Sept. 24, 1957 L. A. BEADLE 2,807,454

STACKABLE FREE SLEDDING PROCESSING CARRIER

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Fig. 1

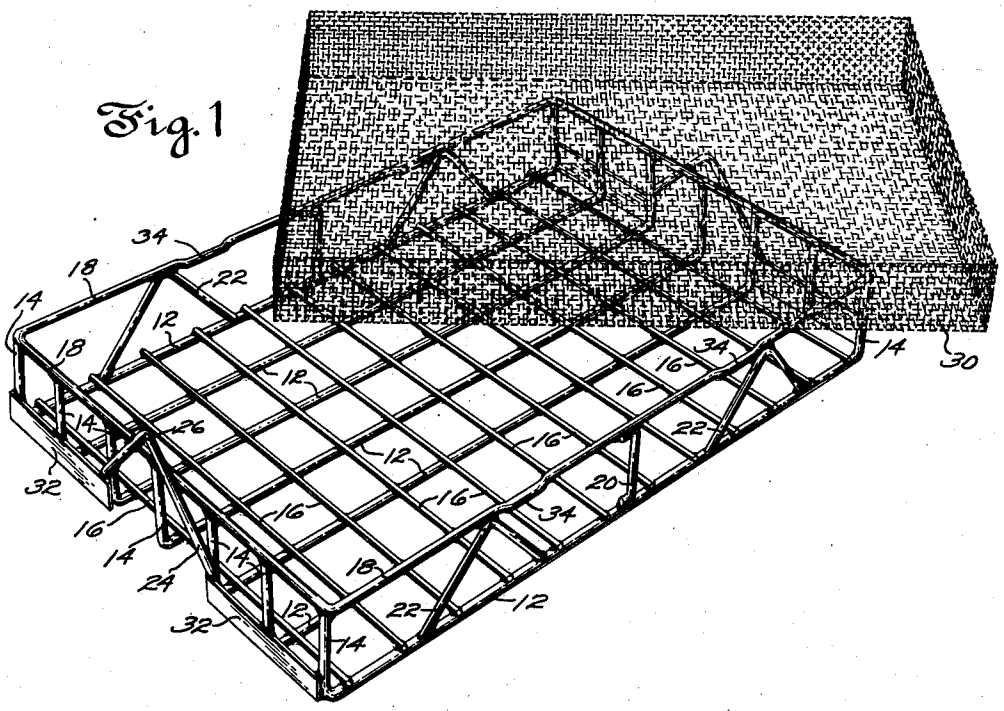
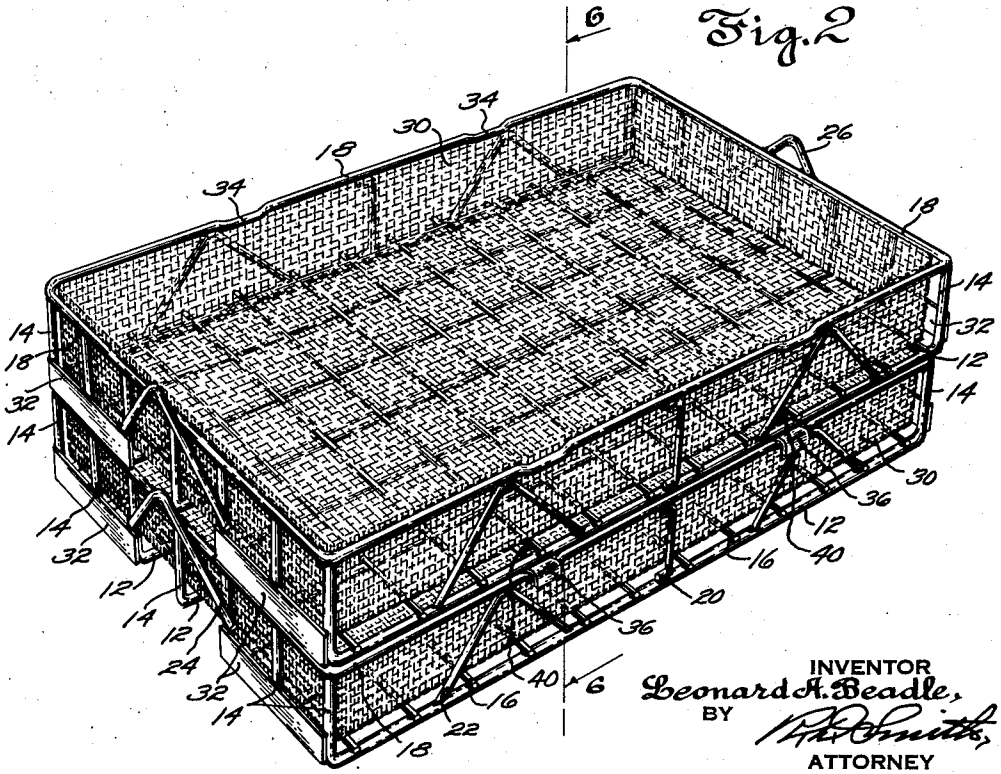


Fig. 2



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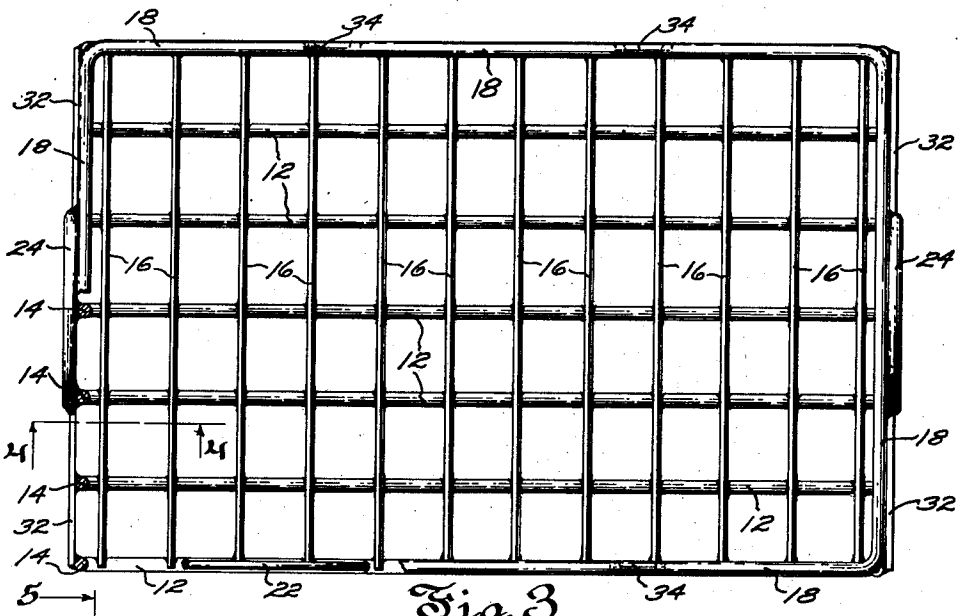


Fig. 3

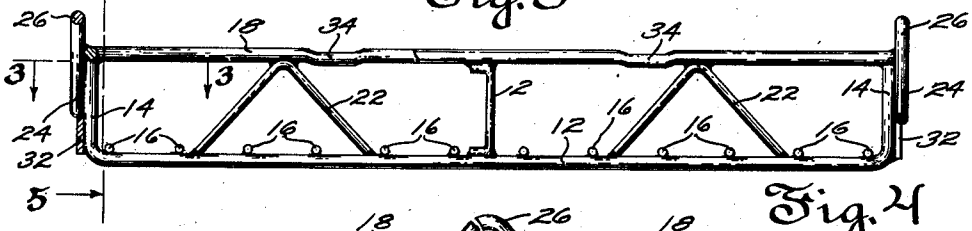


Fig. 4

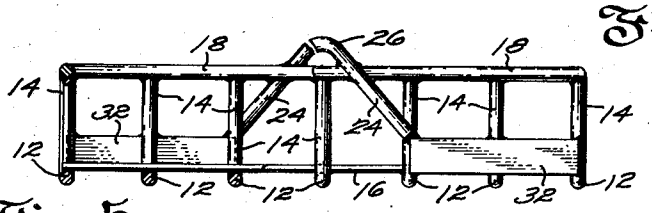


Fig. 5

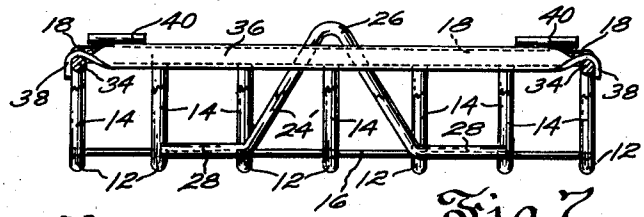


Fig. 7

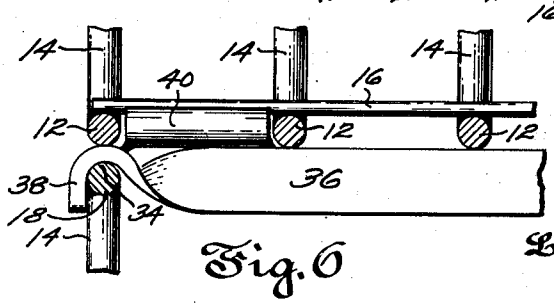


Fig. 6

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STACKABLE FREE SLEDDING PROCESSING CARRIER

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Application March 4, 1955, Serial No. 492,117

5 Claims. (Cl. 263—47)

This invention relates to containers and carriers of joined wire, open construction for holding and transporting work pieces while accompanying them into a processing environment such as a zone of very high heat for galvanizing, annealing, soldering, brazing, etc. or such as immersion in a quenching bath, or a bath of salts, acid solutions, or electrolytes, or such as a carburizing atmosphere. Such processes often are very damaging to the structure of the carrier because of heat caused distortion, surface corrosion, and other life shortening effects of the medium.

Work handling trays formerly proposed for these demanding types of service have been fabricated usually by welding together in meeting or crossing relation suitable forms of more or less heavy round or flat strips of wire. They have not been well suited to sliding easily along rough support surfaces while heavily loaded. The welds employed as well as the wire itself have been subject to impairment by extreme heat, strong acids, effects of carburization, etc.

One object of the present improvements is to achieve greater strength and durability without, or with fewer, welds in the floor region of the tray.

A related object is to increase the smoothness of the base surface of the tray by doing away with the sharp projections and general roughness of arc welded joints at the base edges and base corners of the tray. This reduces tendency of the tray to snag on its support surfaces and the consequent resistance to pushing or pulling over such support surface while heavily loaded with work pieces. Examples of the rough support surfaces referred to are floors of heating ovens that are composed of fire brick or other refractory stone-like material.

A particular object is to provide a tray which when heavily loaded is proof against buckling or fracture in the base portion of its structure when shoved along the floor bed of a heat-treating oven while heavily loaded.

Another object, is without sacrifice of strength, to reduce a gridwork tray to a minimum of weight by the use of a less number of wires and rods than heretofore considered essential.

A still further object is to provide the improved tray with means for stacking a like tray upon it in a manner to maintain the top tray in alignment with the bottom tray while both trays are being moved about or transported from one treating zone to another without removing the work from the trays.

The foregoing and other objects and advantages of the improvements will be evident in greater detail from the following description of a successful embodiment of the invention having reference to the accompanying drawings wherein:

Fig. 1 is a perspective view of a skeleton tray embodying the present improvements accompanied by a wire mesh liner of conventional construction removed from its nested relation to the tray.

Fig. 2 shows two trays like that of Fig. 1 with their respective liners in place stacked stably one upon the other by means shown in Fig. 6 forming a part of the present improvements.

Figs. 3, 4 and 5 are respectively a plan view, a side view and an end view of the tray in Fig. 1 with liner omitted, some of the near wires in each of said views being broken away on correspondingly numbered section planes appearing in another of the same views to reveal far wires of corresponding alignment.

Fig. 6 is a fragmentary view drawn on an enlarged scale taken in section on the plane **6—6** in Fig. 2 looking in the direction of the arrows.

Fig. 7 shows a modification of the construction in Fig. 5 wherein thrust plates are omitted at the ends of the tray and one of the bent handle rods of Fig. 6 is extended to take their place, the near wires being broken away to show one of the tray stacking cross bars in place.

In a tray of the type here concerned component parts of the fabrication which are subjected to the greatest distortive forces in the customary ways of handling the tray are crossing wires that form the floor of the tray. Formerly such floor wires have been of equal size and round and interwoven so that relatively short arches of the wires at their crossing points constitute the base surface of the tray. Where flat wire has constituted the base surface of the tray the frictional resistance to sliding of the tray has been greatly increased. These improvements avoid the heavy resistance to sliding of broad faced flat wire and utilize the friction reducing effect of continuous linear contact that is impossible to interwoven round wires by using straight uncrimped round rods serving as sledding runners by constituting the sole base surface of the tray on which the tray rests and glides. Such floor rods of the tray according to these improvements are bent upright at their end portions to form risers **14** at the ends of the tray thus serving as skeleton end walls for the tray. Crosswise of and solely above the stratum of runner rods **12** there is a layer or stratum of spaced apart tie wires **16** which may be of appreciably smaller size than the runner rods **12**, each of the runner rods and crossing tie wires being preferably spot-welded to each other whereby the roughness and irregularity of arc welding projections is eliminated at the base surface of the tray.

Having thus formed a skeleton floor and skeleton end walls of the tray by uninterrupted continuous runs of the large bent-up and rugged runner rods **12**, a top rim **18** for the basket is provided by applying a circuitous stretch of rod, preferably of the same size and kind of heavy wire that comprises the runner rods **12**. Rim **18** is four-sided being bent into a coplanar quadrilateral frame and then arc welded to the top ends of the risers **14** of runner rods **12**. The vertical space between rim **18** and the two outermost runner rods **12** is spanned by bracing rods in truss formation. One or more of the bracing rods **20** may be vertical and straight with turned-over ends strongly welded to a rim rod and runner rod, while others may be angularly bent, diagonally extending, bracing rods such as **22**. A more elaborate, angularly bent, bracing rod **24** presents an upstanding loop **26** projecting sufficiently above the tray rim **18** to be hooked into and serve as a lifting handle. Handle rod **24** is welded to the rim rod and to the risers **14** of the runner rods.

Four metal thrust pads **32** may be added to the tray structure heretofore described by welding horizontally elongated plates to the outside of the risers at the ends of the basket near the corners.

In use of the tray, impelling dogs may be caused to thrust against plates **32** for pushing the basket in the direction that the runner rods **12** extend as a means of sliding the tray smoothly over an oven bed while heavily loaded with work pieces that are to be conveyed and

processed while remaining in the basket. Both ends of the tray may be alike and both sides of the tray may be alike.

If the work pieces are smaller than the apertures between the aforedescribed wires and rods there will be nested within the skeleton framework of the basket of Figs. 3, 4 and 5 a dished liner **30** of relatively fine-mesh woven wire which may be cut out of wire fabric in the flat and folded up into the shape of the tray liner shown in Fig. 1.

The superior strength, greater external smoothness and generally streamlined character of a tray constructed as hereinbefore described enables two such trays to be stacked in double-deck fashion as shown in Fig. 2 with the aid of dips **34** that are formed in the rim rod **18** near its sturdily supported points where angular bracing rods **22** are welded to it. For this purpose I have devised two cross bar members **36** shown seated loosely in the dips **34** at each of their twisted and bent-over ends so that the top edge of the bar is a little higher than the top of rim rod **18**. Cross bars **36** are provided with welded-on, locating lugs **40** whose lengths laterally of the basket loosely fill the spaces between an outermost runner rod **12** and its adjacent runner rod **12** at each side of the basket. It will be understood that the four ends of the two bars seat in the four dips **34** respectively as shown in Fig. 6.

The distance of separation of bars **36** lengthwise of the basket fits the spacing of an even number of the floor wires **16** lengthwise of the basket which causes the four lugs **40** of the two cross bars **36** to lie practically in locating abutment with two of the floor wires **16**. This prevents lengthwise tray displacement. Thus with the aid of the cross bars **36** it will be seen that one of my improved baskets, when stacked upon another, is dependably restrained against sidewise displacement and also against lengthwise displacement in relation to the underlying basket which supports it.

In Fig. 7, the thrust plates **32** are omitted and the handle rod **24'** is extended horizontally in opposite directions to take their place and receive the tray impelling thrust.

As a non-limiting guide to sizes of trays and component structure that may benefit greatly by the departures from conventional construction herein disclosed, the overall dimensions of the tray may roughly be 21"x33" with a depth of 5". In this size a suitable size of the heavy wire used for runner rods, handle rods and rim rods is ½" diameter, while the bracing rods may be of ⅜" diameter and tie rods of 5/16" diameter for a proportional spacing of the parts shown in the drawings. The metal of all parts of the tray may to advantage be Inconel, believed to be a trade-mark of the International Nickel Company, which possesses toughness and great resistance to continual heating and quenching as well as corrosion.

The side bracing members **22** may each be so modified in shape as to have their looped tops project above the rim wire **18** to serve as handles as do the handle loops **26** shown herein. There may be employed more dips **34** in the rim wire **18** and more of the cross bars or slats **36** than are herein shown. Many other changes and variations may be made within the principles of the invention and the appended claims are directed to such principles rather than to all the precise details of the herein illustrated embodiments of the invention.

I claim:

1. A free sledding work conveying tray adapted to steer itself smoothly through a rough walled passageway in a heat treating oven without snagging against the walls of the passageway when shoved ahead therethrough, comprising a horizontal stratum of more than two rigid runner rods spaced apart laterally of the tray affording the sole and bottommost surfaces on which the tray bottom rests, the end portions of said rods being bent upward to form risers at leading and trailing ends of the tray and the two farthest apart of said rods forming side boundaries of the bottom of the tray, a stratum of rigid tie wires spaced apart lengthwise of the tray confined to levels above said stratum of runner rods and crossing and secured to the latter, said tie wires terminating and being confined in horizontal directions within said side boundaries of the tray, and superstructure including a four-sided rim having two of its sides traversing and fixed to the top ends of said risers and having the other two of its sides spaced substantially vertically above said two farthest apart runner rods respectively and extending substantially parallel therewith, whereby all of said superstructure is contained within said side boundaries of the tray bottom thereby to prevent snagging of said superstructure against upright guide walls of a rough oven passageway when the tray is shoved therethrough.

2. A free sledding tray as defined in claim 1, together with bracing members fixed to the said two farthest apart of the said runner rods spanning and confined to the vertical space between the same and the said rim structure within the said side boundaries of the tray.

3. A stackable free sledding tray constructed as described in claim 1, in which the said rim structure comprises a planar run of heavy round wire bent into shallow dips at spot locations aligned with each other transversely of the tray, together with slat members having downward hooked ends spaced apart to rest simultaneously in said dips of the rim-forming wire, thereby to span the width of the tray and serve as support for a superimposed-like tray.

4. A free sledding tray as defined in claim 1, together with an upwardly arched handle member projecting above the said rim structure and having anchorage legs diagonally crossing the said risers of the said runner rods and fixed thereto.

5. A free sledding tray as defined in claim 4, together with thrust plates traversing and fixed to the outward faces of the said risers of the said runner rods extending between the said handle member and the said side boundaries of the tray.

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