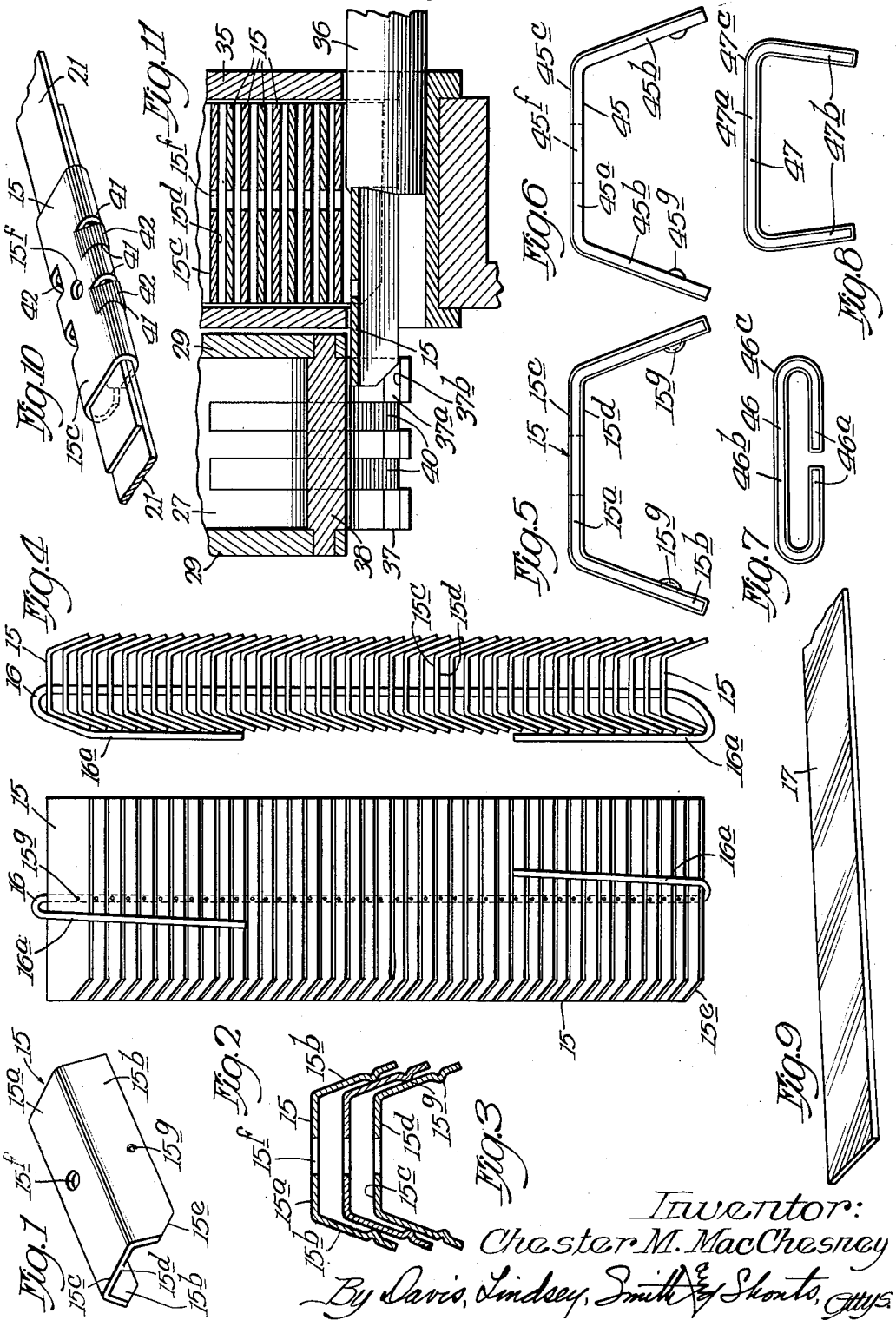
May 18, 1943 C. M. MacCHESNEY 2,319,334

STRAP SEAL

Filed April 5, 1939 2 Sheets-Sheet 1

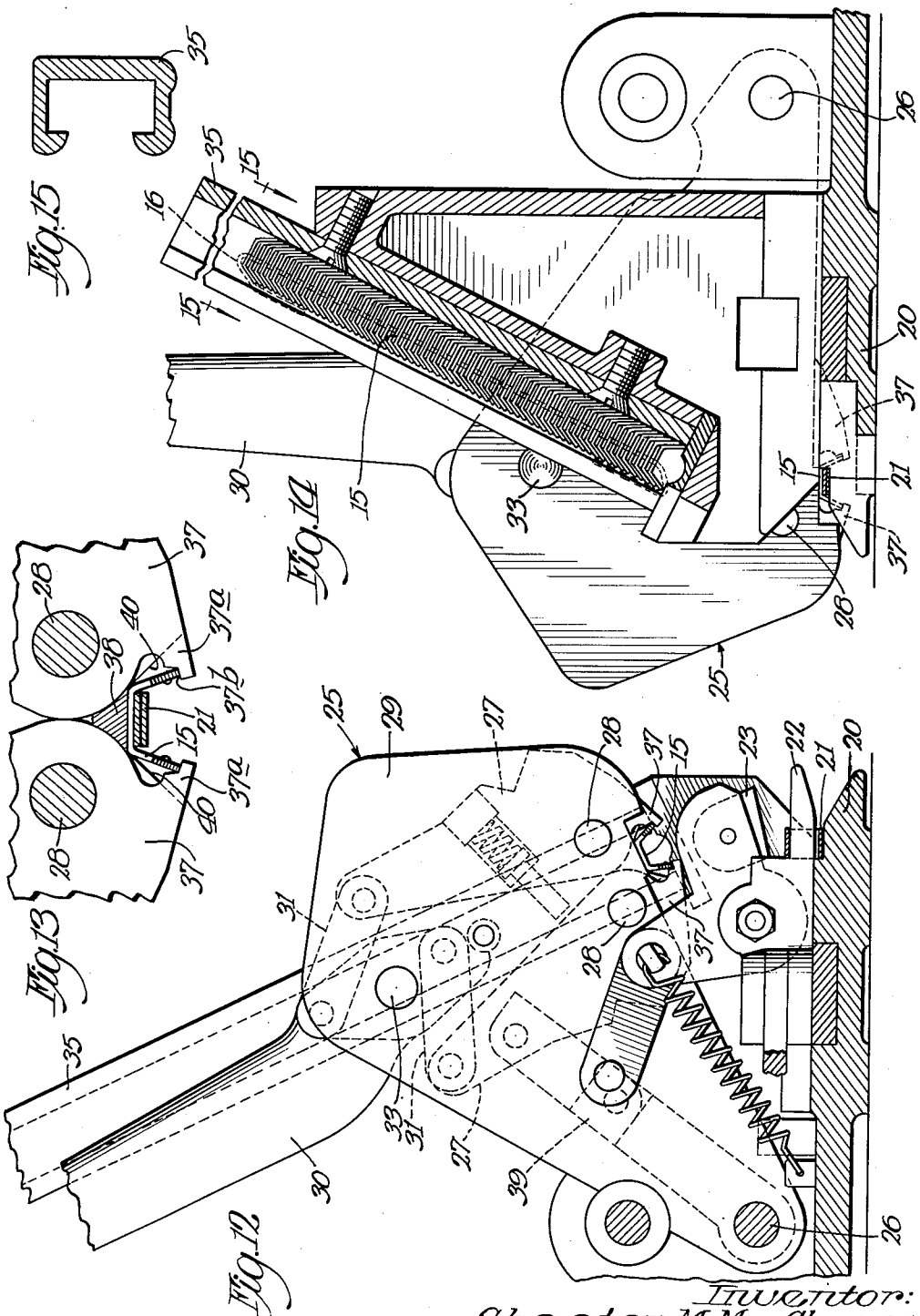


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STRAP SEAL

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2,319,334

STRAP SEAL

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3 Claims. (Cl. 24—23)

This invention relates to improvements in strap seals and method of forming the same, and the purpose of the invention is to provide an improved metal seal adapted for use in uniting the overlapping ends of steel strapping and the like which may be employed in binding and reinforcing boxes or packages or in securing together a number of boxes or packages for shipment.

The present invention is an improvement on the type of seal described and claimed in the United States patents of Chester M. MacChesney, Nos. 2,062,098 and 2,062,099, granted November 24, 1936. In these patents there is disclosed a metal seal of channel form having side walls which are so arranged that a plurality of seals may be superimposed upon each other in a stack and temporarily secured together to form a package which may be conveniently placed in the magazine of a sealing tool, whereupon the fastening means is removed and the individual seals are capable of being then moved successively from the magazine to a position where they may be engaged by the sealing apparatus and operated upon to form interlocking joints in connection with overlapping strap ends engaged thereby. When using a channel-shaped seal of this type, the side walls of the seal are first engaged by bending dies of the sealing tool which bends these walls about the overlapping strap ends, and at or near the conclusion of this bending operation, the edge portions of the seal and the enclosed strap ends are operated upon by shearing dies or punches which deform these edge portions of the seal and the strap ends to provide an interlocking joint. The operation of such a sealing tool requires the expenditure of considerable energy in shearing or otherwise deforming the metal of the strap and seal and also in causing the dies or punches of the sealing tool to move over the seal during the bending and shearing operations.

The principal object of the present invention is to provide an improved seal having surfaces which are provided with a lubricating coating formed of lead or an alloy of lead, thereby facilitating the action of the sealing tool in applying the seal to overlapping strap ends so that the force which must be applied in operating the tool is greatly reduced and an interlocking joint may be more efficiently formed. A further object is to provide a metal strap seal having a coating which will serve as a lubricant and also as a protection against rust and the like. Although a lubricating coating formed entirely of lead may be used with advantage, it is now preferred to employ an alloy having a lead base and, in particular, an alloy of lead and tin, commonly known as "terne coat." Although the alloy used for lubricating the seals is preferably formed entirely, or almost entirely, of lead and tin, it is found that very satisfactory results are obtained when the alloy consists of lead and tin combined with one or more of the elements antimony, bismuth, cadmium and copper, and the invention contemplates the use of all of these ingredients.

Another important object of the invention is to provide an improved method of forming strap seals according to which an elongated strip of metal from which the seals are formed, or the finished seals, are coated with the lubricating material, preferably by running the elongated strip through a molten bath of the alloy or by dipping the finished seals in the alloy after they have been suitably cleaned and prepared for the purpose, after which the coated objects may be treated with palm oil in order to impart a better finish to the coating. Another object of the invention is to provide an improved strap seal having a lubricating coating on one or both sides thereof, whereby the application of the seal to overlapping strap ends by the use of a sealing tool is facilitated while at the same time making it possible to effect more easily at relative separation of the seals in the magazine of a sealing tool when the seals are fed successively therefrom. Another object of the invention is to provide an improved seal package comprising a plurality of superimposed seals having lubricating coatings of lead or lead alloys on one or both sides of each seal and having apertures therethrough to permit the temporary engagement therewith of a binder which may be removed when the seals are placed in the magazine of the sealing tool. Other objects relate to various features of the improved seal and to the method of forming the same which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification, taken with the accompanying drawings, in which two embodiments of the improved seal and one embodiment of the improved seal package are disclosed in connection with portions of a sealing tool and certain examples of improved methods of forming these seals. In the drawings,

Figure 1 shows a perspective view of one form of seal embodying the present invention;

Fig. 2 shows a side elevation of a package of seals embodying the present invention;

Fig. 3 shows a vertical section through a num-

ber of superimposed seals when they are arranged in a package as shown in Fig. 2;

Fig. 4 shows an end elevation of the seal package illustrated in Fig. 2;

Fig. 5 shows an enlarged end elevation of the form of seal illustrated in Figs. 1 to 4, inclusive, wherein a lubricating coating is illustrated on a magnified scale as being applied to all surfaces of the seal;

Fig. 6 is an enlarged end elevation of a seal, similar to that of Fig. 5, illustrating a modified form of the invention in which the lubricating coating is shown on a magnified scale as being applied to the outer surfaces only of the seal;

Fig. 7 is an enlarged end elevation of a closed seal having applied thereto the coating of the present invention which is shown on a magnified scale;

Fig. 8 is an enlarged end elevation of another form of the invention in which the coating is shown as being applied to another form of open seal;

Fig. 9 shows a perspective view of an elongated metal strip having a lubricating coating applied thereto preliminary to being cut into sections which are bent and punched to form seals of the type shown in Figs. 1 to 5, inclusive;

Fig. 10 is a perspective view of a completed seal joint formed by bending one of the seals of the present invention about overlapping strap ends, or by threading the strap ends through the closed seal shown in Fig. 7, then shearing the lateral edges of the seal and strap ends and then bending intervening portions of the metal downwardly to provide an interlocking joint;

Fig. 11 shows an upright section through a portion of the magazine of a sealing tool and through the sealing jaws showing the operation of a feeding plunger in moving one of the seals of the present invention from the magazine to a position between the sealing jaws;

Fig. 12 shows a vertical section through one form of sealing tool which may be used with the seal of the present invention showing in elevation the sealing head of this tool when it is in its elevated position for receiving a seal from the supply magazine;

Fig. 13 shows an enlarged section through the jaws of the sealing tool shown in Figs. 11 and 12, at right angles to the axes about which the jaws move, and illustrating one of the seals of the present invention in position between the jaws and embracing overlapping strap ends;

Fig. 14 shows a vertical section through the sealing tool illustrated in Fig. 12, illustrating the position of the seal package when it is placed in the magazine, the sealing head being shown in elevation in its lower position wherein a seal held between the jaws is in engagement with the upper one of two overlapping strap ends; and

Fig. 15 is a detail section taken on the line 15—15 of Fig. 14.

In Figs. 1, 3 and 5, one form of the improved seal 15 is shown as a sheet metal member of channel form having a back wall or top wall 15*a* and two side walls 15*b* diverging therefrom so that a number of these seals are capable of being nested one within the other to form a seal package. The upper surface of the back wall 15*a* and the outer surfaces of the side walls 15*b* are provided with a lubricating coating 15*c* which is illustrated, on an exaggerated scale, in Fig. 5. The lower surfaces of the side walls 15*b* and the under or inner surfaces of the back wall and the side walls are also preferably provided with a lubricating coating 15*d*. In order to facilitate the movement of the seals from a supply magazine or the like, the forward corners of the side walls 15*b* are preferably cut away on diagonal lines, as shown at 15*e*. The top walls 15*a* of these seals are preferably provided with centrally located holes 15*f* which register with each other when the seals are arranged in a stack, as shown in Figs. 2 and 4, thus permitting a fastening member 16 to be passed therethrough. This fastening member 16 is preferably in the form of a soft ductile wire which, after being inserted through the aligning holes, has its end portions 16*a* reversely bent about the package in order to hold the seals in assembled relationship to each other. In order to provide flexibility in the seal package so that it may readily be placed in the magazine of a sealing tool, the side walls 15*b* of the seal are provided with punched projections 15*g*, preferably extending inwardly, each of which is located midway between the ends of a side wall and somewhat above the lower edge thereof so that when the seals are arranged in a stack, the inwardly punched projections on one seal will engage the side walls of the next lower seal at points above the projections in the latter seal. In this way, a point to point contact is established between the side walls of adjacent seals in the stack, which permits them to rock upon each other so that they readily adjust themselves to the straight side walls of the seal magazine when the package is inserted therein. When the package has been placed in the magazine of the sealing tool, the temporary fastening member 16 may be withdrawn, whereupon the seals may be fed successively from the magazine as hereinafter explained. During this feeding operation, the lowermost seal of the stack is moved outwardly from beneath the next adjacent seal and the ease with which this movement may be accomplished is increased due to the point to point contacts provided by the projections 15*g* and also to the lubricating coatings on the surfaces of the seals.

In the manufacture of the seals of the present invention, an elongated metal strip 17 having the form shown in Fig. 7 is treated in a continuous process, being first run through an acid pickling solution and washed to remove the scale and other foreign particles from the surface of the strip, after which the strip is coated with a suitable flux and then run through a hot molten bath of the lead or the lead base alloy which is to serve as the coating material. This coating material may preferably consist of an alloy of lead and tin combined in the proportions of from fifty per cent to eighty-eight per cent by weight of lead, and from fifty per cent to twelve per cent by weight of tin. In general, a large percentage of lead is desirable in order to improve the lubricating qualities of the alloy and it has been found that small percentages, such as two per cent by weight of antimony, bismuth, cadmium or copper, or any one or more of these metals may be present in the alloy without interfering with its lubricating qualities. After running through the hot molten bath of the lead base alloy, the strip is subjected continuously as it emerges to the action of a bath of palm oil or the like which is to impart a smooth shiny finish to the coating. The strip is then allowed to cool and is wound in a coil, after which it is cut up into sections and punched to form seals of the type described above. If desired, the elongated metal strip may be cut into sections

and punched and bent to form the finished seals which may then be dipped in a hot molten bath of the coating material in order to provide the desired lubricating coating. The application of the lubricating coating to the strip or to the finished seal may be made in other well-known ways within the scope of the present invention.

In Figs. 11 to 15, inclusive, of the drawings, there is illustrated one form of sealing tool with which seals embodying the features of the present invention, and having the form described above, may be used. This sealing apparatus is of the form described and claimed in the United States patents of William C. Childress No. 2,097,443, Ralph H. Norton No. 2,097,955, and Squire Julius Johnson No. 2,097,980, all dated November 2, 1937. This sealing tool comprises a base plate 20 adapted to rest upon the surface of a box or package and having parts adapted to support the overlapping ends of a strap 21 which is passed around the box or package. A stationary cutting blade 22 is carried by the base plate and is adapted to cooperate with a movable cutting blade 23 to cut off the upper strap portion from the source of supply whereupon the upper strap end is moved downwardly from the position shown in Fig. 10 to the position shown in Fig. 12 where the overlapping strap ends lie in close contact with each other. This apparatus comprises a movable sealing head 25 which is pivoted at 26 on the base plate 20 and which embodies a pair of relatively movable jaws 27 pivotally mounted on pins 28 secured in the side plates 29 of the sealing head. An operating lever 30 is pivotally connected with links 31 which in turn are pivotally connected to the upper arms of the sealing jaws 27 so that when the lever is rocked about its pivot 33 carried by the side plates 29, the lower end portions of the jaws 27 will be caused to move inwardly to cause the inward bending of the side walls of one of the seals 15 which, in Fig. 12, is shown positioned between the jaws.

When the head 25 is in its upper position, as shown in Fig. 12, the jaws are adapted to receive between them one of the seals 15 which is fed from the magazine 35, shown particularly in Fig. 14. The lowermost seal of the stack is moved from this magazine by a plunger 36, shown in Fig. 11, and when this plunger reaches the end of its forward stroke the seal will occupy a position between the jaws in readiness for the downward movement of the sealing head 25. Each jaw 27 comprises a plurality of bending dies 37 having hook-shaped portions 37a which are provided at their extremities with shoulders 37b upon which the lower edges of the side walls of the seal rest when it has been moved into a position between the jaws of the magazine, as shown in Fig. 13. When the parts are thus in position, the back wall 15a of the seal will rest against a saddle 38 which is mounted between the jaws. After the seal has thus been positioned, the head 25 is moved downwardly by the lever 30 until the seal embraces the overlapping strap ends, as shown in Fig. 14. A toggle connection 39 which holds the lever 30 against pivotal movement with respect to the side plates 29, during this movement of the head 25, is then broken so that further pressure on the lever 30 will cause this lever to move about its pivot 33 with the result that the jaws 27 are actuated and the bending dies 37 bend the side walls 15b of the seal inwardly and under the overlapping strap ends so that the seal assumes a sleeve-like form enclosing the strap ends. In the later stages of this movement, the lateral portions of the seal are engaged by shearing dies or punches 40, each of which is located between two of the bending dies 37 in each of the jaws 27. In the embodiment illustrated, there are two shearing dies or punches in each of the jaws. These dies or punches shear the metal of the seal and the overlapping strap ends along the lines 41, shown in Fig. 10, and the intervening metal, between each pair of cuts, is deflected downwardly, as shown at 42, so that a plurality of abutting shoulders are formed which prevent relative endwise movement of the overlapping strap ends.

During the operation of applying a seal to the overlapping strap ends, in the manner described above, the friction between the dies of the sealing tool and the walls of the seal is reduced so that the amount of energy required to apply the seal to the overlapping strap ends is about twenty-six or twenty-seven per cent less than that which would be required if the walls of the seal were uncoated. A coating of lead or a lead base alloy produces a much greater saving in this respect than that which can be accomplished with any other lubricating material capable of being used for the purpose, and at the same time, the coating has the advantage that it improves the appearance of the seals and protects them against rust and corrosion. In the operation of a sealing tool of the type referred to above with metal seals which are not coated with lubricating material, it has been found that the metal of the side walls of the seals tends to flow or form ribs ahead of the dies or punches of the sealing tool during the relative movement of the jaws and this greatly increases the work required to operate the sealing tool, but when the lubricating coatings of the present invention are employed, this difficulty is removed and the seals may be quickly and efficiently applied with a much smaller expenditure of energy than has heretofore been required.

Although the improved seals of the present invention are preferably coated on both sides with a lead base alloy or the like, this lubricating material may be applied to the outer sides only of the seals, as shown in Fig. 6, where the seal 45 is similar in construction to the seals shown in Figs. 1, 3 and 5, having a back wall 45a and side walls 45b with an aperture 45f in the back wall and projections 45g located on the side walls midway between the ends thereof. In this construction, a lubricating coating 45c of the lead base alloy or the like is applied electrolytically to the outer surfaces only of the back wall and the side walls of the seal, these being the surfaces which are engaged by the sealing tool during the operation of applying the seal to the strap ends. In the process of manufacturing this form of seal, the coating may be applied to the elongated strap before forming the seals.

The principles of the present invention are not limited to seals of channel form but may be employed in connection with seals of the closed type shown in Fig. 7 which are commonly employed in the forming strap joints in various types of work, particularly in binding together boxes, packages or other load elements in forming load units according to the method described and claimed in the United States Patent of Chester M. MacChesney and John Ekern Ott No. 1,703,495, dated February 26, 1929. This seal comprises a metal member 46 which has its lateral edges 46a reversely bent to underlie the top wall 46b, thus forming a sleeve-like structure which is adapted

to embrace the overlapping strap ends when they are threaded therethrough, after which the seal and the enclosed strap ends may be deformed to provide an interlocking joint, such as that shown in Fig. 10. The seal 46 is provided with a lubricating coating 46c made up of a lead base alloy or the like, such as that described above, which may be applied to both the inner and outer sides thereof. The present invention is of particular advantage in connection with seals of this type which are employed in the practice of the method of loading disclosed in the above mentioned patent to MacChesney and Ott because relatively heavy metal bands or straps are ordinarily used in binding the parts of the load unit together and correspondingly heavy seals are employed, thus requiring the use of sealing tools which are comparatively large and difficult to operate. In the operation of such a tool with seals of the uncoated type heretofore employed, it frequently requires the entire strength of one man to operate the tool and form the joint, due largely to the resistance of the seal to the sliding of the jaws of the sealing tool over it and to the rolling up of the metal ahead of the jaws of the tool, as described above. But when employing seals made according to the present invention, it has been found that the necessary effort to operate the tool is so greatly reduced that one man may operate the tool without difficulty.

In Fig. 8 there is shown another modification of the invention, in which a seal 47 comprising a back wall 47a and side walls 47b, which converge slightly toward each other from the back wall, is provided with a lubricating coating 47c, formed of a lead base alloy or the like and applied preferably to both sides of the seal. This seal, like that shown in Fig. 7, may be formed by cutting up and bending sections of a strip of metal which has previously been coated or they may be formed by coating the completed seals after they have been bent into the desired shapes.

Although certain examples of the improved seal have been shown and described in connection with the explanation of certain examples of the improved method, it will be understood that the seal may take various forms and that the method may be practiced in various ways coming within the scope of the appended claims.

I claim:

1. A metallic strap seal having a lead-containing metallic coating of lubricating and rust-preventive material.

2. A metallic strap seal having outer and inner surfaces and having its outer surface comprising a coating of an alloy including lead and tin.

3. A metallic strap seal having a coating of an alloy of lead and tin combined in the proportions of about fifty per cent to eight-eight per cent of lead and about fifty per cent to twelve per cent of tin.

CHESTER M. MACCHESNEY.