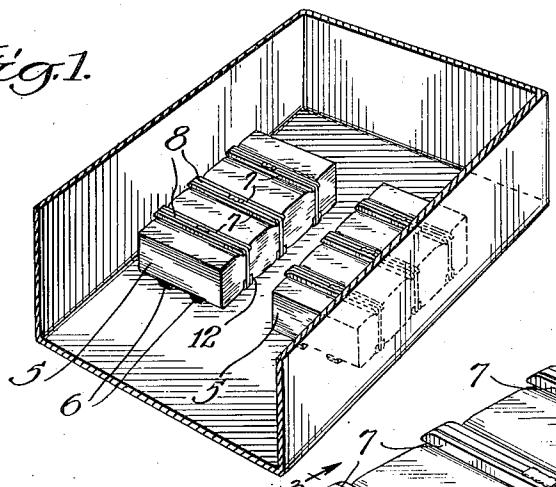
Dec. 15, 1936. H. C. PORTER 2,064,383

METHOD AND MEANS FOR PREPARING SHEET METAL FOR SHIPMENT

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Fig. 1.



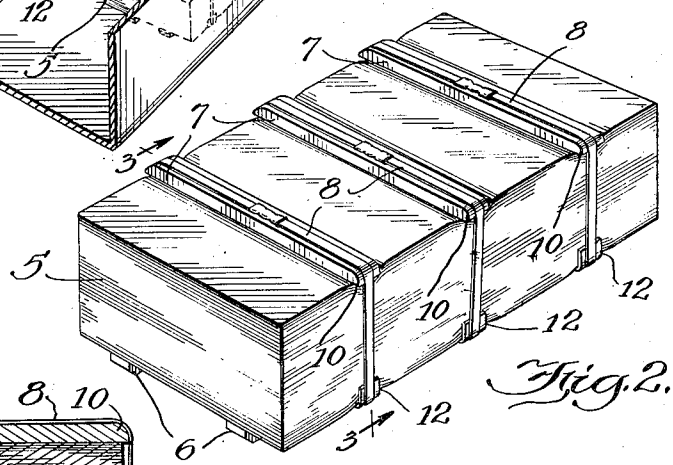


Fig. 2.

Fig. 3.

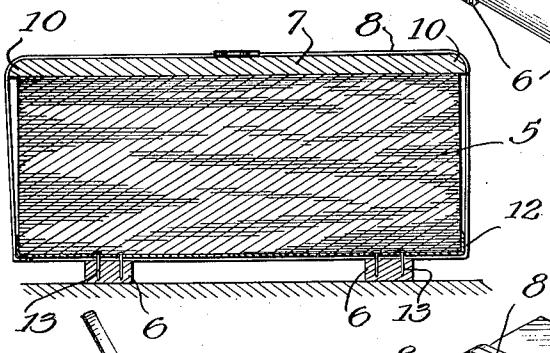
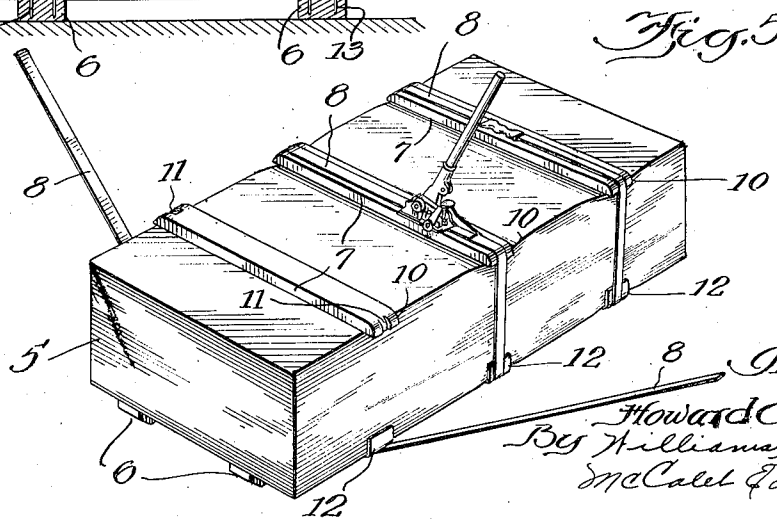


Fig. 5.



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Fig. 4.

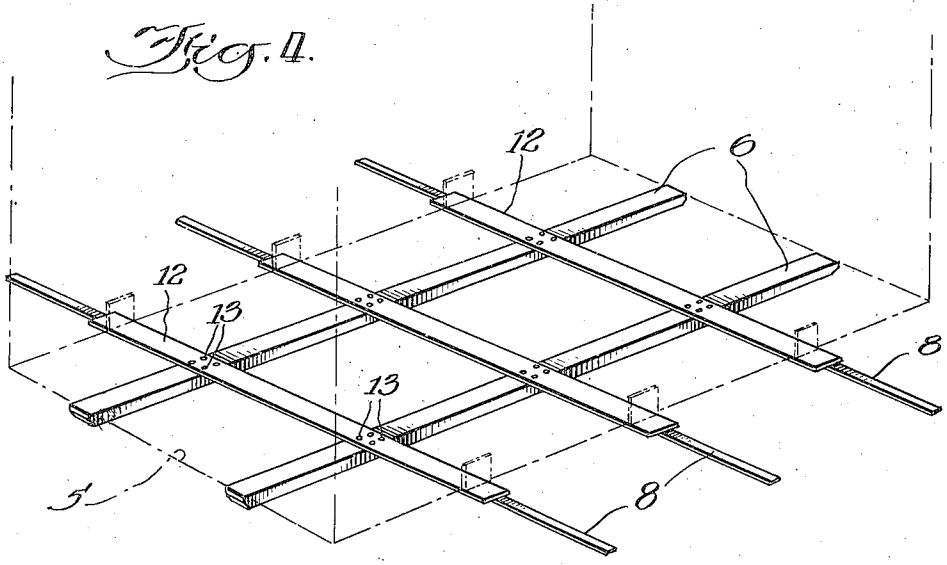


Fig. 6.

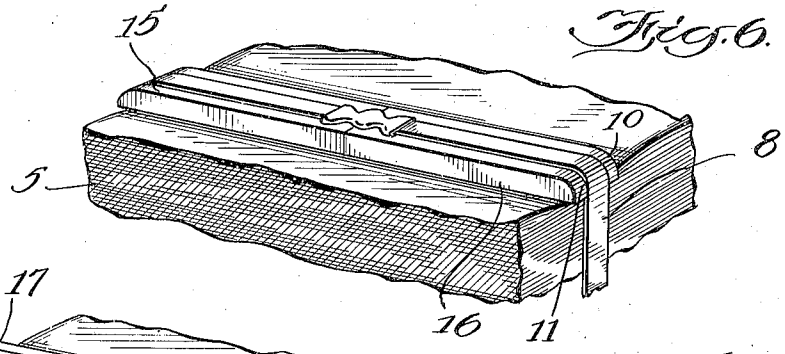


Fig. 7.

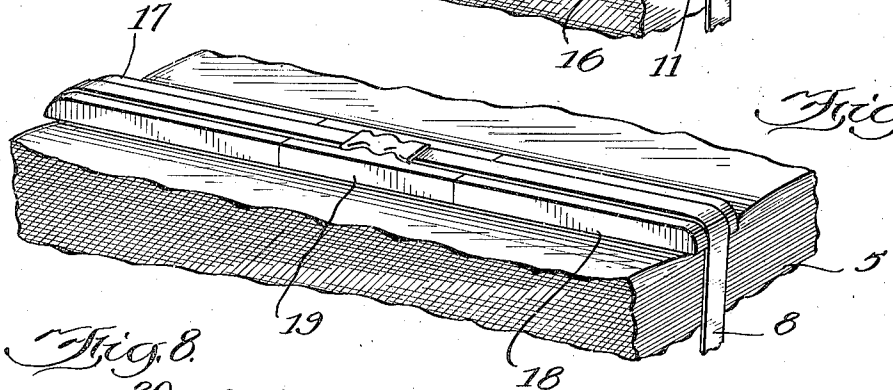
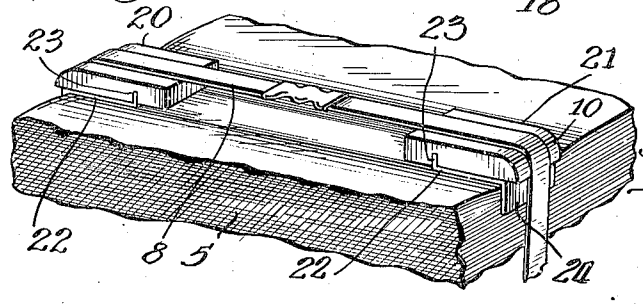


Fig. 8.



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METHOD AND MEANS FOR PREPARING SHEET METAL FOR SHIPMENT

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Fig. 9.

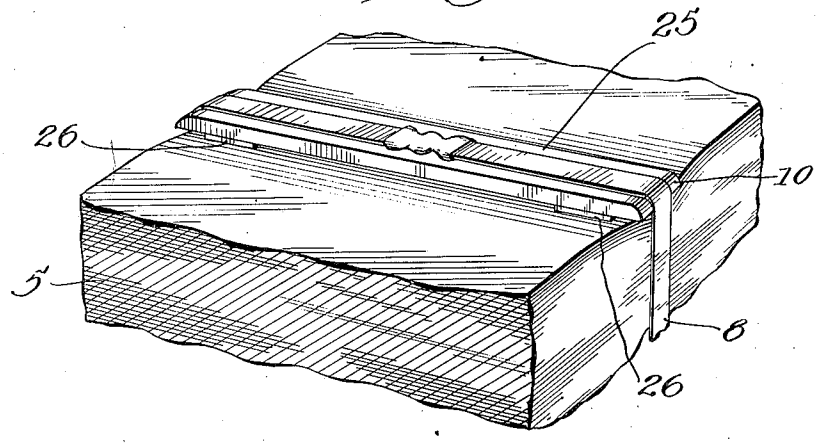


Fig. 10.

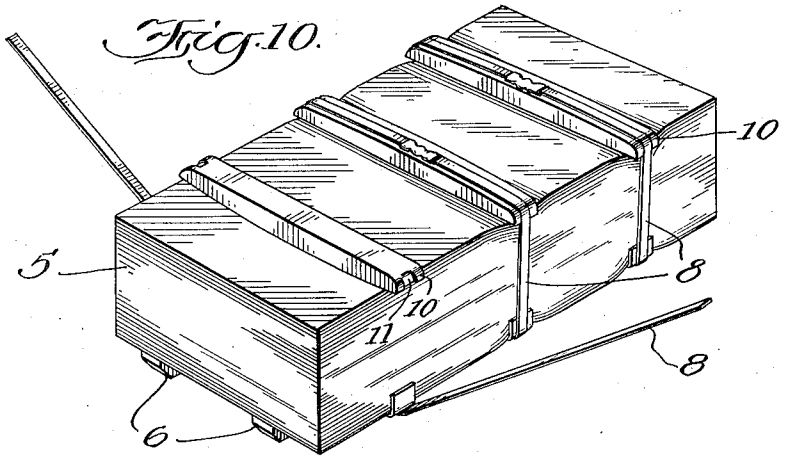
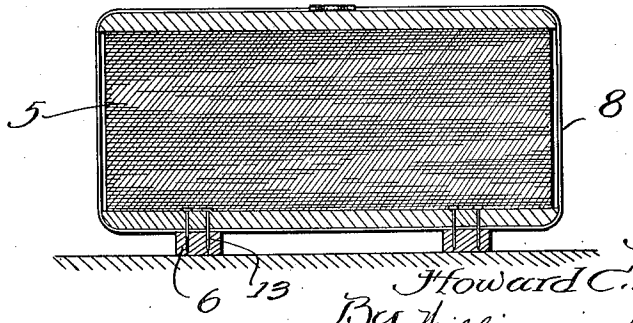


Fig. 11



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Patented Dec. 15, 1936 2,064,383

UNITED STATES PATENT OFFICE

2,064,383

METHOD AND MEANS FOR PREPARING SHEET METAL FOR SHIPMENT

Howard C. Porter, La Grange Park, Ill., assignor to Signode Steel Strapping Company, Chicago, Ill., a corporation of Delaware

Application April 7, 1932, Serial No. 603,705

4 Claims. (Cl. 206—60)

My invention relates to a method and means for preparing sheet metal for shipment.

More particularly it relates to the formation of an improved bundle or pack of sheet metal which, although not limited to such treatment or disposition, is particularly adapted and suitable for shipment on the floor of a railway car or other means of transportation by the so-called "floating load" method. According to the floating load method the bundle or pack, instead of being braced or otherwise anchored against movement relative to the floor of the railway car or other vehicle, is left free to shift under the influence of the shocks and jars of transit; the inertia of the load and its frictional engagement with the floor being the sole or principal preventative of excessive movement.

The floating load method of shipping sheet metal such as sheet steel has been used with considerable success for several years. The usual bundle or pack heretofore in the most general use was of such size and weight that its inertia and frictional engagement with the floor of the car would—or was supposed to—prevent excessive movement under the ordinary shocks of travel and switching and yet under normal and usual conditions would permit sufficient shifting of a bundle to absorb the customary shocks and thereby eliminate the necessity for any attempt to brace or block or otherwise immovably anchor the bundle in relation to the car. Also each bundle was so limited in size and weight that it could be moved into and out of the car with the usual lifting and moving equipment available and so that a number of bundles could be placed upon the car floor and afford sufficient disposition of weight, within the capacity of a car, to comply with the limitations of present day rolling stock.

The usual bundle or pack heretofore in the most general use comprised a stack or pile or pack of steel sheets piled flatwise and ordinarily weighing several tons (from four or five to eight or ten tons being typical weights) supported on a wooden platform or pallet or skid of some sort and tightly bound together and to the skid by loops of flexible metallic binder (either in the form of strap or wire) passing longitudinally and laterally thereabout. The binders were looped about the bundle, drawn tight and tensioned by suitable tools—usually applied to and acting upon the top section or reach thereof—and then the ends fastened together, in an appropriate manner, permanently to close the encircling loop and make a unitary package of the pile of sheets, the platform and the binders.

Experience with past methods of forming the packs has demonstrated that such methods possess a number of more or less serious disadvantages. Thus it has been found that relative shifting between sheets forming a pack has not been prevented to a sufficient extent satisfactorily to reduce the rubbing during transit of sheet on sheet within the bundle to eliminate or reduce within commercial limitations the injurious scratching or other damage to the surface of the sheets. It has been found that the production of even fairly satisfactory bundles was so dependent upon the operator's skill that there was too high a percentage of faulty bundles, occasioned by lack of experience or carelessness, which might even break apart during shipment and result in serious loss due to damaged sheets. The necessity for binders encircling a bundle in two directions required an undesirably large quantity of binder material, particularly since it was found that with past methods excessive internal shifting of the constitutent parts of a bundle could be lessened only by increasing the number of encircling binders. Also the time and labor consumed in forming a bundle was about directly proportional to the number of encircling binders required and consequently the greater the number of binders necessary to attain acceptable results the greater was the expense. The binders which encircled the bundle longitudinally of the floor, i. e., in the direction of the major tendency to shift during transit, and which usually passed under the skid or platform to bind the pack thereto acted as metal runners under the bundle, decreasing the frictional resistance between the bundle and the floor and thereby increasing the danger of excessive shifting,—shifting which tends not only to displace the constituent parts of the bundle, but which may also result in the bundle striking and damaging the end walls of the car and crumpling or otherwise damaging the edges of the sheets themselves. Attempts have been made to eliminate internal shifting between sheets constituting a bundle by providing buttresses at the ends and frictionally acting agents of various sorts along the sides or edges of the bundles or between the sheets, but the extra expense was considerable and the benefits ordinarily were found to be inconsiderable.

In addition to the foregoing method, various types and arrangements of so-called "crates" have been proposed for retaining the packs of sheets, but all such methods are prohibitively expensive; particularly so unless the same crating can be repeatedly used. And since such reuse ordinarily necessitates the return to the shipper of the crating as dunnage, such crating methods are generally unsatisfactory and looked upon with increasing disfavor.

One of the objects of my invention is to provide an improved shipping bundle of stacked sheet material,—particularly sheet steel.

Another object is to provide a flexible-binder-bound bundle in which the constituent parts will not shift relatively to each other to an extent sufficient to cause damage thereto.

Another object is to provide a bundle which, if shipped in accordance with the floating load method, will not shift excessively on the floor of the vehicle when subjected to such shocks as are ordinarily experienced in transit and in switching.

Another object is to provide a type of bundle in which the tendency to injure the edges of the sheets by the encircling tensioned flexible binders is materially reduced.

Another object is to provide a bundle which, size for size, will require less binder material than has been required heretofore,—and with materially better results.

Another object is to provide a bundle which may be reliably formed with relatively unskilled labor and without the exercise of undue care.

A further object is to provide a method for the formation of bundles having the aforementioned and other desirable qualities.

Another object is to provide simple and effective equipment for facilitating the production of the improved type of bundle.

Other objects and advantages will hereinafter appear.

Embodiments of my invention are illustrated in the accompanying drawings wherein,

Fig. 1 is a perspective sectional view of a part of a railway car with two of my improved bundles of sheet steel placed therein for shipment by the "floating load" method,

Fig. 2 is an enlarged perspective view of a complete bundle embodying my invention,

Fig. 3 is a transverse cross section on the line 3—3 of Fig. 2,

Fig. 4 is a perspective view of an arrangement of skid-runners with binders positioned ready for the stacking of the sheets thereon,

Fig. 5 is a perspective view of a bundle in process of being bound according to my improved method,

Fig. 6 is a perspective view of part of a bundle showing a slightly modified arrangement for the construction of the transverse beams,

Fig. 7 is a similar view of another modification,

Fig. 8 is a similar view of another modification,

Fig. 9 is a similar view of a further modification, using a beam of lighter construction,

Fig. 10 is a perspective view of a bundle, in process of being bound, in which is incorporated a modified type of beam particularly adapted for wider sheets, and

Fig. 11 is a transverse sectional view of a bundle including beams at the bottom of the stack as well as at the top thereof.

The mere illustration and description of a few typical examples of my improved bundle and method of procedure will suffice to give a clear understanding of how and why some of the previously mentioned difficulties with prior bundles and methods utilizing flexible binders are overcome. But in order to insure an appreciation of the reasons my invention prevents internal shifting—i. e., relative movement between sheets constituting a bundle—a brief discussion of what I consider to be some of the underlying causes for the failure of prior flexible-binder methods satisfactorily to prevent such shifting may be helpful. Thus it is my belief that with the types of flexible-binder-bound bundles heretofore used there are three factors which contribute to the failure satisfactorily to eliminate undesirable internal shifting (i. e. shifting between sheets constituting a stack). These factors are: (1) the failure of the tension, which ordinarily is applied to the top horizontal section or reach of each binder loop, to exert itself sufficiently as a vertical force pressing the sheets together. (2) The concentration (because of the flexibility of the binders) at the extreme longitudinal edges of the stack, particularly at each binder, of whatever vertical clamping pressure the binders are able to exert with the result that, because the greater the clamping pressure the more completely are the films of air, etc. between sheets expelled, the extreme longitudinal edges of the sheets are more closely clamped together than are the central regions where the pressure is less. Thus when tension is applied to a binder, the bundle becomes thinner at the longitudinal edges than at the center, creating a tendency for the sheets to bow or buckle transversely of the stack. (3) The distortion or contraction of the bundle edgewise, either in whole or in part, due to the edgewise inward pull of the tensioned binders upon the sheets, particularly in the upper region of the stack where the tension is largely concentrated.

The last two of these factors contribute to produce a transverse bow or buckle running lengthwise of the stack. This buckling is generally most pronounced in the top region because, unless the stack is unduly wide and the skid-runners are far apart, the lower sheets are held more or less flat by the weight of upper sheets. The distortion usually becomes more pronounced when the bound bundle is subjected to jars and shocks, such as are incident to handling and transportation, with the result that while the length of the binder in the loop initially tightly encircling the stack remains constant, the effective periphery of the bundle contacted thereby decreases and the tension in the binder diminishes. Of course, any lessening in the binder tension increases the danger of internal shifting.

In general, the manner in which I eliminate these injurious factors or reduce them to unobjectionable minima is to create temporary corrugations or ribs in and across the face of sheets in the stack, reduce the friction between the binders and the stack corners—particularly at the corners where a binder turns from the horizontal section or reach to which the initial tension is applied into the vertical sections along the sides of the stack, and relieve the stack—particularly at the same corners—of edgewise inward pressure from the pull of the tensioned encircling binders. The transverse corrugations stiffen the bundle against the tendency to buckle, both during the binding operation and subsequently under shocks and jars, and distribute the vertical clamping pressure more uniformly or more nearly completely across the sheets, the reduction of friction at the corners translates more of the horizontally applied tension into vertical sheet clamping pressure and the reduction in edgewise or inward pressure also lessens the buckling tendency.

In this description and the appended claims the longitudinal or lengthwise direction or dimension of a sheet, stack or binder is considered to be that direction or dimension which lies substantially in the line of ordinary travel of the vehicle and in which line the most of the shocks

occur (i. e. fore and aft) and the lateral or transverse direction or dimension is considered to be horizontally substantially at right angles thereto (i. e. crosswise of the vehicle). In bundling rectangular sheets the longer dimension should, ordinarily, lie longitudinally of the stack.

Referring now to the drawings, the improved bundle illustrated in Figs. 1 to 5 comprises a stack of flat sheet material 5 such as steel sheets, a pair of longitudinal parallel stack supporting skid-runners 6, preferably of wood, a plurality of lateral beams 7, preferably of wood, which extend across the top of and preferably project slightly beyond the edges of the stack and a plurality of tensioned metal binders 8, each binder encircling the stack laterally or crosswise and having a beam interposed between its top horizontal reach or section and the top of the stack. Preferably the binders and skid-runners are secured together or in some other manner the skid-runners are made an integral part of the bundle so that they and the stack of sheets may be handled and moved as a unit.

Each beam 7 is formed from a piece of wood, which, preferably, is sufficiently long to project a short distance beyond both lateral edges of the stack so as to insure that the associated binder does not engage the edges of the top sheets to compress them inwardly and cause buckling. It should be sufficiently wide and thick to withstand without much bending the compression from end to end exerted thereon by the pull of the binder. The two ends of each beam are provided with rounded corners 10, having binder receiving grooves or channels 11, so that the binder associated therewith turns about and is supported on a curve of relative long radius in passing from its top horizontal section into its two vertical sections along the sides of the stack. The rounded corners thus provided at the two top lateral edges of the stack insure that a relatively large proportion of the primary tension applied to the top horizontal section of a binder during the tensioning operation is translated into vertical pressure or secondary tension tending to squeeze or clamp the sheets together flatwise or face to face. The relatively gradual bends reduce the resistance offered by the metal binder to being bent around the corners and also reduces the binder weakening effect of sharp bends. The fact that these corners are wood—a material differing from the material of the binder—further reduces the friction and assists in translating a greater portion of the horizontal pull of binder tension into a vertical sheet compressing pull. The friction may be still further reduced by applying lubricant to the beam-end corners or impregnating the wood with suitable lubricant. This expedient is especially effective with a wood beam because the lubricant will be gradually squeezed from the pores of the wood as the binder tension is increased and consequently will be continuously supplied, as the binder moves over the corners during the tensioning operation, instead of being wiped or squeezed away when the binder is tensioned, as would be the case if the corners were of metal. The grooving or channeling of the rounded ends of the beams serves to prevent longitudinal displacement of the binders from the associated beams,—a contingency which, of course, would reduce, if not utterly destroy, the binder tension.

These beams projecting as they do slightly beyond the lateral edges of the stack—or at least not ending appreciably inside of the lateral edges,—serve not only to insure that a relatively large proportion of the horizontally applied primary tension is translated into secondary tension or vertical sheet clamping pressure, but they also prevent the horizontally applied tension from pressing inwardly upon the edges of the sheets—particularly those at and near the top of the stack. Thus the sheets are held flat laterally and the objectionable distortion or buckling heretofore mentioned is eliminated. Furthermore, the beams afford relatively resilient cushions between the binders and the stack for absorbing some of the extra strain which may be thrown upon the binders when the stack is subjected to unusually heavy shocks or jolts, or in the event the skid-runners strike an obstruction in the vehicle which will prevent them from moving relative to the vehicle floor. Such a condition may cause the entire momentum of the heavy stack to be thrown momentarily upon the binders and the cushioning effect of the somewhat resilient beams will tend to absorb enough of the extra strain to prevent the binders from being broken thereby.

The binders which I prefer to use are composed of flat metal strap or ribbon of appropriate strength to withstand the desired tension. For bundles of sheet steel weighing several tons I have found that hot rolled steel strap having a yield point of about 7,000 pounds and a tensile strength of about 10,000 pounds gives excellent results. Hot rolled binder strap is preferable to cold rolled strap because of its greater ability to withstand stretching without breaking,—a very desirable attribute when excess strains come upon the binders. Experience with this material has demonstrated, for example, that three transverse straps each of a width of two inches and a thickness of .050 inch and subjected to a primary tension of about 9,000 pounds in the top horizontal section of the stack encircling loop will satisfactorily bind a stock of twenty gauge 42'' x 78'' oiled steel sheets weighing between 8 and 10 tons. Such bundles under normal shipping conditions may be satisfactorily transported by the "shifting load" method, exhibiting no apparent internal shift or distortion of any kind.

The skid-runners may be varied to best suit different conditions and may be attached in a variety of ways so as to constitute an integral part of the bundle. For bundles of sheets such as described in the foregoing typical example, experience has demonstrated that 2'' x 4'' pieces of wood lying flatwise and of approximately the length of the stack give excellent results. I prefer to bevel the under corner of each end at an angle of about 45°. The binders pass between the bottom sheet of the stack and the skids, imbedding themselves into the wood or being laid in cross channels cut into the top surface of the skid-runners. A strip of sheet steel 12 for each binder somewhat wider than the binder and somewhat longer than the width of the stack so that it may be bent upwardly at each end around the lower stack corner, extends between the runners and lies between the upper surfaces thereof and the bottom sheet of the stack. These protective strips may be secured to the runners by nails 13, as most clearly shown in Fig. 4, or other appropriate means to assist in preventing relative movement between the binder and the skid-runners. Care must be taken that the heads of the nails do not project appreciably above the surface of the protector strips in order to prevent them from

denting the sheets piled thereon. Thus the skids constitute an integral part of the bundle and move therewith as the bundle may shift during transit and, because no metal is interposed between the skid-runners and the floor, the increased friction afforded by the wood lessens the tendency of the stack to shift excessively because of the greater resistance offered to the forces of momentum. The protector straps extending around the lower corners and for some distance up the edges of the stack prevent the binders, when they are tensioned, from indenting or cutting into the sheets at the lower corners of the stack.

In forming a bundle according to the method I prefer the two skids **6** are placed on the floor and the binders **7** which have been cut to the proper length to encircle the stack of sheets laterally are laid across them. A flat protector strip **12** is placed over each binder and nailed to the top of both skid-runners. Skid-runners thus prepared for receiving sheets are shown in Fig. 4. Then the sheets are stacked flatwise on the skid-runners until the desired size of bundle is obtained, after which the beams **7** are laid transversely across the top of the stack. Next each binder **8** is brought around the edges of the stack, trained over the rounded corners of its beam within the channels or grooves thereof and its ends brought together at the top of the stack. Then with any suitable tool such, for example, as the tool set forth in Treat Patent No. 1,762,535 dated June 10, 1930, the desired tension is applied in the top horizontal section or reach thereof. And lastly the ends of the binder, which usually are overlapped, are joined in any suitable manner to render permanent the tensioned loop thereof about the stack of sheets. During the tensioning operation upon each binder the transverse beam with its rounded and lubricated ends projecting beyond the edges of the stack causes a relatively large proportion of the primary applied tension to be translated into a vertical clamping pressure between the sheets of the stack,—a pressure which is not localized merely in the regions of the corners, but is distributed inwardly from the corners a considerable distance. This vertical clamping pressure greatly increases the friction between the sheets and thereby proportionally lessens the tendency for the sheets to shift relative to each other. Furthermore, the beam prevents the horizontally applied tension from buckling the sheets edgewise and thereby eliminates the tendency of the stack to become transversely distorted or compressed or bowed, the presence of which condition would tend to a reduction of tension in the binders, as previously explained. I have discovered also that if the tension is raised to a desirably effective amount a temporary or transient lateral corrugation or rib is indented into the sheets by each beam and encircling binder. These corrugations or ribs stiffen the sheets against the tendency to buckle, assist in distributing the vertical clamping pressure more uniformly across the sheets and provide small interlocking shoulders in adjacent sheets which effectively lessen the tendency of the sheets to shift among themselves. These corrugations or ribs, which ordinarily exhibit themselves as slight dips in the upper surface of the bundle in the regions where the binders and beams transversely cross it are shown in somewhat exaggerated form in Figs. 2 and 5. The effect of these lateral ribs or corrugations plus the increased surface friction between sheets caused by the greater and more distributed clamping pressure serve to prevent relative movement or internal shifting, under even unusually severe conditions, to such an extent that damage due to scratching, crumpled edges and the like is reduced far below that which prevailed with prior methods and equipment. And these advantageous conditions are attainable with laterally disposed binders only so that important savings in cost of binder material may be effected because of the elimination of the necessity for the longitudinally disposed binders heretofore employed. The number of lateral binders required will, of course, vary as the size of sheets and bundles and transportation conditions vary, but for sheets and bundles of the size and character of the typical example heretofore given, satisfactory results can be obtained, under ordinary shipping and handling conditions, with only three transverse binders.

Fig. 6 illustrates a modified beam construction wherein each beam, instead of being continuous from end to end, is formed in two sections **15** and **16**. Each section has a rounded channeled corner at its outer end for the passage of the binder **8** thereabout and is cut to such a length that two sections abutting at their rear or inner ends provide, in effect, a single beam extending laterally across the top of a stack and preferably projecting a short distance beyond each lateral edge thereof. This construction permits handling the beams in shorter units. The abutting inner ends of the beam sections should fit snugly and squarely so that they will not tend to buckle sideways out from under the associated binder.

Fig. 7 illustrates another modification, particularly adapted for readily accommodating the method and equipment to stacks of different widths. Thus each transverse beam comprises two end sections **17** and **18**, which may be of standard length for a variety of widths of stack, and an intermediate section **19** interposed between the inner ends of the two end sections. This arrangement lends itself particularly to varying widths of stack because, regardless of the width of stack to be bound into a bundle, the two end sections of the beams may be all alike. The intermediate sections **19** may be cut to the length required to complete each beam across the stack so that the rounded outer corners of the end sections **17** and **18** project slightly beyond the edges of the stack, as and for the purposes heretofore described.

Fig. 8 illustrates another modification wherein the beam effect is produced by two similar end sections **20** and **21**, each having rounded outer corners for the passage of the binder thereover. Each of these end sections is provided with a substantially Z-shaped metal retaining clip **22**. The inner hooked end **23** of a clip lies in a notch provided in the lower surface of the corresponding end section to prevent relative movement therebetween due to binder tension. The midpart of each clip lies between its beam end-section and the top sheet of the stack. The outer hooked or flanged end **24** of each clip is turned down to engage the edges of a considerable number of the top sheets of the stack and distribute thereto the pull of the tensioned binder. The length of these downwardly extending flanges should be sufficient to engage the edges of enough sheets to enable their combined rigidity edgewise to overcome the horizontal pull or tension in the binder and prevent the longitudinal buckling or distortion heretofore discussed.

Fig. 9 illustrates a modified type of bundle which may be used in situations where it is desirable or necessary to employ beams which are relatively light and frail and, in consequence, quite flexible and unable to withstand alone the compression of the pull in the top section of the associated tensioned binder. In this arrangement the opposite ends of the beam **25** are supported upon blocks **26**, near the corners of the bundles. These blocks will serve to prevent the outwardly projecting ends of the flexible beam from pressing upon the top sheets in such a manner as to press the edges inwardly toward the center of the sheet and cause the longitudinal buckling heretofore discussed.

In connection with the preparation of all bundles where it is not desired to use a continuous beam which is rigid enough to withstand the edgewise pressure and bending effect of the tensioned binders, it is necessary that the beam sections, such for example, as those illustrated in Figs. 6 to 9 inclusive, be at least long enough so that the transverse corrugation or rib is formed across the sheets rather than that the sheets be buckled longitudinally by the concentration of clamping pressure at the extreme edges or by inward pressure from the pull in the top section of the binder.

Fig. 10 illustrates the bundling of a stack where, because of the width of the sheets, it might be necessary to use beams so long that, unless they were excessively thick, the horizontally applied initial tension would tend to buckle or bend them outwardly in the central region. Under such conditions it may be found expedient to convexly curve the lower or inner surface of each beam so that the center thereof will press more heavily against the sheets than do the ends of the beam. With wider sheets such a beam will more readily insure the formation of the transverse corrugation or rib and will more uniformly distribute the compression across the faces of the sheets. It will also tend to prevent the ends of the beams from bending downwardly to a sufficient extent unduly to concentrate the compression at the extreme edges of the stack.

Fig. 11 illustrates a modified type of bundle wherein beams are applied transversely across both the bottom and the top of the stack. This arrangement may be found especially effective where the sheets are so wide that they tend to sag excessively between the skid-runners; and also when conditions arise where it is deemed advisable to apply the primary tension in one of the vertical sections of the binder rather than in the top horizontal section thereof. With sheets of the more commonly encountered widths only the top beams are necessary because there will be no appreciable sag between the skid-runners, the lower sheets are prevented from buckling by the weight of the upper sheets and the binder pull between the lower corners (unless the tension is applied at one side) is too small to create any objectionable buckling tendency.

As a general proposition the greater the radius of the rounded beam end corners the more will the primary or initial horizontally applied tension be translated into vertical sheet clamping pressure. In practice, however, it has been found that corners with a radius of from one inch to three inches give good results. It has also been discovered that if the beams are arranged with the grain running parallel to the top section of the binder it is not always necessary to preform the rounded channeled corners because the compression of the wood will permit the tensioned binders to be imbedded therein, particularly if the corners are merely bevelled, to form both the rounded corners and the binder receiving channels with sufficient accuracy to afford satisfactory commercial results.

Having thus illustrated and described the nature and several embodiments of my invention, what I claim and desire to secure by United States Letters Patent is as follows:

1. A shipping bundle comprising a stack of substantially flat and uniformly thick sheets of metal piled flatwise one upon another, a flexible metallic binder looped and tensioned about the stack of sheets, and a beam disposed upon the top sheet of the stack parallel to and below the binder, the tension of the binder causing the beam temporarily to retain in sheets of the stack a stiffening transverse corrugation parallel to and under the beam, which corrugation together with the beam stiffens the stack against deformation transversely thereto.

2. A shipping bundle comprising a stack of substantially flat and uniformly thick sheets of metal piled flatwise one upon another, a plurality of parallel spaced skid-runners supporting the stack, a flexible metallic binder looped and tensioned about the stack of sheets at substantially right-angles to the skid-runners, and a beam disposed upon the top sheet of the stack parallel to and below the binder, the tension of the binder causing the beam temporarily to retain in sheets of the stack a stiffening transverse corrugation parallel to and under the beam, which corrugation together with the beam stiffens the stack against deformation transversely thereto.

3. A shipping bundle comprising a stack of substantially flat and uniformly thick sheets of metal piled flatwise one upon another, a flexible metallic binder looped and tensioned about the stack of sheets, and a beam disposed upon the top sheet of the stack parallel to and below the binder, the tension of the binder causing the beam temporarily to retain in sheets of the stack a stiffening transverse corrugation parallel to and under the beam, which corrugation together with the beam cooperate to translate the tension of the binder into sheet to sheet clamping pressure distributed effectively across the stack to prevent shifting between sheets.

4. A shipping bundle comprising a stack of substantially flat and uniformly thick sheets of metal piled flatwise one upon another, a longitudinally rigid beam extending across the top sheet of the stack and at least to opposite edges thereof, and a flexible metallic binder looped and tensioned about the stack and beam in a direction longitudinally of the beam, said beam serving to prevent the tension of the binder from exerting a stack distorting pressure inwardly from the edges of sheets and also to cause the tension of the binder to create a temporary transverse corrugation across sheets of the stack, which corrugation together with the beam cooperate to translate binder tension into sheet to sheet clamping pressure.

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