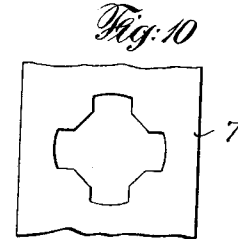
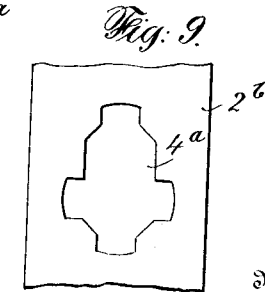
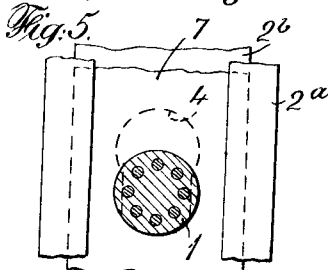
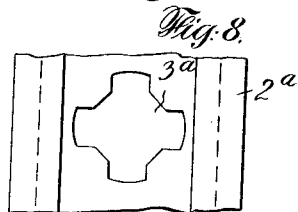
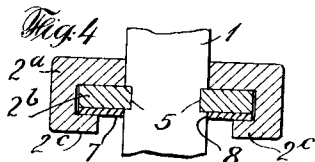
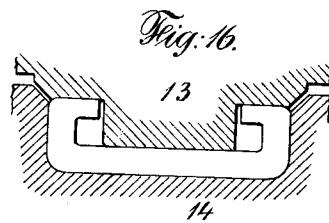
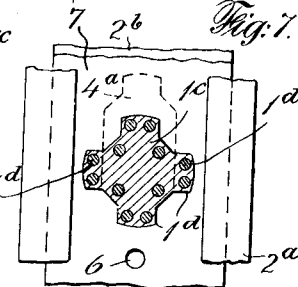
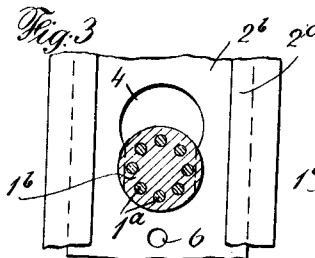
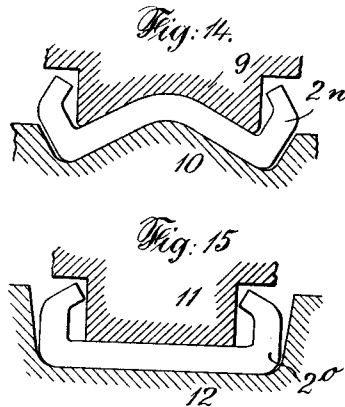
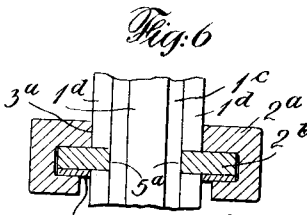
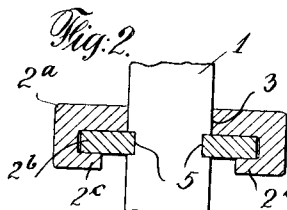
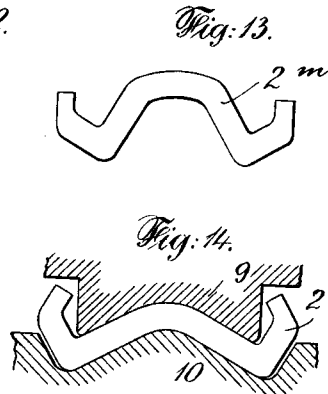
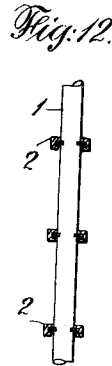
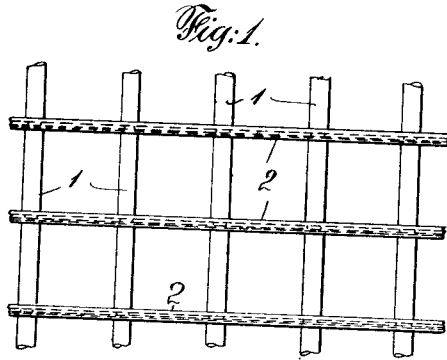


F. E. CANDA.
GRATING.
APPLICATION FILED APR. 20, 1914.

1,109,613.

Patented Sept. 1, 1914.



Witnesses:
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FERDINAND E. CANDA, OF NEW YORK, N. Y.

GRATING.

1,109,613.

Specification of Letters Patent.

Patented Sept. 1, 1914.

Application filed April 20, 1914. Serial No. 833,159.

To all whom it may concern:

Be it known that I, FERDINAND E. CANDA, a citizen of the United States of America, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Gratings, of which the following is a specification.

My invention relates to improvements in metallic gratings—particularly jail door and window gratings and the like, and comprises improvements upon the grating for the same purpose illustrated and described in my Patent No. 856,130, dated June 4, 1907.

My invention consists in the novel construction of the bars or members of the grating, whereby the easy manufacture of the same from rolled shapes is rendered possible, and whereby the bars are locked firmly in place; all as hereinafter described and particularly pointed out in the appended claims.

The objects of my invention are to improve the construction of gratings, and particularly jail gratings and the like, to make the same more secure, to facilitate the construction of such gratings, to conceal the joints between the members of the grating, to permit the use of rolled shapes and reduce machine work to a minimum, to provide a form of composite bar, adaptable for use in such gratings, and so formed that the principal hard steel tool-resisting cores may not be cut, and generally to provide a grating which shall be, for equal weights and sizes of its members, stronger than other gratings heretofore produced, and yet relatively easy to construct.

I will now proceed to describe my invention with reference to the accompanying drawings, and will then point out the novel features in claims.

In said drawings: Figure 1 shows a side elevation of a grating constructed in accordance with my invention. Fig. 2 shows a transverse section of a portion of the grating, the section being taken through one of the channel bars and the accompanying key bar of such grating. Fig. 3 shows a front view of one of the channel bars and key bars, and a transverse section of one of the bars arranged at right angles to such channel bars. Fig. 4 is a view similar to Fig. 2, but illustrating the use of a cover plate, and Fig. 5 is a view similar to Fig. 3, but showing the

cover plate. Figs. 6 and 7 are similar to Figs. 4 and 5, respectively, but illustrate the use of a composite bar of cruciform section in lieu of the round bar shown in Figs. 4 and 5. Fig. 8 is a face view of a portion of the channel bar employed in cooperation with such cruciform bar. Fig. 9 is a face view of a portion of the corresponding key bar. Fig. 10 is a face view of a portion of the corresponding cover plate. Fig. 11 shows a transverse section of such cover plate. Fig. 12 shows a transverse section of a portion of the grating. Figs. 13, 14, 15 and 16 are views indicating diagrammatically the method of and means for rolling the channel bar herein illustrated and described; said views showing fragmentary axial sections of different passes of the rolls by which the channel bars are formed, and showing a channel bar, in successive stages, corresponding to such passes.

Referring now to the accompanying drawings, and at first to Figs. 1, 2, 3 and 12, numerals 1 designate one of the two series of cross bars of the grating, that is to say, in the constructions shown, the vertical bars, and numerals 2 designate the other series of members of the grating, that is to say, in the construction shown, the horizontal members; though when desired the members 1 may be horizontal, and the members 2 vertical. As shown particularly in Figs. 2 and 3, the horizontal members 2 each consist of two sub-bars, or sub-members, 2^a and 2^b, the members 2^a being of partly-closed channel section, *i. e.* being provided with lips 2^c, parallel to the back or base of the channel and partly inclosing the members 2^b (such members 2^b being commonly termed the "keys"). It will be understood that members 2^a and 2^b are readily assembled, before insertion of the rods 1, by inserting an end of a member 2^b into an end of the channel of a member 2^a, and then sliding such member 2^b through the channel of member 2^a. The members 2^a have holes 3 for the passage of the bars 1 and the members 2^b have holes 4 for the passage of said bars 1; and the bars 1 have notches 5. The holes 4 of the keys 2^b are elongated, as shown particularly in Fig. 3, each hole 4 being at one end of the diameter of the main portion of the bar 1, and at the other end of the diameter of the notch 5 of that bar. The construction is such, it will be seen, that when bars 2^a and 2^b are assembled, with the larger portions of

holes 4 of bars 2^b in registry with the corresponding holes 3 of bars 2^a, the bars 1 may be inserted through the holes 3-4 of the bars 2^a-2^b, and then, when the notches 5 of bars 1 are in registry with holes 4 of keys 2^b, those keys may be moved lengthwise a distance sufficient to bring the narrower portions of the holes 4 into engagement with the notches 5, thereby precluding the disengagement of bars 1 from bars 2. Bars 2^a and 2^b may then be locked together in such relative arrangement by driving suitable rivets through registering rivet holes 6 (Fig. 3) and heading over such rivets. The grating thus assembled cannot be disassembled without severing such rivets or without cutting the bars in a number of places. In some cases, as when the grating is set into a strong wall, such rivets are unnecessary.

The bars 2, by the construction described, are of such size and section, that the cutting of them is very difficult; and moreover the sub-bars 2^a and 2^b of these bars 2 may be of different materials, *i. e.*, one may be of hard steel and the other of soft steel. It being well known that it is practically impossible for a saw, drill or other tool to work simultaneously in hard steel and in soft steel, it will be apparent that it is practically impossible, with facilities obtainable in a jail or the like, to cut such a composite bar 2. If desired, however, both sub-bars, 2^a and 2^b, may be of hard material, or both may be of soft material.

To prevent the cutting of the bars 1, I preferably make them of the composite construction illustrated in Fig. 3, wherein the bar shown comprises hard steel cores 1^a surrounded by a soft steel body 1^b. Such composite bars are covered by my Patent No. 847,551, dated March 19, 1907.

The construction shown in Figs. 2 and 3 is very strong; but in some cases, objections may arise to the larger portion of the holes 4 being visible in the completed grating. In such case, I provide, alongside the keys 2^b, cover plates 7 as shown in Figs. 4 and 5. These cover plates have openings 8 of the size of the bars 1, such openings registering with the holes 3 of the bars 2^a, and they serve to conceal completely the holes 4 in bars 2^b. These cover plates may be quite thin, as they are not required for strength.

In Figs. 6-11 inclusive, I illustrate a construction which, for various reasons, is superior to those illustrated in Figs. 2-5 inclusive. In such construction the vertical bars of the grating, here designated by numerals 1^c, are provided with lateral projections 1^d. I prefer that such bars 1^c shall be of the cruciform section shown. The holes 3^a of channel bars 2^a are of corresponding section. These bars 1^c are provided with notches 5^a (Fig. 6) formed by cutting through the projections 1^d, and the holes 4^a

of the key bars 2^b are elongated on one side, in the direction of longitudinal movement of such key-bars, to the end that by such longitudinal movement of the key bars, after the bars 1^c have been passed through the registering openings 3^a and 4^a, of bars 2^a and 2^b, the bars 2^b will enter and engage the notches 5^a of the bars 1^c, thereby holding the bars 1^c against rotation and against longitudinal withdrawal. The bars 2^a and 2^b of the construction shown in Figs. 6-9 inclusive, are locked together, when the key bars have been so engaged with the bars 1^c, by rivets inserted through registering rivet holes 6 of the bars 2^a and 2^b, as in the construction illustrated in Figs. 2-5 inclusive. In Figs. 6 and 7 I have indicated the provision of this second construction with cover plates 7, as in the first construction described.

Heretofore in certain jail gratings the grating bars of one of the two series of intersecting members have been so-called laminated steel bars, consisting of an annular hard steel portion surrounded by a soft steel cover, and with a soft steel core inside it. If this soft steel cover be cut through, the bar is considerably weakened, so far as resistance to shock is concerned, for the hard steel portion is necessarily brittle, because of its hardness. For this reason it has been feared by some that gratings composed in part of such laminated bars may be so weakened, by cutting through the soft steel outer portions of such laminated bars, that after such cutting the bars might be broken. While this is a condition almost impossible of occurrence in a jail or the like, still it is desirable to avoid even this possible criticism, of the prior laminated bars referred to. The bars 1 of the construction illustrated in Figs. 2-5 inclusive, are free from criticisms on the ground mentioned, for the reason that the protection against cutting of the bar is afforded by a multiplicity of hard steel cores 1^a, soft steel 1^b being within the space surrounded by these cores 1^a, as well as outside such cores. It being practically impossible to cut into the cores 1^a even if the soft steel around such cores 1^a be cut through, the soft steel within the space surrounded by such cores 1^a is unaffected and therefore the strength of the bars 1 is not materially decreased by cutting through the soft steel outside of the cores 1^a. The cruciform section illustrated in Figs. 6 and 7 is even superior to the circular bars 1 illustrated in Figs. 2 and 3, in this respect, because, no matter how a saw or file or the like may be applied to the exterior of the bar 1^c, since it is impossible to cut through the hard steel cores 1^a lying within the projections of such cruciform structure, it is impossible to reach, with the saw or file, more than a very small portion indeed of the soft steel. But

while it is practically impossible to cut through the lateral projections of the cruciform bar, by means of a saw, file, or other implement available in a jail or the like, the notches 5^a are readily formed in such bars, in the shop, by means of powerful shears. Such shears cut through the lateral projections of the cruciform bar, including the hard steel cores 1^a lying within the projections of said cruciform bar, without difficulty. But shears, such as are required for this operation, of course are not available in a jail or the like.

The cruciform bar, having hard steel cores, 1^a lying within its lateral projections, are readily formed by the process described and claimed in my application filed February 18, 1907, Sr. No. 357,853.

The rolling of partly closed channel bars such as bars 2^a and 2^c has not heretofore been done, or found practicable, so far as I am aware; but the rolling of such bars is practicable by the method and means illustrated in Figs. 13-16 inclusive, illustrating the said bars in several stages of the rolling operation. There is no difficulty in rolling such bar to the form shown in Fig. 13, wherein the bar is designated by reference number 2^m. Any good designer of rolls can design suitable roll-passes to produce the section 2^m. By the rolls 9 and 10 illustrated in Fig. 14, this section, there designated as 2ⁿ, is spread slightly with the least reduction possible. By the further rolls 11 and 12 illustrated in Fig. 15, the section, there designated 2^o, is spread or bent still farther toward the channel shape, and the back or base of the channel section is made practically straight. The lips 2^c of the channel section have, by the successive operations indicated in Figs. 14 and 15, been curved in to the oblique position illustrated in Fig. 15, (without the touching of those lips by the rolls,) as the result of the gradual spreading or straightening out of the main body or back of the section. In the final pass, illustrated in Fig. 16, these lips 2^c are bent down substantially parallel to the back or base of the channel section; this final pass being the first of the various passes illustrated in which these lips are acted upon directly by the rolls.

In my application for Letters Patent for a composite metal bar, filed February 19, 1914, Sr. No. 819,769 (a division of my above mentioned application Sr. No. 357,853) I have claimed a composite metal bar comprising a body of relatively soft and tough metal having interspersed through it in a spaced arrangement, a plurality of cores of relatively hard metal, said bar having in its surface longitudinal ribs, certain of said hard metal cores lying partly within said ribs. Therefore I have not claimed such invention broadly herein. In another appli-

cation, filed July 31, 1914, Sr. No. 854,316 I have claimed the bar of cruciform section having hard metal cores so arranged in its ribs as to prevent sawing through the ribs, as shown in Figs. 6 and 7.

It is not in all cases necessary to lock together bars 2^a and 2^b, by a rivet or rivets passed through rivet holes 6, as described, as in many cases these gratings, when assembled, are set into massive walls, or between frames, which themselves preclude such lateral motion of bars 2^b with reference to bars 2^a, as would permit the removal of the bars 1.

What I claim is:—

1. A grating comprising in combination two series of intersecting members, certain of the members of one said series notched at intervals for engagement by the members of the other series, the members of such other series being of composite construction and comprising each a channel bar and another bar mounted within the channel of such channel bar, and movable longitudinally with respect thereto, such channel bar having lips parallel to the back of such bar, inclosing the edges of the other bar, the sub-bars of each such composite member having apertures which, when in registry, permit the passage of the notched members of the first series, one of the bars composing each such composite member having openings elongated, with respect to the section of the bars of the first series, and reduced in width in one portion to permit such sub-bar to enter the notches of the bars of the first series and thereby to lock together the two series of grating members.

2. A grating comprising in combination two series of intersecting members, certain of the members of one said series notched at intervals for engagement by the members of the other series, the members of such other series being of composite construction, and comprising each a channel bar and a key bar mounted within the channel of such channel bar, and movable longitudinally with respect thereto, such channel bar having lips parallel to the back of such bar inclosing the edges of the key bar, each channel bar and its corresponding key bar having apertures which, when in registry, permit the passage of the notched members of the first series, the key bars having openings elongated, with respect to the section of the bars of the first series, and reduced in width in one portion to permit such key bars to enter the edges of the bars of the first series, and thereby to lock together the two series of grating members.

3. A grating comprising in combination two series of intersecting members, certain of the members of one said series notched, at intervals for engagement by the members of the other series, the members of such

other series being of composite construction and comprising each a channel bar and another bar mounted within the channel of such channel bar, and movable longitudinally with respect thereto, such channel bar having lips parallel to the back of such bar, inclosing the edges of the other bar, the sub-bars of each such composite member having apertures which, when in registry, permit the passage of the notched members of the first series, one of the bars composing each such composite member having openings elongated, with respect to the section of the bars of the first series, and reduced in width in one portion to permit such sub-bar to enter the notches of the bars of the first series and thereby to lock together the two series of grating members, and cover plates within the channels of such channel bars and engaged by the lips thereof, and fitting over the bars of the first series and concealing the above mentioned elongations of openings through which the bars of the first series pass.

4. A grating comprising in combination two series of intersecting members, certain of the members of one said series notched at intervals for engagement by the members of the other series, the members of such other series being of composite construction, and

comprising each a channel bar and a key bar mounted within the channel of such channel bar, and movable longitudinally with respect thereto, such channel bar having lips parallel to the back of such bar inclosing the edges of the key bar, each channel bar and its corresponding key bar having apertures which, when in registry, permit the passage of the notched members of the first series, the key bars having openings elongated, with respect to the section of the bars of the first series, and reduced in width in one portion to permit such key bars to enter the edges of the bars of the first series, and thereby to lock together the two series of grating members, and cover plates within the channels of such channel bars and engaged by the lips thereof, and fitting over the bars of the first series and concealing the above mentioned elongation of openings through which the bars of the first series pass.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FERDINAND E. CANDA.

Witnesses:

H. M. MARBLE,
PAUL H. FRANKE.