

UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING PLATES.

No. 902,787.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HARRY E. SHELDON, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Methods of Manufacturing Plates, of which the following is a specification.

In the accompanying drawings which make part of this specification, Figure 1, is a plan view showing a pack of sheets with the edges thereof notched and ragged as they appear when the rolling of the pack is finished, and Fig. 2 is an elevation of a separated pile of blanks cut from a circle x shown on Fig. 1.

My novel process relates to the manufacture of sheet metal and its objects are to save a large percentage of what would become scrap if the usual methods of manufacture were followed; to eliminate the shearing of the rolled sheets to standard sizes; and to save time and expense in the pickling operation.

Ordinarily, two or more, usually six, sheets are made into a pile and passed through the rolls and such sheets of the pack as may stick together are torn apart, so that the sheets may be handled singly in their subsequent treatment, which involves among other things, pickling, cleaning, shearing and stamping. The sticking together of the sheets is on the whole an objection, since they must be separated and the closer the sheets stick together the greater the objection since the force required must also be increased. When the sheets do stick together, it is an act to be prevented rather than sought and in such case the force with which they stick together should be the least possible.

In my process I aim in every act of rolling a pile of sheets to make the sheets stick together into a pack which will not separate or allow the sheets to slip or crawl during their subsequent treatment. This is accomplished by bringing the plates up to a sufficiently high temperature and so regulating the pressure of the rolls that the sheets shall become more or less welded together; at any rate, the temperature and pressure must be such that, during all the subsequent handling of the rolled pack, the latter will remain intact. If the sheets of the pack are not sufficiently stuck together, the severe blows, pressures and strains produced by

the shears and presses will separate the pack and thus defeat the objects I have in view. So, I seek a condition of the sheets which, in the ordinary practice, is a disadvantage.

In the common practice, the separate sheets are separately picked up and placed in holders or pickling crates with spaces between the adjacent sheets. The crates with the sheets therein are then lowered in the pickling bath which acts upon all surfaces of each sheet. It will be found upon opening properly rolled packs, that is, separating the same into their constituent sheets, that the surfaces of the sheets which were contiguous in the pack are sufficiently clean or free from scale, or would be sufficiently clean or free from scale, if not opened while too hot, to warrant the omission of pickling all but the two outside sheets, because, if the air has been excluded from contact with the inner sheets, they will not become oxidized. Here again, is an important step in my process, viz., the pickling of the pack without opening the same, either wholly or partly. Here is a saving not only in the pickling solution, but also in the handling, as a whole pack can be as expeditiously pickled as a single sheet. A further saving results also from not having to clean the sheets which were between the exterior sheets of the pack.

In the usual practice the separated sheets are sheared or squared to certain standard sizes and to no others. In the rolling of the packs the pressure of the rolls causes the metal of the sheets to spread or flow out in the planes of the sheets, whereby the packs become thinner and, consequently the individual sheets thereof become larger. The metal does not flow or squeeze out evenly at the several edges of the sheets but portions thereof flow farther than others, and the edges become somewhat broken and notched as shown at x on the drawing.

The dotted line y shows the size of the largest sheet that can be cut out. If a larger sized blank were to be cut out, its edges would not be perfect, as they would include some of the notches x . If a smaller standard sized sheet were to be cut out the waste would be much increased. Ordinarily an inch will be cut from the sides and from four to six inches from one or both ends, and the cut-off edges will form waste or scrap.

In order to get perfect sheets of any standard size, for example, sheets thirty

inches wide, the sheets must be rolled at least thirty-two inches wide, so that, when sheared to the required width, none of the breaks or notches on the edges will be included. In the common practice, the rolled and pickled sheets will be sheared to the standard size, even if the edges are not broken or notched to the shearing line *y*, because the shearing machine is set for that standard size and the change to a smaller size would involve too great a loss of time and the operator will not have time to inspect each sheet to see what standard size it can be cut to. Any inspection of the sheets would add materially to the cost of manufacture.

In the practice of all the steps of my invention, I avoid the shearing of the sheets; but I may, of course, shear the pack to some standard size before separating the sheets, if the product is desired in squared or rectangular sheets. Preferably I omit altogether the shearing and send the packs to a stamping machine which blanks out a number of piles of blanks, the circle *z* indicating how the blanks will be cut from the pack.

It is not practical to stamp or shear two or more loosely superposed metal sheets as they will slip or crawl on each other. Therefore, in order to prevent the crawl of the sheets I desire to have the sheets of the pack remain stuck together not only until the pack is pickled, but also until it has been sheared or stamped into blanks, *z*. If the pack be not rolled so as to keep the sheets stuck together until they are sheared or stamped, then a part of the objects of my invention will not be attained. The sticking of the sheets together so that they will stay together during subsequent treatment should not be left to chance, if the best results are expected.

After the piles of small blanks have been stamped they are sent to the openers, or persons who separate the piles into individual blanks. The blanks being small will be opened easily compared with the force required to open the packs as they come from the rolls, because the edges of the sheets in the packs are somewhat interlocked by means of the interlocking of the broken edges of the sheets. This is quite an advantage over the old way and is quite evident even in the separation of the sheets of squared packs, that is, packs cut with rectangular corners.

In case a bad spot occurs in the middle of one sheet and the defect is transmitted in rolling to several or all of the other sheets

of the pack, each sheet would, by the old process, be spoiled, as it is torn from the contiguous sheet; but if the pack be stamped before separating it into sheets, only a small portion of the pack will be ruined. By leaving the sheets in the pack during treatment subsequent to the rolling, I also in many cases avoid the necessity of annealing the blanks before shearing or stamping.

It is clear that my method in its preferred form may be modified, for example, the pickling may be in some instances eliminated; the rolled pack may be separated into a plurality of packs before stamping; the unopened pack may be pickled and then sheared and stamped; or the unopened pack may be pickled, and then opened and stamped, or opened and sheared and stamped. The process may be otherwise modified and I do not therefore desire to limit myself to the practice of all the steps indicated, but I desire protection on the various sub-processes thereof and on such changes as may fairly come within the scope of my invention.

Having described my invention, I claim:—

1. In the manufacture of sheet metal, rolling a plurality of sheets so that they become incipiently welded or adhere together into a pack to such an extent that they will remain together during subsequent treatment, subsequently stamping a plurality of said sheets into a plurality of blanks, and then separating the welded or adherent blanks.

2. In the manufacture of sheet metal, rolling a plurality of sheets so that the same become incipiently welded or adhere together into a pack to such an extent that they will remain together during subsequent treatment, and pickling a plurality of the sheets while in such welded or adherent condition.

3. The method of manufacturing sheets of metal, which consists in heating the sheets, rolling a plurality of superposed heated sheets into an adherent pack, treating the pack with a pickling solution to remove the scale, stamping separate packs of blanks from said adherent pack, and separating the sheets of the packs of blanks.

Signed at Pittsburgh this 19th day of January 1903.

HARRY E. SHELDON.

Witnesses:

A. M. STEEN,
F. N. BARBER.