

Nov. 28, 1961

R. A. WILKINS

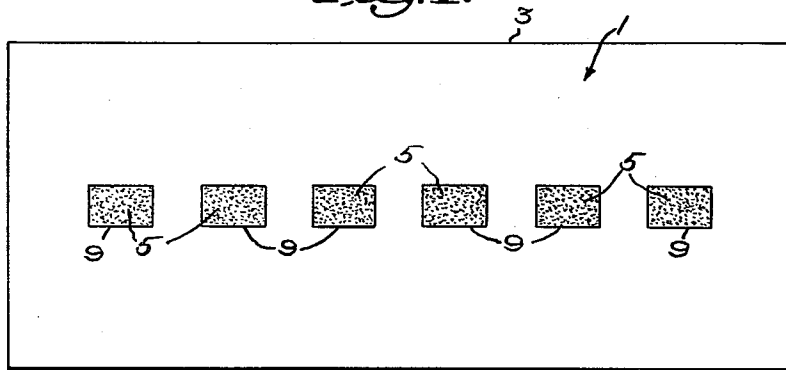
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METHOD OF MAKING INTERNALLY SLITTED STRIP MATERIAL

Filed July 1, 1957

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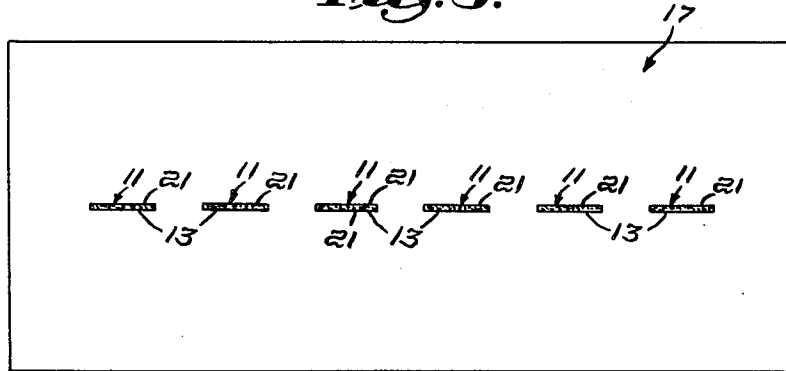
*Fig. 1.*



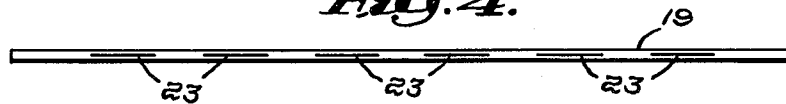
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



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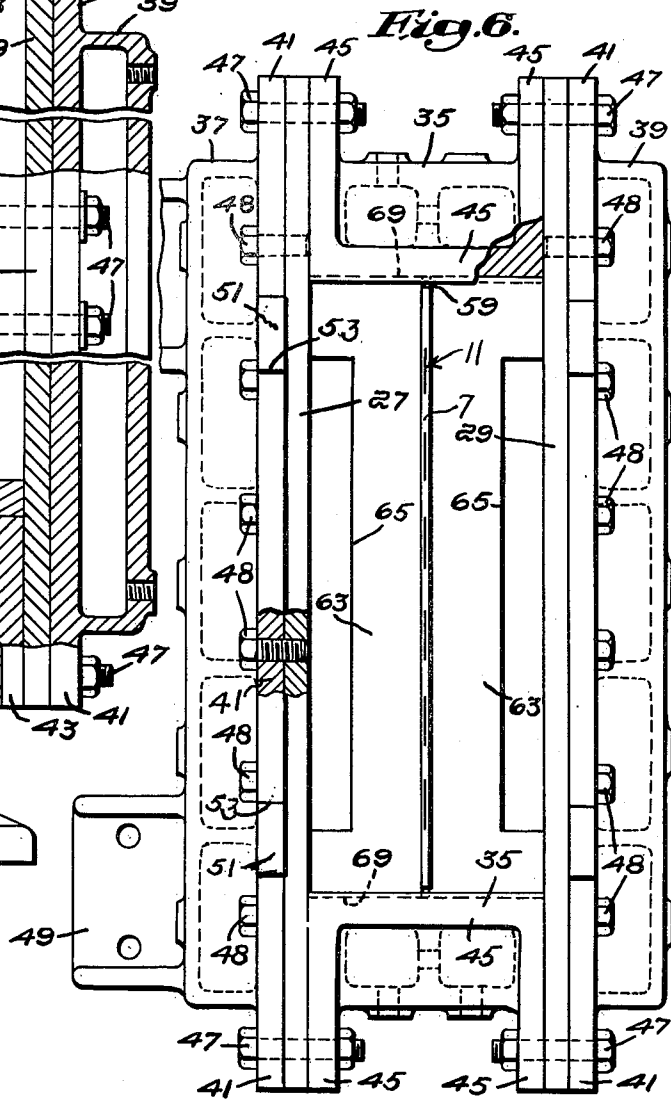
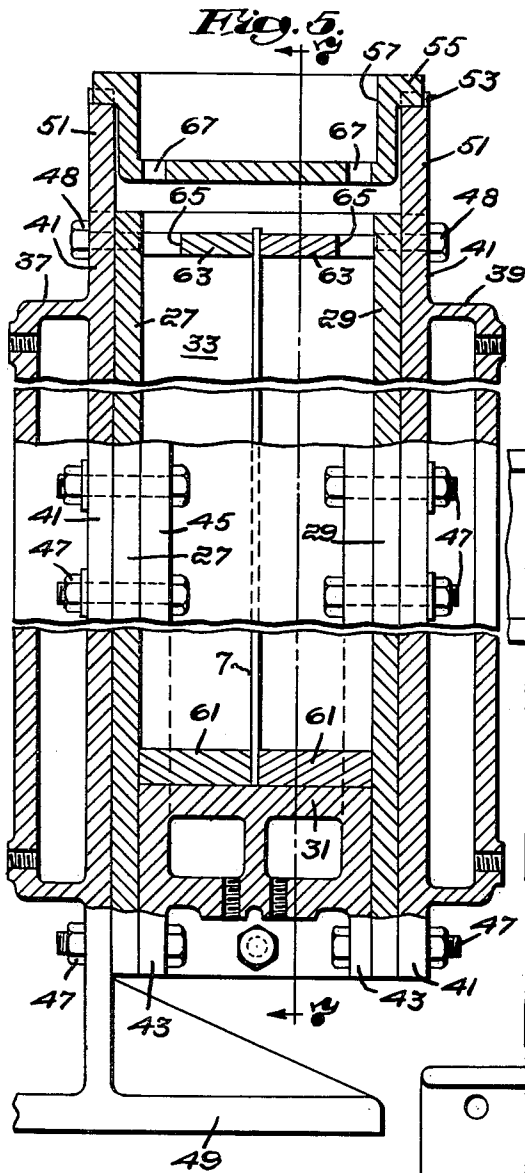
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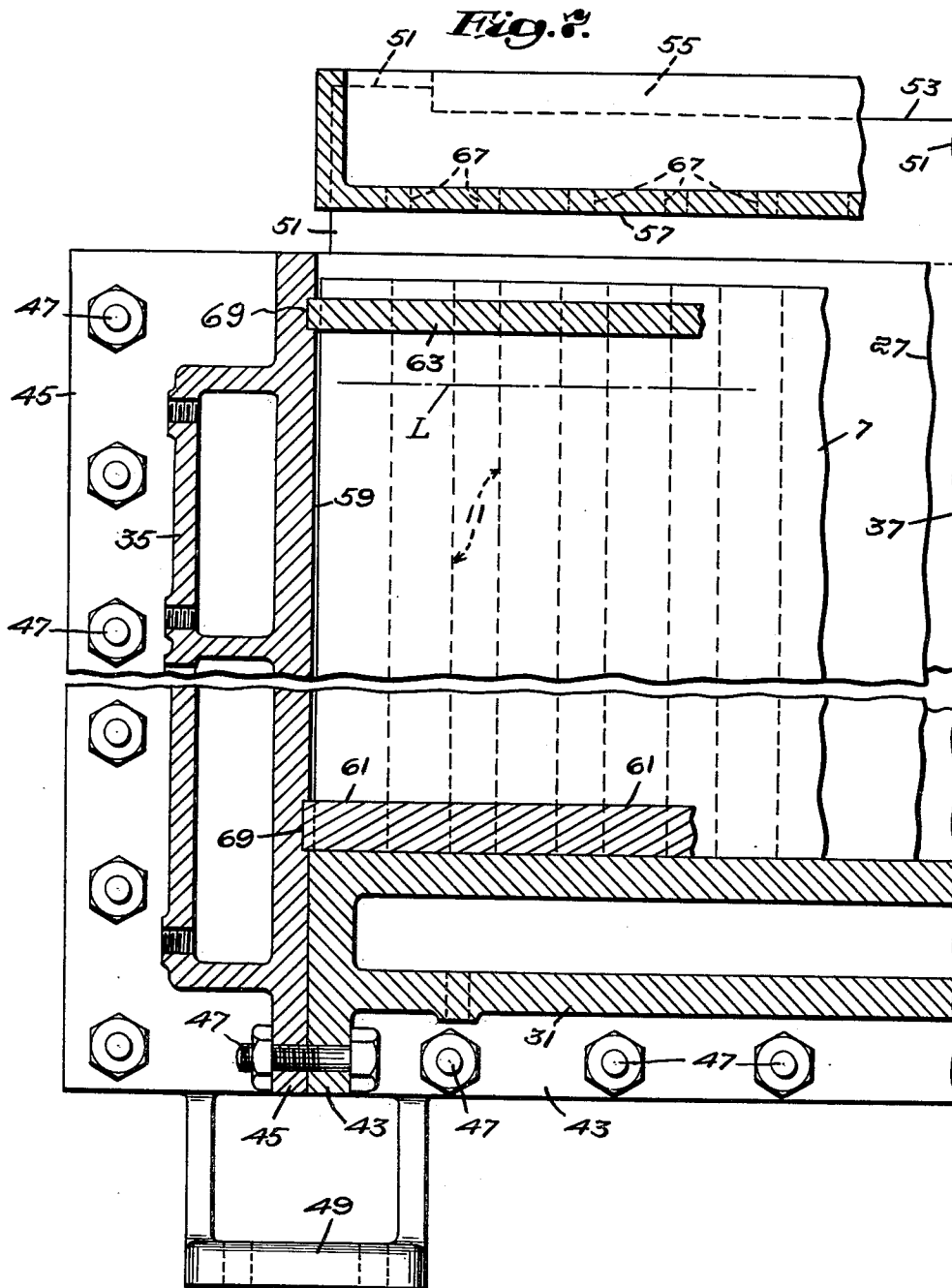
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METHOD OF MAKING INTERNALLY SLITTED STRIP MATERIAL

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4 Sheets-Sheet 3



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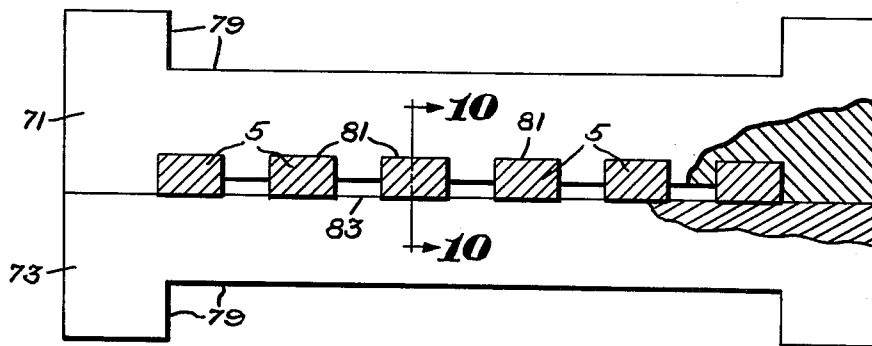
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METHOD OF MAKING INTERNALLY SLITTED STRIP MATERIAL

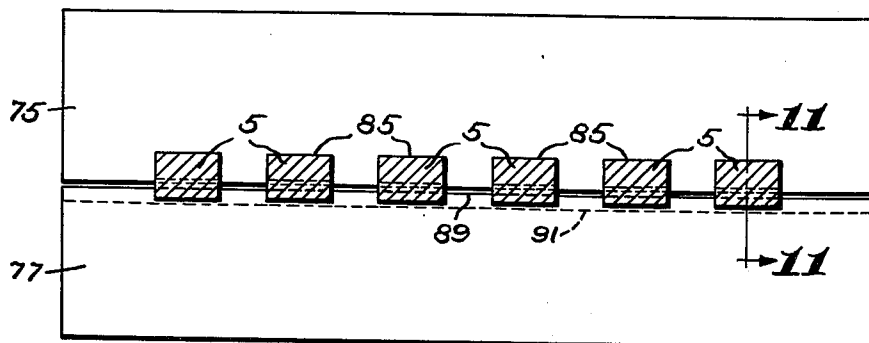
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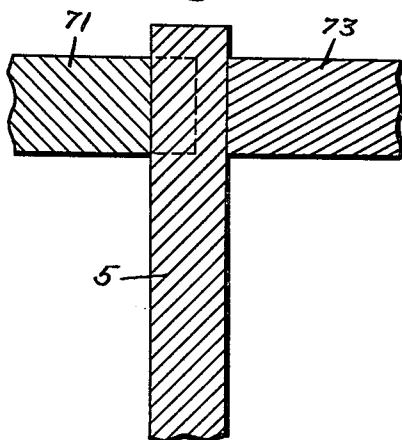
**Fig. 8.**



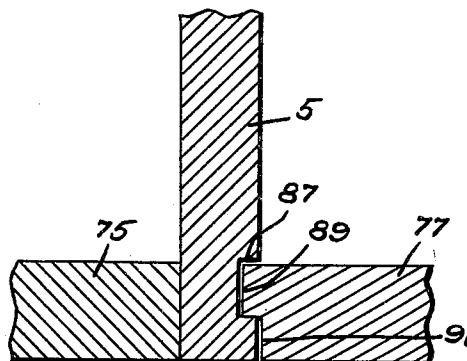
**Fig. 9.**



**Fig. 10.**



**Fig. 11.**



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3,010,200

## METHOD OF MAKING INTERNALLY SLITTED STRIP MATERIAL

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Filed July 1, 1957, Ser. No. 669,355

1 Claim. (Cl. 29—529)

My invention relates to methods of making strips in long lengths of cold workable metal having between and parallel to their opposite faces slits extending lengthwise thereof, which slits are capable of being expanded, for example by introduction therinto of pressure fluid, to form fluid conducting or other passages. The strip may have but one such slit or a plurality of spaced parallel slits, the advantages secured by the method however being most pronounced when there is a plurality of slits.

The method according to the present invention constitutes an improvement on methods of making the above strips disclosed by applicant's co-pending applications Serial Number 518,768, now abandoned, filed June 29, 1955, Serial Number 570,372, filed March 8, 1956, and Serial Number 650,133, now Patent No. 2,950,512, filed April 2, 1957.

According to methods disclosed by these co-pending applications the strip may be formed by rolling a thick metal billet formed by casting the metal about elongated members, of pulverized or pulverizable weld preventing material, of flattened transverse cross-section of the widths of the slits to be formed in the strip. The rolling operation elongates the billet in the direction of the lengths of such members and thins it to produce the strips, this thinning moving substantially into contact those opposite faces of the spaces in the billet as cast which are occupied by these members. The rolling operation, if such members in the billet as cast are not of pulverized material, crushes and pulverizes them as the rolling operation thins and elongates the billet. The pulverized material produced by this crushing of the members, or the pulverized material of the members in the billet as cast, is reduced by the rolling operation to a fine weld preventing powder which, as the billet is thinned and elongated by the rolling operation, is spread along the spaces occupied by said members and the slits being formed.

The billet according to said co-pending applications may be cast in the vertical mold chamber of a stationary mold, or by use of continuous casting apparatus of the type having a chilled ring the interior space of which constitutes a mold chamber, the axis of which ring is vertical, and a cooperating descendable platen positioned beneath such ring. In employing the stationary mold for casting the billet it is necessary, according to the methods disclosed by said applications, to install in the mold the elongated members of weld preventing material about which the metal is to be cast when the mold is poured. In employing the continuous casting apparatus it is necessary to install such members in such way that they will be guided into and through the chilled ring as the platen descends so that the metal will be progressively cast about the members. Such installation of the members in these stationary molds and in such continuous casting apparatus involves considerable labor which, in proceeding according to said methods, must be repeated each time a billet is to be cast.

Furthermore the thicknesses of the members or bodies of weld preventing material in the thick billet rolled to produce the slitted strip need be but very thin from the standpoint of such material preventing welding together of the opposite faces of the slits. For example, a billet 5 inches thick having such members 0.03 inch thick may

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be rolled to produce strip 0.01 inch thick without the faces of the slits being welded together by the rolling operation, in such case the thickness of the layer of weld preventing powder in the slits being but about 0.0002 inch thick, that is to say, such layers being practically geometrically non-existent, but even at that being many times thicker than necessary to prevent such welding. In forming the billets containing the members it is next to impossible to employ members of such small thicknesses, if they are of massive material such as graphite, soapstone, or bonded together powder such as talc, magnesia, and the like, described in said co-pending applications, because members of such thicknesses would be so fragile that they would be difficult to produce and handle without breakage. Members of such thicknesses can be employed if they are made of textile strips woven of yarns of pulverizable vitreous fibers such as fibers of heat refractory glass, quartz, and the like described in said co-pending application Serial Number 570,372.

However, such textile tapes must be held under tension during the casting operations to keep them straight, require special equipment for their production, are expensive as compared to thick rods of the above mentioned massive material, and are not always obtainable, and furthermore require considerable labor in installing them in the stationary mold and continuous casting apparatus. Also such thin gauge members may be produced, as described in said co-pending application Serial Number 650,133, by filling open sided relatively thin walled metal tubes with the weld preventing material in the form of a paste and then baking the filled tube to harden such paste, those portions of the metal of the tube which are surrounded by the molten metal poured into the mold entirely melting during the casting operation to form part of the metal of the billet. Such members encased in these tubes likewise are somewhat expensive to produce as compared to the members in the form of thick rods of the above mentioned massive materials. As a result of all this it is more economical in any ordinary case to form the billet by casting the metal about rods of sufficient thickness to have such strength that they can be readily produced, handled and installed without liability of breakage. The employment of such thick rods of course causes the billet to contain much more weld preventing material than is necessary to produce the slits, the excess of such material being forced by the rolling operation from the spaces occupied by the rods and thus wasted. Such waste may present a serious economic loss, particularly when the rods are of soapstone and thus somewhat expensive, or when of substances such as boron nitride which are very expensive.

It is an object of the present invention to reduce the expense of producing the slitted strip by reducing the labor and material costs incident to producing it by the methods disclosed by said co-pending applications.

According to the present invention, a thick preliminary billet is cast or otherwise formed containing one or more rather thick rods or other bodies of weld preventing material of rectangular or other flattened transverse cross-section having their medial widthwise planes parallel to the faces of the billet, in other words, a billet such as one of those described for producing the slitted strip according to methods disclosed by said co-pending application Serial Number 518,768. Instead of rolling this preliminary billet to reduce it to the gauge of the strip to be produced, it is only partially reduced to form an elongated rolled product containing elongated bodies of appreciable thickness of compacted pulverized or powdered weld preventing material in the spaces occupied by the rods or other bodies of the preliminary billet as cast, which spaces are thinned by this rolling operation. This rolled product may then be severed transversely, or both

transversely and lengthwise, into a number of lengths in each of which the elongated bodies of weld preventing material are of requisite length and number to form the elongated members of weld preventing material of a second thick billet that after being formed may be rolled to reduce it to the gauge of the slitted strip desired. Or this second billet, like the preliminary billet, may be rolled to but partially reduce it and from the product thus formed may be severed lengths each for use as slabs in forming a third thick billet, which latter may be rolled to reduce it to the gauge of the slitted strip or it may be partially reduced to form a rolled product from which may be severed lengths each for use as a slab in forming a fourth thick billet that may be rolled to reduce it to the gauge of the slitted strip.

According to the improved method, the second and subsequent billets may be formed by casting metal against one of the lengths severed from the product produced by the rolling of the preceding billet, which length for convenience in terminology is herein termed a "slab." So casting the metal is availed of to form a thick succeeding billet. Such casting operation may be performed by pouring molten metal into a mold chamber in which the slab is present, the poured metal being at a temperature requisite to melt the portions of the slab which it contacts so as to cause the two metals to flow into each other and form an integral metal structure when the metals solidify, but without melting any of those portions of the slab down to those passages therein which contain the bodies of pulverized or powdered weld preventing material so as not to destroy the continuity or regularity of said bodies. The slab may be positioned in the mold chamber in such way that the poured molten metal contacts it at but one of its faces, or may be so positioned that the molten metal contacts both of its faces. In this way a second or other subsequent thick billet may be formed exactly like the preliminary billet except that the spaces occupied by the weld preventing material are much thinner in the second or other subsequent billet than in the preliminary or other preceding billet. The second or other subsequent billet after removal from the molding apparatus may, as above explained, be rolled to produce the desired slitted strip.

By building up the slab with the same metal as that which forms the slab the billet formed by use of the slab and hence the strip produced by rolling that billet will be of the same metal throughout its extent. Alternately the slab of any given metal, particularly the slab to be rolled to the gauge of the slitted strip, may be built up in the above way with a different metal, say a less expensive metal. For example, a slab of copper selected for its corrosion resistant properties may be built up with brass, such as one consisting of 70% copper and 30% zinc, to form the thick billet. Building up the slab with a less expensive metal effects savings in material costs, and produces when the resulting thick billet is rolled to produce the slitted strip a strip formed predominantly of the less expensive metal, the slits of which strip, and consequently the passages formed by expanding those slits, are lined with the metal of the slab.

Preferably the thick billets are hot rolled to produce the slabs, and those surfaces of the slab which are to be contacted by the molten metal are preferably preliminarily cleaned, say by pickling them, or by sand blasting them, or by scalping them to remove therefrom a film of the metal.

Also any of the slabs produced from any of the thick billets may be built up to form a further thick billet by placing against one or both of the cleaned faces of the slab the cleaned face of a second slab, securing the assembled slabs together at their edges, and cold or hot rolling, preferably hot rolling, the assembly to weld the slabs thereof together throughout their extent at their interfaces so as to form an integral structure. This way of building up the slab is particularly desirable when a bimetal slitted

strip is desired, in which case said second slab or slabs of the billet to be rolled to the gauge of the slitted strip may be of a different metal from the metal of the slab to which said second slab or slabs are welded.

It will be observed that by the improved method the product formed by rolling the preliminary or other thick billet partially to reduce it may be severed to form a relatively large number of the slabs, but one of which slabs need be used in producing each immediately subsequent thick billet. Consequently it is again necessary to incur the labor and expense of installing the separate elongated members of weld preventing material in the molding apparatus only after such number of slabs is exhausted in producing the final billets rolled to form the desired slitted strips, and therefore there is no substantial wastage of weld preventing material except perhaps to some extent in producing the slabs from the preliminary billet in which the elongated members of such material are relatively thick.

The invention will be further understood from the following description when read in the light of the accompanying drawings in which:

FIG. 1 is an end view of a preliminary billet according to the invention;

FIG. 2 is an end view of a slab severed from the product formed by rolling the preliminary billet;

FIG. 3 is an end view of the second billet formed by use of the slab according to FIG. 2;

FIG. 4 is an end view of the slitted strip formed by rolling the second billet according to FIG. 3;

FIG. 5 is an elevation of a mold which may be employed for producing the second billet, with the slab according to FIG. 2 installed therein, and with parts broken away and parts in section;

FIG. 6 is a plan of the mold according to FIG. 5, with the pouring box removed, on an enlarged scale;

FIG. 7 is a fragmentary section on the line 7-7 of FIG. 5, on an enlarged scale, and with parts broken away;

FIGS. 8 and 9 are plans of attachments for supporting in the mold according to FIGS. 5, 6 and 7 the elongated members of weld preventing material for producing the preliminary billet according to FIG. 1 with said members in association with such attachments;

FIG. 10 is a section on the line 10-10 of FIG. 8; and FIG. 11 is a section on the line 11-11 of FIG. 9.

Referring to the drawings, the preliminary billet 1 may have intermediate its opposite faces 3 a row of rods 5 of pulverizable weld preventing material such as graphite, soapstone, or a hardened mixture of powdered material such as talc, magnesia, or alumina, mixed with a suitable binder, as described in said co-pending application Serial Number 518,768, or said members may be in the form of strips cut from pressed-board made of pulverizable vitreous fibers with a filler as described by said co-pending application Serial Number 570,372, or the rods may be of boron nitride which ordinarily gives extremely satisfactory results. This preliminary billet, as hereinbefore mentioned, may be produced in any of the ways disclosed by said co-pending applications. The preliminary billet after being formed may be hot rolled to thin and elongate it to form a rolled product or bar from which may be severed slabs 7 according to FIG. 2, in which slabs the spaces 9 containing the rods of weld preventing material of the preliminary billet are much reduced in thickness to form the passages 11 of FIG. 2, which passages are filled with bodies 13 of pulverized or powdered weld preventing material formed by the rolling operation crushing the rods of the preliminary billet and spreading such crushed material along the passages as the preliminary billet is being thinned and elongated to form such passages.

Each of these slabs 7 may then be thickened by casting metal against its cleaned opposite faces 15, in the way hereinbefore described, to produce the second billet

17 according to FIG. 3 having a row of the passages 11 filled with the weld preventing material of the slab. The second billet 17 may then be rolled to thin and elongate it to produce the strip 19 in which the opposite faces 21 of the passages 11 have been moved substantially into contact to form the row of slits 23.

Instead of rolling each of the set of "second" billets down to the gauge of the final slitted strip to be produced, it may be rolled to reduce it only to the gauge of the slabs 7 of FIG. 2, and from such rolled product may be severed further slabs each for use in producing a "third" thick billet identical with the billet 17 of FIG. 3 except that the passages containing the weld preventing material are thinner in said third billet than in said second billet. Such operations may be repeated to form a set of billets each constituting a "fourth" thick billet as hereinbefore explained. Despite the progressive thinning of the passages containing the weld preventing material in the successive sets of billets so formed the passages of each set will be thick enough to provide enough weld preventing material to prevent welding of the faces of the slits if any of those sets are rolled to reduce them to any practicable gauge of the desired slitted strip.

As an example of the above method, but without limitation to such an example, the preliminary billet 1 may be 5 feet long and 5 inches thick with the medial widthwise planes of the rectangular rods 5 of weld preventing material therein positioned midway between the opposite faces 3 of such billet, the thickness of each of these rods being  $\frac{3}{8}$  inch. The preliminary billet 1 may then be rolled to thin and elongate it to produce a rolled product or bar 0.31 inch thick with the passages 11 therein 0.03 inch thick and of the same widths as those spaces 9 which contain the rods 5 of the preliminary billet. So thinning the preliminary billet will elongate it about 16 fold to produce a rolled product or bar about 80 feet long. From this bar may be severed fifteen slabs 7 each about 64 inches long and each for use in producing a second billet 5 feet long and 5 inches thick. This second billet may then be rolled to thin and elongate it to produce a strip 19 (FIG. 4) 0.01 inch thick and about 2,500 feet long, in which strip the layers of weld preventing material in the slits are about 0.0002 inch thick, in other words, as hereinbefore mentioned, such layers from a geometrical standpoint being practically nonexistent.

In the above example the thicknesses of the layers of weld preventing material in each "second" thick billet 17 are adequate to permit that billet to be rolled partially to reduce it to form a rolled product from which may be severed further slabs each for use in producing the "third" thick billet and thick enough to permit each of still further slabs produced from each such "third" billet to be used for producing one of the hereinbefore mentioned "fourth" thick billets, and any of these thick billets of the various sets thereof so produced may be rolled to reduce it to produce a slitted strip of 0.01 inch gauge and even substantially smaller gauge.

It will be observed from the above example that as fifteen "second" billets 17 may be formed from the slabs produced by rolling the preliminary billet 1 it is necessary to produce but one preliminary billet for each fifteen "second" billets, and, if each "third" billet is of the same thickness as each "second" billet, it is necessary to produce but one preliminary billet for each 225 "third" billets, and, if each "fourth" billet is of the same thickness as each "third" billet, is necessary to produce but one preliminary billet for each 3,175 "fourth" billets. From the set of "second" billets could be produced about 37,000 feet of the 0.01 inch gauge slitted strip; from the set of "third" billets about 560,000 feet; and from the set of "fourth" billets about 8,400,000 feet.

The above results in a great saving in labor and material costs, as hereinbefore explained, such saving being most pronounced when the strip contains a large number

of slits. It will be understood that, although for convenience of illustration but six slits are shown in the strip according to FIG. 4, commonly the strip will contain a much larger number of slits, say as many as twenty or thirty or even more. Also the savings are most pronounced when great precision and uniformity are required in the widths of the slits and their spacing particularly when they are to be closely spaced. Often it is necessary for certain uses of the strip to have slits of extremely uniform width very closely spaced, say spaced  $\frac{3}{16}$  inch, and such result can be secured commonly only by careful machining of the rods of weld preventing material and great care in accurately positioning them in the mold. Further, such savings permit the use of rods or other members of desirable weld preventing material the expense of which would otherwise be prohibitive, for example, the use of rods of boron nitride, which currently costs about fifty dollars per pound. Boron nitride is extremely desirable because it is stable at the pouring and hot rolling temperatures of all the metals mentioned in said co-pending applications, and at such temperatures is chemically inert with respect to such metals, and further, like soapstone and graphite, is readily machinable enabling it, although commonly available in but short lengths, to be readily used in the form of sectional rods in the ways described in said co-pending applications. The material and labor costs involved in the use of such rods would be prohibitive according to the methods of said co-pending applications, but according to the improved method become almost negligible per pound of strip produced.

The preliminary and subsequent billets according to the present invention are preferably as thick as available mill facilities will permit. Best results will be secured when the thicknesses of the rods 5 are not greater than their widths. For any given thickness of the preliminary billet such thicknesses of the rods, largely considered, are determined by the thicknesses of the second or other subsequent billets 17 and the gauge of the final strip to be produced by rolling the second or other subsequent billets. The thickness of the rods should be of such value as to secure in the slabs passages 11 of requisite thickness to contain enough weld preventing material to produce the slits of the strip when the second or subsequent billets are rolled to reduce them to the gauge of the final strip. Also for rods 5 of any given thickness in the preliminary billet the degree of thinning of that billet by the rolling operation should be such as to make the passages 11 in the slabs of requisite thickness consistent with the thickness of the second or subsequent billets to produce the slits of the final strip when the second or subsequent billets are reduced to the gauge of that strip. The slitted strip may be of any desired gauge depending upon the use to which it is to be put. Ordinarily in commercial practice it will not be of less gauge than about 0.01 inch. The slitted strip may be of any desired thicker gauge, but ordinarily in commercial practice will not exceed about 0.12 inch. These values of gauges, however, are given merely as examples of what commonly may be expected in commercial practice, and not as limitations.

An example of a mold for use in forming the second or other subsequent billets, but without limitation to such mold, is shown in FIGS. 5, 6 and 7. This mold comprises the opposite face plates 27 and 29 between which at their edge portions are inserted the water jacketed member 31 forming the bottom of the open top mold chamber 33, and the water jacketed members 35 forming the edges of that chamber. As shown, the face plates 27 and 29 are backed by the water jacketed members 37 and 39, respectively. These members 37 and 39 are each shown as provided with the peripheral flanges 41, and the members 31 and 35 with the peripheral flanges 43 and 45, respectively. Through aligned perforations in these flanges and those portions of the face plates 27 and 29 which lie between the flanges extend bolts 47. At the

top of the mold those portions of the uppermost horizontal flanges 41 of the members 37 and 39 which are intermediate the bolts 47 at the ends of such horizontal flanges, as viewed in FIG. 6, are secured to the face plates 27 and 29 by tap bolts 48 extending through perforations in said flanges and tapped into the face plates. The backing member 37 at the left of the mold, as viewed in FIG. 5, is shown as provided with feet 49 that may rest upon and be bolted to a suitable support (not shown). By removing the bolts 47 securing the member 39 and face plate 29 to the rest of the mold that member and face plate may be removed from the rest of the mold for opening the mold chamber to permit removal therefrom of the billet after it is cast. As illustrated, the uppermost flanges 41 of the members 37 and 39 are provided with upwardly extending portions 51 formed on their upper edges with notches 53 which removably receive the outwardly projecting lugs 55 of a removable pouring box 57.

When the vertical mold chamber 33 is opened by removal of the pouring box 57, face plate 29, and water jacketed member 39, in the way above described, the slab 7 may be placed in said chamber with its lower edge resting upon the upper surface of the bottom member 31 of the mold. The mold chamber transversely thereof is of the transverse size and shape of the billet to be cast in it, and preferably but not necessarily the longer transverse dimension of the mold chamber is such that the slab extends from one of the edges of said chamber to the other, as shown by FIGS. 6 and 7, except for a slight clearance 59 at each of opposite edges of the slab for permitting the latter to be readily inserted in the chamber and to permit its thermal expansion without buckling during the casting operation.

As shown, the slab 7 is positioned midway between the face plates 27 and 29 defining the thickness of the billet to be cast. It is held in that position at its lower end by plates 61 of heat refractory material such as graphite, which plates at one of their longitudinal edges abut against the adjacent face of the slab and at their opposite longitudinal edge abut against the adjacent face plate. At its upper end portion it is held in position by plates 63, of the same material as the plates 61, having innermost longitudinally extending edges abutting against the faces of the slab and opposite outermost longitudinally extending edges abutting against the face plates. The outermost edge portion of each plate 63 is shown as cut away for part of its length to form a notch 65 beneath the row of holes 67 in the bottom of the pouring box 57 to permit the molten metal discharging from those holes to enter the mold chamber.

As shown, to prevent any possibility of the slab positioning plates 61 at the bottom of the mold chamber from floating upward in the molten metal poured into that chamber, the members 35 of the mold are formed with longitudinally extending grooves 69 which receive the end portions of those plates. For supporting the slab positioning plates 63 at the top of the mold chamber the members 35 of the mold are formed with like grooves 69 for receiving the end portions of those plates. The slab, being of solidified metal, is denser than the same metal when molten and poured into the mold chamber. Hence the slab has no tendency to float upward in the molten metal. It will be observed that the slab positioning plates 63 at the top of the mold chamber merely abut against the faces of the slab, thus permitting the latter to expand vertically when heated by the molten metal.

The molten metal is poured into the mold chamber by way of the pouring box and notches 65 in the slab positioning plates 63 to fill the mold chamber to a level L (FIG. 7) slightly below such plates so as to secure a billet of requisite length. The metal may be poured into the mold chamber at a rate in accordance with common foundry practice in casting billets to be subjected to

a rolling operation for producing strip, which rate would fill a mold chamber about 5 feet high to the desired level in about 30 seconds. As hereinbefore explained, the metal is poured into the chamber at such temperature with respect to the thickness of the slab 7 and the cooling effect of the water cooled mold on such metal that the latter prior to its solidifying in said chamber will melt the outer portions of the slab contacted by it to cause the metal so melted to mix with the poured metal, but without melting any portion of the metal of the slab down to the passages therein containing the pulverized weld preventing material. This pouring temperature may be in accordance with ordinary foundry practice, but preferably is at the lower part of the range of pouring temperatures commonly employed for any given metal, say a pouring temperature of about 2100° F. when deoxidized copper is the metal employed, that is to say, about 150 to 200° above the liquidus temperature of such metal. By employing a relatively low pouring temperature assurance is had that the slab will not melt down to the passages containing the weld preventing material at the center portion of the mass of metal in the mold, at which center portion the metal cools more slowly than at other portions of such mass. After the billet is removed from the mold it preferably is cut off at each of its ends to remove several inches of the length of the cast metal prior to rolling it to insure that at such ends where the metal cools most rapidly the billet will contain no portions in which the slab has not satisfactorily united with the metal poured into the mold chamber.

The preliminary billet, if desired, also may be cast in the same mold as the second and subsequent billets, in which case for the positioning plates 63 at the upper part of the mold chamber may be substituted the two plates 71 and 73 (FIGS. 8 and 10), while for the positioning plates 61 at the bottom of the mold chamber may be substituted the two plates 75 and 77 (FIGS. 9 and 11). These substitute plates, which may be of the same material as the plates 61 and 63, hold the vertical rods 5 of the row thereof in laterally spaced position in the mold chamber. As shown in FIGS. 8 and 10, each plate 71 and 73, like the plates 63, is formed with a notch 79 at its outer edge for permitting entrance into the mold chamber of the streams of molten metal from the pouring box. The plate 71 at its longitudinally extending edge adjacent the plate 73 is shown as provided with spaced notches 81 in which the rods 5 are received and fit so as to hold them in spaced relation. The longitudinally extending edge 83 of the plate 75 is shown as straight and abuts the adjacent surfaces of the rods so as to hold them in said notches 81. Similarly, the plate 75 at the bottom of the mold is shown as formed with spaced notches 85 in which the lower end portions of the rods 5 are received and fit so as to hold the rods at their lower end portions in spaced relation. To insure against the rods floating upward in the molten metal they are shown as provided on one of their faces adjacent their lower ends with notches 87 in which is received the projecting longitudinally extending flange 89 formed by rabbeting out the lower portion of the edge of the plate 77 adjacent the rods as indicated at 91 (FIG. 11). The rods are slidably received in the assembly formed by the plates 71 and 73 to permit them to expand lengthwise when heated by the metal poured into the mold.

It will be understood that within the scope of the appended claim wide deviations may be made from the form of the invention herein described without departing from the spirit of the invention.

I claim:

The method of making elongated internally slitted metal strip of the character described which comprises forming a relatively thick metal billet having one or more longitudinally extending passages of flattened cross-section, such as rectangular, and of substantial thickness proportionate to that of the relatively thick billet, arranged with

their widthwise medial planes parallel to opposite faces of the billet, which passages immediately contain bodies of weld preventing material, rolling said billet in the direction of the length of said passages for elongating it and said bodies and for thinning it and said bodies to produce a relatively long, relatively thin but only partially reduced bar in which opposite widthwise faces of said passages are spaced apart and said passages are filled with compacted correspondingly only partially reduced masses of said weld preventing material, severing said bar transversely into lengths to form a plurality of slabs, building up said slabs to form a plurality of second relatively thick billets each having one or more elongated passages, filled with bodies of weld preventing material, corresponding in size and shape to those of the slab and arranged with their widthwise medial planes parallel to opposite widthwise faces of such second billets, such building up of each of said slabs comprising pouring molten metal into a mold chamber of transverse cross-section that of such second billet with the slab so positioned in said chamber and the molten metal so poured into it that such metal contacts both faces of the slab, the temperature of the molten metal so poured being such in respect to the thickness of the slab and the cooling effect of the mold on the molten metal that the latter prior to its solidifying in said chamber will melt the outer portions of the metal of the slab contacted by it to cause

metal so melted to flow into the poured metal but without melting the metal of the slab down to any of said passages therein, and rolling the second billets in the direction of the lengths of said passages therein for elongating said billets and said bodies in said passages and for thinning said billets to move the opposite widthwise faces of said passages substantially into contact to produce the internally slitted strip, each of said slabs being built up with metal the same as that of the given slab, said metal employed for building up the slab being poured into the mold chamber in highly superheated condition.

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