

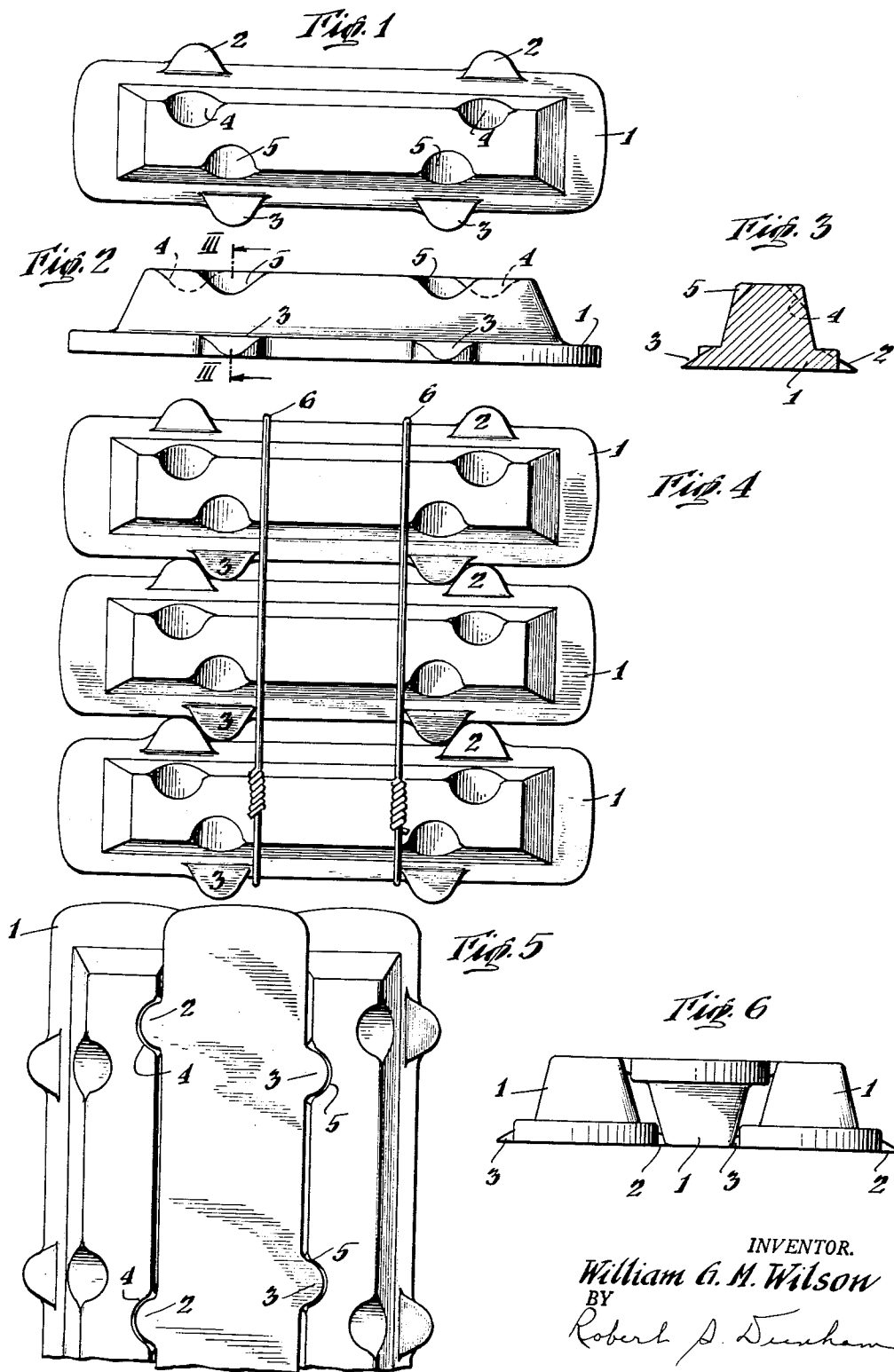
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INTERLOCKING INGOTS

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INTERLOCKING INGOTS

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The present invention relates to articles adapted to be arranged in tiers or layers, and to shipping bundles containing a plurality of tiers of said articles.

The invention is described herein as applied to metal ingots, particularly aluminum ingots, and to bundles of such ingots prepared for shipment. While the invention is of special utility in connection with such ingots, it may be applied to other articles, and I therefore do not intend to limit my invention in its broader aspects to any specific article.

Aluminum ingots are commonly formed, for convenience in casting, into elongated shapes of various cross sections. In shipping such ingots, it is common to assemble a convenient number of them in a bundle of a size and weight which can be readily handled by mechanical equipment such as small cranes and fork-lift trucks. Typically, the ingots are assembled in bundles of forty-four, each bundle being held together by wires or bands extending around the bundle transversely of the length of the ingots.

Difficulty has been encountered in the shipment of such ingots because of the tendency of the individual ingots to slip endwise in their bundles. When a freight car is filled with such bundles, this endwise slippage may produce an interlocking between the bundles which has at times been so severe as to require that substantially an entire carload be unloaded by cutting the wires or bands and removing the ingots individually by hand instead of removing the bundles with power-driven equipment. It is not practical to remedy this situation by means of wires or bands extending longitudinally around the bundle, because the ingots have such a small cross-section that they can slip readily between such wires. While longitudinal slippage can be prevented by means of wires, providing enough wire is used, the resulting bundle is expensive and difficult to prepare.

It is therefore an object of the present invention to provide an article such as an ingot which may be assembled in a tier with other ingots of similar form, with interlocking lugs and/or notches on the ingots to prevent relative endwise movement of the ingots after the tier is assembled.

A further object of the invention is to provide an ingot which may be assembled in a tier with other ingots, either with all the ingots in the tier upright or with alternate ingots inverted, the interlocking lugs and/or notches being effective in either manner of assembly.

A further object of the invention is to provide an improved bundle of ingots in which the individual ingots within the bundle are interlocked with other ingots to prevent relative endwise slippage.

In the preferred form of my invention, which is described in detail below, the foregoing and other objects are attained by providing each ingot on one side near the bottom with a pair of spaced projecting lugs. On the opposite side of the ingot, at the same level, is provided a second pair of projecting lugs spaced more closely together than the first pair of lugs, so that two ingots may

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be assembled side by side, with the second pair of more narrowly spaced lugs on one ingot fitting between the first pair of more widely spaced lugs on the other ingot.

On the top of each ingot, there are formed at one side a pair of notches corresponding in size and spacing to the first pair of lugs. On the opposite side is formed a second pair of notches corresponding in size and spacing to the second pair of lugs. When the ingots are assembled in a tier with alternate ingots inverted, the first and second pairs of lugs on the upright ingot are received in the corresponding pairs of notches on the inverted ingots. Similarly, the first and second pairs of lugs on the inverted ingots are received in the corresponding pairs of notches in the upright ingots. The cooperating notches and lugs prevent endwise movement of adjacent ingots.

In the drawings:

Fig. 1 is a plan view of a single ingot constructed in accordance with the invention;

Fig. 2 is an elevational view of the ingot of Fig. 1;

Fig. 3 is a sectional view taken on the line III—III of Fig. 2;

Fig. 4 is a plan view of a bundle employing the invention showing an upper tier of three ingots in the bundle;

Fig. 5 is a plan view of a modified form of tier arrangement in accordance with the invention;

Fig. 6 is an elevational view of the tier of Fig. 5.

Referring to the drawings, there is shown in Figs. 1 to 3 an ingot 1 having a pair of widely spaced lugs 2 adjacent its bottom on one side and a pair of more narrowly spaced lugs 3 adjacent its bottom on the other side. In one edge of the upper surface of the lug there are formed a pair of widely spaced notches 4 corresponding in size and spacing to the lugs 2. On the opposite side of the top of the ingot are formed a pair of notches 5, corresponding in size and spacing to the lugs 3. The distance between the inwardly facing surfaces of the lugs 2 is just slightly larger than the distance between the outwardly facing surfaces of the lugs 3, so that the lugs 3 on an adjacent similar article may slide freely between the lugs 2.

An ingot constructed as shown in Figs. 1 to 3 may be assembled with other ingots in an interlocking tier either by placing all the ingots upright or by inverting alternate ingots. A bundle including an upper tier with all the ingots upright is illustrated in Fig. 4. In that figure, three ingots are shown held together in a bundle by a pair of spaced bands 6. The spacing between the inwardly facing sides of the widely spaced lugs 2 on each ingot is substantially the same as the spacing between the outwardly facing sides of the narrowly spaced lugs 3 on each ingot, so that the ingots assembled as shown in Fig. 4 are held against longitudinal movement with respect to one another by engagement of the lugs 3 with lugs 2. The distance between the outer side of each lug 3 and the end of the ingot is made substantially equal to the distance between the corresponding lug 2 and the end of the ingot plus the width of the lug 2. By so dimensioning the lugs and their spacing from the ingot ends, they may be made to hold the ends of the ingots in substantial alignment, as shown, so that the completed bundle has no projections nor recesses which would be likely to cause interlocking of adjacent bundles.

In Fig. 5 is illustrated a tier of three ingots in which the two end ingots are upright and the center one is inverted. It may be seen that the widely spaced lugs 2 on the center ingot are received in the widely spaced notches 4 on the left hand upright ingot. Likewise the narrowly spaced lugs 3 on the inverted center ingot are received in the narrowly spaced notches 5 on the right hand upright ingot. In a similar manner, as best seen in Fig. 6, the narrowly spaced lugs 3 on the right hand ingot 1 project into the corresponding notches on the

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inverted center ingot and the widely spaced lugs 2 on the left hand ingot project into the widely spaced notches on the inverted center ingot.

The lugs have been disclosed as located at the bottom of the ingot and the notches at the top. This is the most convenient arrangement for casting purposes. However, the interlocking would be just as effective with the lugs at the top and the notches at the bottom. Therefore, in this specification and the appended claims, it is to be considered that the terms bottom and top are relative, referring to opposite horizontal faces of the ingot, without limitation as to the particular face which is up.

It will be readily understood that the ingots of Fig. 5 may be formed into a bundle by the use of suitable encircling bands such as the bands 6 of Fig. 4. Each bundle may be composed of several tiers and each tier may be composed of any convenient number of ingots.

The preferred embodiment of the invention illustrated herein is capable of assembly in tiers either with all ingots of tier upright, as shown in Fig. 4, or with alternate ingots inverted, as shown in Figs. 5 and 6. If only the type of tier shown in Fig. 4 is to be used, the notches 4 and 5 may be omitted. Similarly, if only the type of tier shown in Figs. 5 and 6 is to be used, lugs need be provided only on one side of each ingot at the top or bottom, and matching notches on the opposite side, at the bottom or top.

In the preferred embodiment of the invention, the lugs are all shown as of equal width, and the notches are just wide enough to receive the lugs with a loose fit. This construction is greatly to be preferred in all modifications of the invention. However, in the modifications just mentioned where only the "all upright" type of stacking is to be used, it is not necessary that all lugs be of the same width.

Other modifications of my invention, such as those briefly mentioned in the immediately preceding paragraphs, will readily occur to those skilled in the art, and I therefore intend my invention to be limited only by the appended claims.

I claim:

1. An elongated article adapted to form with other similar articles a tier of articles interlocked against relative longitudinal movement comprising an elongated body with a first pair of longitudinally spaced lugs projecting laterally from one side of said body, and a second pair of longitudinally spaced lugs projecting laterally from the opposite side thereof, both said pairs of lugs being adjacent the bottom of said body, said body having a first pair of notches formed in said one side of said body and longitudinally spaced and dimensioned to receive said first pair of lugs on an adjacent article and a second pair of notches formed in said opposite side of said body and longitudinally spaced and dimensioned to receive said second pair

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of lugs on an adjacent article and a second pair of notches being adjacent the top of said body, so that said article may be placed with other similar articles in a tier which consists of alternate upright and inverted articles, the lugs and notches on adjacent articles cooperating to prevent relative longitudinal shifting of the articles.

2. An article as defined in claim 1, in which said notches are only slightly wider than said lugs, so as to receive said lugs slidably.

3. An article as defined in claim 1, consisting of an ingot.

4. A bundle including at least one tier of elongated articles interlocked against longitudinal movement, each said article comprising an elongated body with a first pair of longitudinally spaced lugs projecting laterally from one side of said body, and a second pair of longitudinally spaced lugs projecting laterally from the opposite side thereof, both said pairs of lugs being at the same level adjacent the bottom of said body, each said lug of said second pair having its surface nearest the end of the body spaced from said end by a distance slightly greater than the sum of the distance of the corresponding surface of the corresponding lug of the first pair from said end of the body plus the width of said corresponding lug, said body also having a first pair of notches formed in said opposite side of said body and longitudinally spaced and dimensioned to receive said first pair of lugs on an adjacent article, and a second pair of notches formed in one side of said body and longitudinally spaced and dimensioned to receive said second pair of lugs on an adjacent article, both said pairs of notches being adjacent the top of said body, the articles in said tier being alternately upright and inverted with the lugs and notches on adjacent articles cooperating to prevent relative longitudinal shifting of the articles, and at least one band extending transversely around said bundle and holding said articles against lateral shifting movement, said band being effective to hold said lugs and notches in interlocking engagement.

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