensed and smoothed and at the same time toughened, while the bearings being a considerable distance from the rolls are not heated to an extent sufficient to interfere with the free turning of the rolls. After the surfaces of the rolls have been brought to a condition most favorable for rolling the supply of burning mixture is either cut off or reduced, and the rolls are allowed to gradually cool until in contracting the pressure between them is reduced to an extent sufficient to permit the loosening of the screws 12, after which the housings may be restored to the positions shown in Fig. 1 and the screws adjusted in accordance with the gage of the sheets. This rolled surface is found superior to the polished working surfaces produced by ordinary methods, inasmuch as the surfaces are toughened and condensed and the rolls are perfectly matched, whereas during an ordinary polishing or truing operation it is impossible to produce perfectly matched rolls, and the sheets will be more or less uneven and of varying thickness throughout their widths. In the preparation of the rolls as described only one of the rolls may be positively driven, the other being rotated through frictional contact with the first, or both rolls may be positively driven through gearing. It is preferred, however, to provide the journals 15 with intermeshing gears 21 and 21′ at each end, said gears being of different diameter, respectively, so that the rolls being of equal diameter will have unequal surface speeds, and this results not only in the formation of a condensed rolled surface, but the rolls will also mutually planish each other and produce a rolling-surface that is superior to the surface produced by methods now practiced.

In addition to the condensing of the surfaces by pressure and rolling it is found advisable to further condense the working surface by means of hammers, and to accomplish this a series of hammers is arranged to engage each of the rolls, the hammers loosening any small particles of metal or oxid which may cling to the surfaces of the rolls and producing further condensation of the metal.

Each housing is provided with guides for the reception of a slidably-mounted bar 40, which is reciprocated in a direction parallel with the axis of the rolls by means of a suitable cam 41, the cam being mounted on a shaft 42, that may be turned manually or by any suitable mechanism. The bar is arranged in a line radiating from the axis of the roll, preferably at an angle of about forty-five degrees from the horizontal, and said bar is provided with a plurality of openings 48 for the reception of the shanks 49 of hammers 50. Each shank is provided with a small flange or collar 51, to the rear of which is a helical compression-spring 52, encircling the shank. From each shank projects an arm 52, extending through a suitable guiding-opening in the bar and disposed in the path of movement of a series of cams 54, formed on the periphery of a disk 55, that is mounted on a shaft 56, having bearings 57 depending from the bar 40. As this shaft is rotated the cams 54 will successively engage the arms 53 and will move the latter, together with the shanks, outward from the rolls, thus compressing the springs 52, and after each cam passes from contact with the arm the spring in reassuming its initial position will drive the hammer forcibly against the surface of the roll. Between the collar 51 and an annular flange 57, near the inner end of the bar, is a small cushioning-spring 58, which tends to withdraw the hammer from contact with the roll after each blow. The shaft 56 is rotated continuously, and the hammers are continuously reciprocated, and at the same time bar 40 is reciprocated in a direction parallel with the axis of the roll, so that all portions of the working surface will be subjected to the action of the hammers and any loose particles of metal or oxid will be loosened and will fall from the rolls. As the rolls are heated during this hammering operation there is no danger of crystallization of the metal, and the rolling-surface is condensed and to a certain extent is indented by the hammer-blows. The indentations, however, are reduced by the pressure at the point of contact of the rolls, and while such indentations are not visible except under a microscope they will produce in the surface of the sheet metal the mottled effect invariably found in the higher grades of imported Russian sheet metal, and while this is not of any value so far as known or does not add to the quality of the metal it improves the appearance and adds to its attractiveness, metal finished in this way commanding a much higher price in the market than metal of the same grade without the mottled effect. It is, moreover, found advantageous to carry on the hammering operation during the rolling of the sheets, inasmuch as such hammering keeps the mottled effect constant and at the same time dislodges any loose particles of metal or oxid that may cling to the roll.

Having thus described the invention, what is claimed is—

1. The herein-described method of treating rolls for the manufacture of sheet metal, said method consisting in hammering the rolls during the rolling operation in such manner as to slightly indent the same.

2. The herein-described method of treating rolls, said method consisting in continuously hammering the rolls during the rolling operation in such manner as to slightly indent the same.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

AMBROSE RIDD.

Witnesses:
J. H. JOCHUM, Jr.,
JAS. M. WALKER.