

W. S. POTTER.
 MANUFACTURE OF PERFORATED PLATES OF MANGANESE STEEL.
 APPLICATION FILED JAN. 18, 1912.

1,018,370.

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Fig. 1.

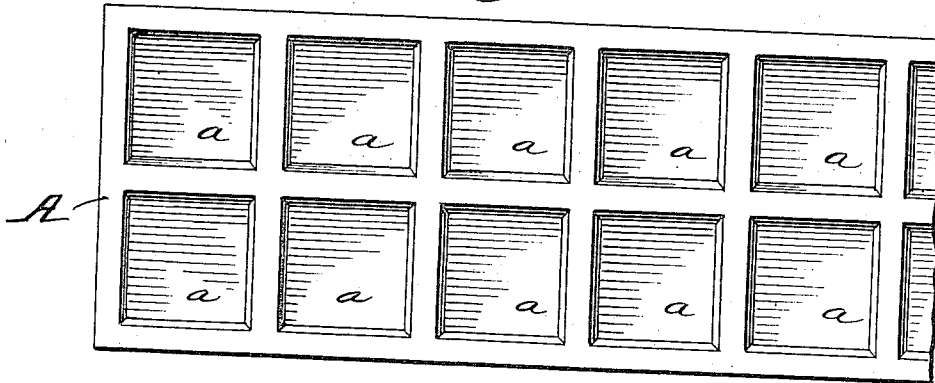


Fig. 2.

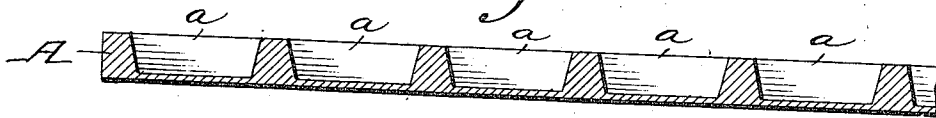


Fig. 3.

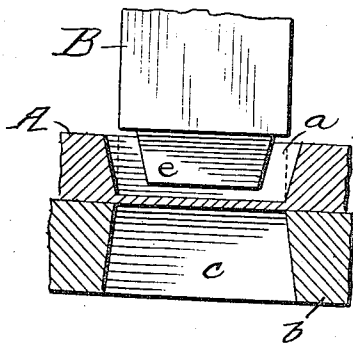


Fig. 4.

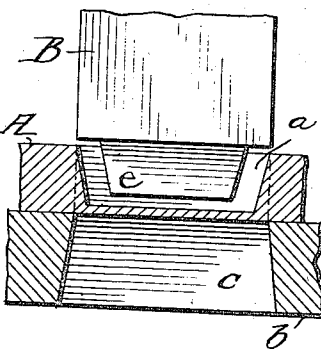


Fig. 5.

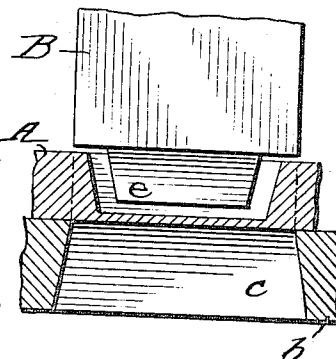
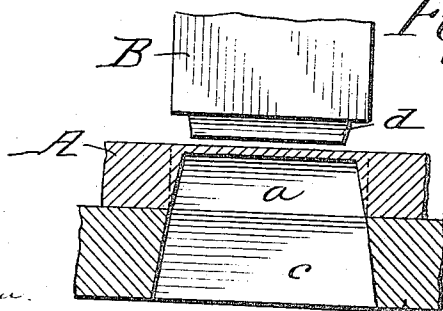


Fig. 6.



Witnesses.
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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF PERFORATED PLATES OF MANGANESE STEEL.

1,018,370.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WINFIELD S. POTTER, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in the Manufacture of Perforated Plates of Manganese Steel; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the production of perforated plates of manganese steel, and more particularly to the production of such perforated plates as are required for use as screens, such as coke screens and stone or ore screens which require to be made of such a thickness that they can not be readily perforated by a punching operation without damage to the dies or punches.

The characteristic feature of my invention consists in a heat treatment of the manganese steel plate, during the operations necessary to produce the perforations, which makes the punching operation less damaging to the punches and dies, and which reduces the metal losses which would occur if the perforating were done in the ordinary manner. Furthermore, by the practice of my invention, it is feasible to readily produce a plate with perforations separated by a very small amount of intervening metal, so that the finished screen has a correspondingly high efficiency in service, inasmuch as its total area of perforations (*i. e.* its screening area) is considerably larger than would be possible if the punching were effected while the plate was cold or in the manner ordinarily employed for the production of punched steel screens.

In the accompanying drawing, Figure 1 represents a portion of a plate of manganese steel, after it has been subjected to the preliminary operation of recessing the plate under the heat conditions incident to the practice of my invention, and prior to the final perforating operation. Fig. 2 represents a longitudinal section thereof. Figs. 3, 4, 5 and 6 represent various modifications of the final operation of completing the perforation of the plate after it has been preliminarily recessed.

Similar numerals indicate similar parts throughout the several views.

In carrying out my invention, the manganese plate for conversion into the indented screen is first brought into a substantially uniform, austenitic condition. It is then heated until it has the ductility required for the first forming step of the operation, to wit, the recessing of the plate, and is thereafter quickly brought to a suitable mechanism for producing such recesses, as, for example, a hydraulic press provided with a flat upper die surface and a bottom die surface or anvil having firmly affixed to its upper surface a plate with projecting studs so formed as to impress the desired recesses in the under side of the hot plate of manganese steel which is placed thereon for that purpose. When the hot manganese steel plate has been placed upon the studded plate or anvil of the press, the upper die or flat faced ram of the press is lowered and presses upon the upper side of the hot manganese steel plate until the indenting or recessing studs of the anvil have penetrated to the desired depth. A second row or series of rows of indentations may be made in like manner, by appropriately advancing the plate, and so on, until the recessing is completed. To effect the desired recessing, as above described, the plate is first heated until in a uniform and sufficiently ductile condition (say, to from 1000° C. to 1200° C.) and is pressed and cooled during the pressing and recessing so that at the completion of each series of recesses, the plate cools down during the working of the metal until it has temperatures between about 800° C. and about 1075° C., so that the steel is brought into a fine-grained dense wrought state. After the recessing is completed, the plate may be immediately quenched if it has not cooled materially below 800° C., but it will ordinarily require a re-heating and equalizing of its temperatures at between 800° C. and 1050° C. (preferably at about 1,000° C.) before quenching. The quenching of the indented plate, as it is taken from the re-heating furnace, is for the purpose of rapidly cooling it to below 420° C. and may be effected by immersing it in water. The plate is thereafter straightened or leveled, as may be necessary to facilitate the execution of the next step of the operation, which consists in punching out the thin disks of metal constituting the bottoms of the recesses in the plate, thereby completing the

perforation of the plate. The recessed and heat-treated plate should be re-heated to between 300° C. and 420° C., in order to further facilitate the punching operation, and in order to avoid a loss of the advantage obtained by the preliminary working, heat treatment and toughening of the recessed and quenched plate.

In Figs. 1 and 2, A indicates a portion of a screen plate and *a* the preliminary recesses made therein, as hereinbefore described. As shown in Fig. 3, the punch B may punch out the disk-like bottom of the recess at the periphery of the disk-like bottom, in which event, the cooperating stationary bottom die *b* will have an aperture *c* of corresponding dimensions. In Fig. 4, the punch and the bottom die are so arranged that the punch will cut out an aperture corresponding to the upper outline of the recess. In Fig. 5, the punch and the stationary die are so arranged that the punch will cut out a still larger portion than is represented by the indented recess, thereby still further lessening the space between the adjacent perforations in the finished screen. In some instances, the recessed plate may be reversed in position upon the stationary die *b*, as indicated in Fig. 6.

Having thus described my invention, what I claim is:—

1. The method of perforating plates of manganese steel which have first been brought into a substantially uniform, austenitic condition; which comprises working the metal and impressing the plate with recesses corresponding in location to the desired perforations, the working and impressing of the plate being carried on at temperatures which in the finishing stage are within

the range of 800° C. to 1075° C., quenching the recessed plate from a temperature within that range, reheating to between 300° C. and 420° C., and punching the plate or sheet at the indentations to complete the perforations, substantially as described.

2. The method of perforating plates of manganese steel which have first been brought into a substantially uniform, austenitic condition, which comprises working the metal and impressing the plate with recesses corresponding in location to the desired perforations, the working and impressing of the plate being carried on at temperatures which in the finishing stage are within the range of 800° C. to 1075° C., equalizing the temperatures of the recessed plate within that range, quenching, re-heating to between 300° C. and 420° C., and punching the plate at the indentations to complete the perforations, substantially as described.

3. In the production of a perforated plate of manganese steel, the method of preparing the plate for punching, which comprises working the metal and impressing the plate with recesses corresponding in location to the desired perforations, the working and impressing of the plate being carried on at temperatures which in the finishing stage are within the range of 800° C. to 1075° C., equalizing the temperatures of the recessed plate within that range, and quenching, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

WINFIELD S. POTTER.

Witnesses:

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