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Description

This invention relates to a packaging or wrapping assembly which facilitates the packaging or wrapping of a load with a flexible material.

It is well known to wrap loads with plastics sheet (usually called 'film") in order to produce coherent packages which are easy to handle and are protected by an outer plastics covering. At present, two types of synthetic plastics sheet material are commonly used for this purpose. One of these (hereinafter referred to as "shrink wrap") will shrink in size upon application of heat so that, when a film of the said material is wrapped around a load and heat is then applied to it, the material shrinks and is brought into close conformity with the outer contours of the load. The other, hereinafter referred to as "stretch wrap" (but also commonly known as "cling wrap" or "cling film"). may be stretched around a load and simply grips or clings to the contours of said load.

A film of either material may be wrapped around a load in one of two main ways. A narrow strip of stretch film may be wound helically (sometimes termed "spirally") around a load, usually from the base of the load upwards. While this is done, the top of the load is optionally secured and protected by a sheet of plastics or other material, the edges of which are held firmly by the helical wrapping. Alternatively, a broad strip or "full web" of film, substantially as broad as the load is high, may be wound a few times around the load. With shrink film it is also common to form a bag by folding a length of the film to form two superimposed plys and sealing two edges together, and then inverting the said bag over the load and pulling it down over the load.

Either helical (spiral) or "full web" winding of film is usual with stretch wrap packaging, whereas the use of bags is usual with shrink wrap packaging.

With shrink wrap packaging it is necessary to heat the plastics material once it has been applied to the load. This is usually done by passing the load, on a conveyor belt, through a heated tunnel. It will be appreciated that in a factory or warehouse where a large number of loads are packaged this operation and the machinery to carry it out are likely to be extremely expensive with regard to waste heat, time and labour. This is particularly so when it is considered that each load (generally pallet-mounted) must be placed at the tunnel entry and removed from the exit, presumably by a fork-lift truck or similar vehicle. Moreover, hot air in the tunnel is usually driven by fans and large amounte of heat energy are continually lost and wasted at the tunnel entry and exit.

A considerably cheaper and simpler method of heating loads using a static-air hot box adapted for mounting on a fork-lift truck or similar is described in GB—Patent No. 1509523. Nevertheless, the method of shrink wrapping, although it results in a stronger package than one that is obtainable by stretch wrapping, is considerably more expensive than stretch wrapping. Stretch wrapping is therefore increasingly popular for all types of load, as well as being necessary for heat-sensitive or inflammable goods.

It is also known to use other forms of flexible masterial for wrapping loads, for example flexible strapping or bands, and various forms of fabrics or netlike materials.

Hitherto, packaging or wrapping has usually been a manual operation and extremely arduous and time-consuming. However, a recent innovation has been the development of a specialised stretch-wrapping machine incorporating a horizontal turntable (on which a load on a pallet may be deposited) and an adjacent upright member on which a roll of stretch wrap is mounted so as to be movable up and down. In use, once one end of the stretch wrap has been anchored (for example under a corner of the base of the load) the machine is actuated by an operator so that the turntable is rotated and stretch wrap is paid out from the roll. The roll mounting is then graually moved upwards, at a rate depending on the type of load, and the stretch wrap is helically (spirally) wound to the top of the load. Optionally there may be an adjustable platen mounted on the upright member, which platen can be lowered into engagement with the top of the load to steady the load during wrapping

In US Patent Specification No. 4282700 (Goldstein) there is described a machine which packages a load by winding the wrapper film around it. This does not manipulate it in doing so, but it merely carries the load in a static fashion upon the forks of the vehicle and wraps it as it carries it on the forks. The forks perform their normal purpose (i.e. they carry the load) and the vehicle performs its normal purpose (i.e. it moves about and transports the load) and the essence of this machine's purpose is that it carries out a wrapping operation on a vehicle, while it is moving from one place to another, to save time.

In Swiss Patent Specification No. 86911 (Pletscher) there is described an arrangement by which power is derived from the rear wheels of a lorry, by way of a roller set in a well or trough sunk into the ground. The way in which this power is used is indicated only in very general terms.

We have now discovered that vehicles driven by their front wheels are peculiarly well suited for this purpose, in a way in which the conventional vehicles are not suitable. Rear-wheel-drive vehicles are very unstable in such conditions, mainly because their weight distribution is adverse—they put most weight on the front (non-driven) wheels and least on the rear (driven) wheels. Such instability is a great disadvantage, and this is overcome by using a front-wheel-drive vehicle such as a forklift truck. Also, we have devised an improved method which, does not require the power take-off mechanism to be permanently installed in a pit,

but can be used on level ground and can be made portable.

Front-wheel drive vehicles have advantages over conventional rear-wheel-drive vehicles as the weight of the vehicle is concentrated over the driven wheels and this enhances the power transmission out via the wheels, and the stability of the drive.

Forklift trucks are especially useful as the vehicle because (a) the mechanism of a forklift truck is much more smooth and versatile than that of conventional trucks, even to the extent of allowing very gradual and even movement ("creeping"), so a driver of a forklift can control the wrapping operation with great sensitivity when this is required—and a conventional lorry transmission cannot do this;

(b) the forklift has the fork and mast equipment which allows a further degree of versatiality, by allowing this equipment to contribute another facility which can contribute to the wrapping operation and be linked in with the manipulation of the load (for example "mast tilting" and "rise and fall" movements of the truck mast);

(c) the forklift truck is an exceptional vehicle because it can be made to suit a wide range of uses and can be use in places where ordinary vehicles cannot be used—for example inside storerooms, in "fire hazard" areas, refrigerated stores, and the like.

Thus, the present invention provides a method for packaging a load by applying a wrapping material around it, characterised in that the load is placed on transportable machinery for receiving and manipulating the load which is operated in order to perform the wrapping and is driven by the wheel-driving power of a front-wheel of a separate stationary vehicle.

The invention also provides transportable machinery for packaging a load by applying a wrapping material around it characterised in that it comprises:

(a) means for receiving and manipulating the load to be wrapped;

(b) means for effecting power offtake from a front wheel of a front-wheel-driven vehicle; and

(c) means for using the power offtake derived means (b) above to operate the load receiving and manipulating means (a) above in order to perform the wrapping.

One form of the present invention uses a packaging assembly comprising a vehicle with (1) a store of packaging material adjustably mounted thereon and (2) means, driven by the said vehicle, for receiving and manipulating a load to be packaged. Other forms provide means for storing and dispensing a packaging material and means for receiving and manipulating a load to be packaged, adapted for use in conjunction with a vehicle which serves as a supporting means and/or source of driving power.

The term "receiving and manipulating" is used here to means the wide range of operations to which a load may be subjected in a packaging operation. This includes lifting it, turning it, rotating it, and forwarding it to another stage or place, and is not restricted to meaning any one of these alone.

The term "packaging" is used herein as a convenient broad and general term to means the wide range of ways in which a load may be held together and covered, wholly or partly, with another material. This may be described sometimes by other words, for example as wrapping, binding, or even as "unitising."

The packaging material used in the packaging assembly of the present invention may be any of a wide range available and in conventional use. Advantageously, it may be a flexible wrapping (packaging) material.

Such a flexible material which may be used for making a load into a package may be any of the many flexible materials which are available in commerce for use in wrapping loads. The object in choosing any flexible material is to wrap an article or a group of articles, (along or in conjunction with any desired support for it) to produce a coherent package which is easy to handle. Usually this operation will result in a package which is protected by an outer plastics covering, but this overing need not necessaruly cover the entire surface of the package or be made entirely of plastics material.

Thus it may be for example either of the two types of synthetic plastics film (the usual name for such sheet material) which are most commonly used for this purpose, namely:-

(a) the so-called "shrink wrap" film (which will shrink in size upon appliction of heat so that when a film of said material is wrapped around a load and heat applied, the material shrinks and is brought into close conformity with the outer contours of the load, and

(b) the so-called "stretch wrap" film (also commonly known as 'cling wrap" or "cling film"), which may be stretched around a load and simply clings to the contours of said load.

Such film may be used in any width, ranging from a narrow strip or band (which is usually bound around the load in several regions, or wound repeatedly and/or progressively) to a wide strip or band which is equal to (or may even exceed) the maximum dimension of the load. It may also be used in a wide variety of thicknesses, according to the strength and duty required of it, and materials of many such thicknesses are readily available in commerce. The film may also be used in the form of a length of pre-formed "bag" (made by folding a film and appropriately sealing edges together) so that individual sections ("bags") may be separated from the length for each load.

The packaging material may also be any form of strapping, which may be formed from any of a wide variety of flexible materials for example a metal (for example steel), a plastics material of adequate tensile strength for example an organic polymeric material (for example nylon, polyester, polypropylene), or any combination thereof.

As a further variant, the packaging material

may be a form of netting or its equivalent, which may be made by fabricating a suitable form of a flexible material (for example threads, strips, cores or filaments) into a net, for example by weaving, or by cutting sheet material (usually with a pattern of slits) so as to convert it to a structure which is expandable to form a network which functions as the equivalent of a true net. An example of the latter material is sometimes sold under the name "NETLON." Netting and similar materials can be especially useful for packaging materials or products which require access of air for satisfactory storage, for example fruit and vegetables.

Other packaging materials can also be used, for example ropes, wires, cords, tapes, cloth and other textile or similar materials (woven or unwoven). The choice will depend upon such factors as availability, convenience and cost, and will be subject to the usual requirement that the packaging material should not damage the load to be packaged (for example by cutting into it or deforming it unduly).

If desired, a combination of such materials may be used. In this way, the desirable properties of different forms of packaging materials or packaging techniques may be secured. For example, the strength or tear-resistance of one material may be combined with the waterproof or dustproof properties of another. In particular, the use of metal or plastics strapping alone may tend to damage some loads (for example sacks or bags) so a better result may be achieved by use of it in conjunction with another appropriate packaging material or support material. Even when a single type of packaging material is used, more than one form of it may be used for better results, for example plastics sheeting or film of different thicknesses and/or composition can be used together. Similarly, one packaging material reinforced with another may be used.

The invention may be used also for the packaging of a load in other ways than just binding it together. For example the load may be enveloped by a packaging material which is formed *in situ* and so holds it together and/or protects it, as for example by spraying a fibre-forming material to form a web around the load (often described as "cocooning") or by spraying a lacquer, sealant, paint or the like over it. Such a form of packaging may itself protect the load. Alternatively, it can be combined with other packaging means to provide added protection or to improve the effect of another packaging material. One example of this would be the spraying of a waterproofing or sealing coating over a primary packaging material, which has the required strength but can benefit from the extra treatment. Also, this spraying may be a more economical way for getting the components of a composite packaging material together.

Most conveniently, flexible packaging material is used in the form of a roll or coil, and it is commonly supplied by the manufacturers in this form. This may be wound upon its own solid spindle or core, or it may be wound upon a hollow core so that it can be placed upon a separate spindle or core. Such a roll or coil may be enclosed in a container (sometimes called a cassette), either because this can be convenient for storage or cleanliness of the packaging material, or because it eases the handling (for example change-over) of rolls or coils.

The mounting by which the supply of flexible material is carried on the vehicle, and also its mode of construction and its attachment to the vehicle, may be any which allows the flexible material to be dispensed at the desired rate for wrapping the load. Consequently, the preferred mounting will depend to some extent upon the flexible material used and the mode of packaging to be employed.

Thus one form of mounting comprises an attachment for the vehicle, adapted to carry a roll or coil of the flexible material, on which the flexible material is retained and from which it can be dispensed as required. This attachment may be a simple holder for the roll or coil, or for the casing or core of such a roll or coil.

The mounting may be arranged, preferably adjustably, so as to dispense the wrapping material in whatever manner is appropriate for the particular mode of packaging being used for the load. As a general guide, rotation about a vertical axis is more convenient for dispensing films when wrapping most loads and rotation about a horizontal axis is more convenient when wrapping loads such as heavy rolls of paper (for example newsprint) or carpets. Any angle between horizontal and vertical may be used, however, and the choice is for the operator to make.

A very convenient form of mounting comprises a spigot attachment, adapted to be fitted in a position on the forks of a fork lift truck, on which a supply of flexible material can be carried. Alternatively, it may be mounted elsewhere on the truck, for example on the carriage of the truck. Advantageously it may be adjustable, especially vertically. Another alternative, which is useful when the flexible wrapping material is a length of "shrink wrap" bags made in roll form, comprises a spindle (similar to that described above and conveniently rotatable about a horizontal axix) adapted to be mounted on a overhead load guard of the truck so that the bags can be fed out from it and pulled down over the load.

Of course, a broad roll of film suitable for full web packaging can be used instead of a narrow film roll, and this may be mounted on the carriage, on the forks or otherwise.

It is preferably provided with means for restraining the dispensing of flexible material so as to prevent it running out loosely (as loosely running material can fail to wrap the load securely or tightly enough). This restraining means may be a simple brake or an equivalent device, and it may act by pressure (for example through friction or a spring or roller device) bearing on the spindle or core, or even on the flexible material itself. In

some cases the inertia or stiffness of the dispensing device may be sufficient to regulate the supply of the flexible material, so that no additional restraining or braking means is necessary.

The load, comprising the materials which are to be packaged may be of any shape and may be made up of a single article or item or be made up of a collection of separated articles or items. A particular example of such a collection is a bundle or array of sacks, boxes or other individual packages which are to be wrapped together to form a larger package. Another form of load to which the invention is especially applicable is a large heavy load such as a bale, spool, reel or bobbin, (for example a roll of cloth, sheet metal or carpet, or a large cylindrical bale of newsprint) or drum (made of metal, fibreboard, or other material). The application of the invention is not restricted to these, however, and small individual and irregular articles may also be adequately and efficiently wrapped.

The load may be associated with a support, intended to add some protection to the load or to assist in the packaging or other handling operations to which the load may be subjected. Such a support may be intended, for example, to give added protection or support during a lifting operation, or to give some protection where the package makes contact with the ground or other packages.

Examples of supports include pallets, boards, edging strips, slip-sheets, and any combination of these. The supports may be made of wood, plastics, metal or of any combination of these. An expecially useful form of support comprises one or more pieces of sheet material (for example sheets of cardboard, fibreboard or the like) folded into a configuration which, when wrapped around with the flexible wrapping material, is thereby given increased rigidity and is able to give more support to the load than the un-folded and unwrapped sheet material. This may be described as a "pallet-less" load. In its most simple form, this uses extra parts of the base, folded over to form "legs" or "feet" on which the load can rest. Some manufacturers describe a configuration of this kind as "fluting". This gives a much improved package, and the folding configuration may be used to form a solid or a hollow support structure. A hollow support structure has several advantages; not only can it replace a pallet, but also the spaces in it can allow insertion of wooden "stretchers" for reinforcement, or passage of the forks of a fork-lift truck. This produces, in effect, a cheap and disposable substitute for a conventional re-usable pallet. Such folded sheet structures may be used alone or in conjunction with other supports, for example stiff sheets which are not folded.

The mode of packaging the load, and the packaging means used, may vary according to the particular load to be packaged and the extent to which it may require protection. The form of packaging material used is also very relevant. The choice can thus be made to suit the shape and weight of the load and the nature of any support associated with it.

The means for packaging the load (including receiving and manipulating it for this purpose) may for example comprise a load-bearing turntable (usually circular in shape and horizontally disposed, so that it can be turned about a vertical axis) or it may comprise one or more rollers (usually rotatable about a substantially horizontal axis) to support and rotate the load during the operation of packaging. A horizontal turntable is usually the more convenient choice when the load can be placed upon it and the turntable can then be used to rotate the load, but rollers can be more convenient when the load already has a round shape and can be laid on its side for rotation. It may be necessary to use care to place the load on to a turntable in a position which allows it to remain stable during rotation of the turntable. If it is placed too far away from the centre of the turntable, rotation may cause it to fall off unless a suitable stabiliser is used to keep it in place. A combination of a turntable with rollers set into its surface may be used if desired.

The drive mechanism comprises a transmission system which transfers motion from the vehicle wheels to the turntable or rollers used to move the load. This transmission system may be for example a belt or chain drive, connected to the base of the load-bearing turntable or rollers. This system may be driven by a take-up device which is driven by direct engagement with one or both of the vehicle drive wheels. This take-up device may be one or more rollers, or it may be a small turntable or like device, driven by direct engagement with one or both of the drive wheels of the vehicle. Usually, such rollers may conveniently use both drive wheels, while such a small turntable conveniently uses one vehicle wheel. However, two small turntables may be provided, appropriately spaced-apart and each being driven in the same direction by engagement with one of the two drive wheels of the vehicle. When rollers are used (commonly a pair of rollers) inclusion of an arrangement to vary the spacing between the rollers allows for different sizes and types of vehicle wheels and tyres to be accommodated.

When a load is to be packaged (whether manipulation of the load is by rollers or by turntable) it is desirable to use a load stabiliser. This is preferably in the form of a vertically adjustable batten with one or more rollers or a platen suspended thereform, and it is advantageously mounted on a mast of the vehicle and is lowered into contact with the top of the load. If desired, however, one or more stabilisers may be brought into contact with the load, for example at the sides of the load if this is appropriate to achieve the desired steadiness of the load during packaging.

When such a load stabiliser is used, it may be carried on the vehicle (for example on the mast or forks of a fork-lift truck) as described above, but it is sometimes more convenient to associate it with

the load-handling means for example as a part of a unit comprising a load-bearing turntable or a load-handling roller system.

Rollers facilitate manipulation of a load (and in particular any load which is approximately cylindrical in shape—for example a bale, spool, reel or bobbin—especially if it is also heavy) so that the load may be wrapped more easily. Thus is may be completely enclosed in shrink or stretch wrap film, or it may be wrapped in more than one plane (for example by strapping).

When rollers are located on a load-bearing turntable, it is usually convenient that the transmission and drive mechanism from the vehicle will include controls which enable the turntable and/or the rollers to be rotated independently of each other. An example is a form of clutch mechanism.

In a further embodiment in which rollers are located on a load-bearing turntable, side extensions may be provided on the turntable adjacent the ends of the rollers to help to support long loads, and especially flexible loads (for example a long bundle of strips, rods, or the like. Similarly, one of the rollers may be replaced by a screw to facilitate the helical wrapping of a long cylindrical load for example a rolled-up carpet.

When using flexible strapping to package a load, this can be assisted by provision of a cage, adjustably mounted on the vehicle, which cage is capable of descending to encircle the load so that a strapping dispenser device connected to the cage can wrap the load with strapping as the load rotates. This method may also be used for other flexible packaging materials, for example film, and not only for strapping. Of course it is also possible to wrap flexible strapping around a load simply by mounting a roll of strapping on the vehicle and paying it out around the load, as the load is rotated, as has been mentioned above in relation to film material.

As a particularly useful variant, more than one such load-packaging means (each conveniently referred to as a "station") may be provided, so that loads can be packaged more speedily. This arrangement can be used to permit the same operation to be carried out (either simultaneously or successively) on separate loads, or to permit successive operations on the same load. Most usefully, however, the arrangement can permit the one "station" to be used for the packaging of one load while another "station" is being supplied with another load ready for packaging or is having a packaged load removed from it. To avoid an arrangement which is unduly complex, the most convenient number of "stations" (for example turntables and/or sets of rollers) is two, though more may be provided if so desired.

When using more than one "station", the power supply and operation of each can be made independent of the others. This can be done by using appropriate valves or equivalent devices to split and control the power supply between them.

Thus the invention may include two load-bearing turntables for alternately receiving loads to be packaged by a single vehicle, so that the vehicle is almost continually in operation. In other words, while a packaged load is being removed from a first turntable and replaced by another load to be packaged, the vehicle is being operated to package a load on a second turntable. Either or both of the turntables may be replaced by an alternative load-handling device, as described herein.

An especially useful embodiment of the invention is that which includes a load-bearing turntable together with one or more flaps (usually one or two) pivotally connected relative to the upper surface of the turntable so as to be capable of being swung upwards. These flaps act to restrain movement of a load on the turntable, so that the load can be rotated without the load falling off. Provision of a means for turning or tipping the turntable (together with the load on it) through an angle of about 90 degrees enables a load to be wrapped first in one direction and then in another direction. This will usually require some means to be provided to rotate the load when it is in its second orientation. The need for any extra means for rotating the load in this way may be avoided, for example, if the operation of tilting the turntable and load in one direction and then back again causes the load to be turned on its side. This can occur if the shape and angle of the surfaces are appropriately designed. To aid such manipulation, the flap or flaps preferably have means such as runners or rails mounted thereon to facilitate movement of the load

The angle through which the turntable and its load (kept in place by side flaps and/or a load stabiliser bearing on the top of the load) may be made to be even more than 90 degrees, and the load may be totally inverted. This operation has the advantage of enabling the operator to remove any temporary or damaged support from the package (as inversion places the original bottom layer now at the top of the package) and replace it by another. Furthermore, this arrangement also enables the operator to remove damaged parts from the package itself (for example a damaged bag, situated originally at the bottom of the load and normally very difficult to remove or rectify), and then finish the wrapping operation and finally invert the load again back to its normal orientation.

Such an inversion system may be associated with the vehicle or with the load-handling "station", as may be more convenient for operation and/or construction.

When one or more parts of the mechanism of the wrapping unit are incorporated in a platform, this platform should be constructed to be as low as practicable. The platform may, if desired, be sunk into a recess in the ground, so as to bring its upper surface conveniently close to normal ground level. If the surface of the platform is above ground level, then it may be necessary to provide a ramp in order to give the operating vehicle access to the platform surface and allow its drive wheels to engage the means (rollers or small turntable) by which it is to power the

packaging unit. Such a ramp may be an intergral part of the platform construction, or it may be detachable or adapted to fold away when not required. A ramp will not necessarily be required when the power taken off from the vehicle is not taken through its wheels.

The mode of construction of the packaging and load-manipulating means should be such it can be used conveniently in conjunction with the vehicle and the means used for dispensing the supply of flexible or other material used for packaging. Thus it may be either unitary or modular, as desired. Unitary construction has the advantage that the apparatus can be made and kept as a single unit, ready for the vehicle to brought to it for operation. Modular construction has the advantage it gives the operator to interchange modules or elements of the construction in order to produce an assembly specially adapted to suit different needs and locations. It also has the advantage of allowing easy replacement of sections which wear out or are damaged.

One form of module is a platform incorporating a circular turntable which is rotatable by a force derived from the vehicle (e.g. fork-lift truck). This platform is most conveniently a substantially rectangular one, and for ease of use it incorporates not only the turntable but also a means for driving the turntable. This mechanism may be self-contained, operated for example by a motor (most conveniently hydraulic or pneumatic) which can draw its motive power from an appropriate outlet on the vehicle. Alternatively, the mechanism may be a mechanical one which can derive its motive power from the vehicle by a means of a mechanical connection. Alternative methods for this are described more fully above.

A particular form of construction of the platform is one which incorporates a recess containing two rollers spaced apart, preferably mounted so that one is at a slightly higher level than the other and both are capable of rotation in only one direction, towards the higher roller. The recess and the rollers located therein conveniently extend longitudinally parallel to two opposing sides of the platform. In one part of the unit these rollers can be used to carry a horizontally rotatable load, and be arranged to be powered accordingly. In another part of the packaging unit, these rollers can serve as the means for taking driving power from the vehicle's wheels, and be provided with appropriate means for transmitting this power on to the load-packaging mechanism. In this latter case, a ramp may be provided to give a vehicle access to the rollers; this ramp may be at the side of the platform nearest to the slightly lower roller. A drive belt or chain may be provided to connect these rollers with the turntable support to rotate it.

If desired, the turntable unit, the drive mechanism and the platform may be made as separate modules which can be connected together. This has a great advantage in that they may be connected together to make up any desired combination or assembly, and the components may be interchanged from time to time to suit different requirements without having to keep another complete alternative assembly available. It also has the advantage that the separate component modules may be made much smaller in size and weight, and therefore more conveniently moved about in relatively confined spaces or taken in and out of buildings having entrances of limited size which would not admit a complete assembly easily. The modules may be transported conveniently by the vehicle used as power source. So, if the vehicle has a towbar this can be used to tow the modules—especially easily if the modules fit or "nest" together into compact form. Handling of the modules by the vehicle (especially a fork-lift truck) may be aided by constructing the modules with suitable "pockets" into which the forks fit. Similarly, the vehicle may transport the supply of packaging material.

An example of modular construction is the provision of separate units for the power offtake, the support of the load, and the manipulation of the load (especially for the packaging operation). Such components may be joined together by conventional means, for example by nut and bolt connections, though the components may be designed if desired so that their joining is assisted by appropriately designed mating surfaces. Thus, a roller platform and turntable may be combined in a single unit.

When modular construction is used, additional modules may be matched and linked in to provide additional functions, for example a weighing unit.

When the vehicle has been linked with the two units (the unit for supply of packaging material and the packaging unit which wraps the load), the mode of operation and control is usually that the driver of the vehicle can actuate its accelerator pedal and, by this, make the wheels of the vehicle turn at any desired speed, variable at will over the vehicle's range of capability. The wheels then act through the transmission mechanism (the rollers, turntable, chain drive, etc.) which take up the motion of the wheels and use it to rotate the turntable. Packaging material is fed out from the supply roll (or its equivalent) to package the load.

The apparatus may incorporate ancillary features to any extent which the user may require. For example, a load stabiliser may be used, which can be brought into contact with the load during the wrapping operation. Such a stabiliser may be a platen, adjustably mounted on the mast of the vehicle so that it can be brought into engagement with the load (usually at its top) when it is in position on the turntable, so as to steady the load and keep it in place during wrapping.

Another ancillary may be a heating means, which is useful for bringing about the shrinking of "shrink film." This may comprise one or mor heated panels or a hot air blower, adapted to be movable adjacent to a film-covered surface of the load to direct heat on to the film and shrink it into close conformity with the load contours. The heating means may be supported on the vehicle

or constructed so that it can be tilted (for example by the mast) in order to direct heat more accurately on to the wrapping of an irregularly shaped load. The heat means may use any convenient source of heat. When a portable fuel (for example liquefied petroleum gas) is used, the supply of this may be carried very conveniently by the vehicle used as source of power.

Similarly, safety measures may be incorporated to prevent the operating vehicle moving (e.g. travelling forwards) while it is being used to power the assembly of the present invention. These may comprise restraining means (for example one or more chains, ropes, straps, stops, or the like, or combinations of these) which can be secured to one or more anchoring points on the vehicle and on the platform bearing the load-handling means. The customary anchoring points provided on the vehicle usually serve this purpose well. Alternatively, the platform may be provided with one or more obstables (for example a raised bar, railing, posts or the like) positioned in the path of the vehicle to impede any movement which could be dangerous. Such obstacles may be fixed, detachable, or adapted to be retracted or folded back when not requred for use.

The invention is illustrated but not limited by the accompanying drawings comprising Figures 1 to 6, in which:

Figure 1 represents a view in vertical section of a packaging assembly according to the present invention showing the powering vehicle, the load to be packaged, and the supply of packaging material in position for use in the packaging operation.

Figures 2 and 3 represent perspective view and plan view respectively of one form of packaging assembly for use in conjunction with a vehicle, incorporating a single load-bearing turntable.

Figures 4 and 5 represent plan views of alternative forms of packaging assembly for use in conjunction with a vehicle, incorporating two load-bearing turntables.

Figure 6 represents a plan view of a variant of the assembly shown in Figure 4, employing small turntables as alternatives to rollers as the means for the offtake of power from the vehicle drive wheels.

These drawings are schematic only, and are not drawn to scale.

In Figure 1, the assembly comprises a platform section (1) with an approach ramp section (2) up which a vehicle may be driven into place on the platform section (1). The platform section (1) has a recess (3) containing two rollers (4) and (5) positioned so that their upper surfaces extend above the level of the platform surface sufficiently for the driving wheels of a vehicle to be accommodated between them in a stable manner permitting power to be transmitted from the vehicle wheels to rotate the rollers. The platform section (1) also has a second recess (6) containing a horizontal turntable (7) on which a load to be packaged can be placed. This turntable (7) is carried upon a vertical axis or spindle (8), about which it can be rotated. Fitted on the upper surface of the platform (1) is a stop or barrier (20) in a position which enables it to make contact with the fork-lift truck when the truck is in the desired position on the rollers (4) and (5), to restrain the truck from moving forward off the rollers when the driving wheels are used to rotate the rollers.

The spindle (8) carries a wheel (9) connected by a chain or belt (10) to another wheel (11) driven (directly or indirectly) by the rollers (4) and (5). The wheels (9) and (11), together with the belt or chain (10), constitute a form of power transmission which uses the rotation of the rollers (4) and (5) (initiated by the power wheels of a vehicle) to rotate the load-bearing turntable (7) and any load or other items placed upon it. For safety and convenience this tranmission is beneath the upper surface of the platform (1). The turntable (7) most conveniently (but not essentially) has its upper surface substantially level with the upper surface of the platform (1) to make the loading operation easier.

In Figure 1, there is shown a fork-lift truck (12) in a position on the platform (1) so that its front wheels (23) (the driving wheels) are in engagement with the two rollers (4) and (5). At the front end of the fork-lift truck (12) the vertical mast (13) carries forks (14) on which is attached a roll of packaging film (15) rotatable about a substantially vertical spigot (16). On the turntable (7) is positioned a pallet (17) on which an assembly of bags or other load components (18) to be packaged, topped by a cover-sheet or slip-sheet (19), are placed.

The mast of the fork-lift truck also carries an arm (21) which is adjustable (by means not shown) and on which is mounted a stabilising platen (22) adapted to be brought into contact with the load [preferably its uppermost surface, or the cover-sheet or slip-sheet (19)].

In operation the fork-lift truck (12), having the roll of packaging or wrapping film (15) mounted on the spigot (16) on its forks (14), is driven up the ramp (2) on to the platform (1) and manoeuvred until its front (driving) wheels (23) engage the rollers (4) and (5) and are supported between them, the mast (13) of the truck faces the turntable (7), and the front of the truck meets the stop (20). If the roller (4) (now located in front of the truck's front wheels) is higher than roller (5), then it can serve to prevent the truck from driving forward off the rollers and may even make the safety stop (20) less necessary.

The load of items to be packaged (18) [for example a pallet, load and cover (17), (18) and (19)] is deposited substantially centrally on the turntable (7) (for example by another fork-lift truck). The end of the wrapping material (for example "stretch wrap" film) on its roll (15) is anchored to the load (18) [for example between a lower corner of the load (18) and the pallet (17)] and the stabilising platen (22) is lowered into engagement with the top of the load (if the type of

load requires and permits this). The operator then presses the accelarator control of the truck, and the truck's front (drive) wheels (23) rotate and thereby drive the rollers (4) and (5) and, by way of the chosen transmission mechanism, thus turn the turntable (7) and the pallet load on it. The wrapping film is fed out from its supply roll (15) and begins to be wound around the base of the load (18). The speed of rotation of the load is controlled by the pressure the operator puts on the truck's accelerator pedal, and is therefore infinitely variable from the slowest speed of the truck's "creep" facility to its highest speed. As wrapping of the load proceeds, the operator actuates the truck's controls to raise the carriage and forks (and, with them, the roll of packaging film upon them) so that the film is wound around the rotating load, in a spiralling manner up the load.

If the load is irregular in shape, the operator of the truck may be able to make the film conform better to the shape of the load by making adjustments, for example by raising the platen from the top of the load and tilting the mast (forwards or backwards) so that the film is fed out as a slight angle.

The construction may be altered in many ways to suit particular needs.

For example, the platform unit (1) may be sunk into the ground or floor. This may enable the ramp section (2) to be omitted.

Even more usefully, the whole may be made so that the platform section (1) is in two parts-one part containing the rollers (4) and (5) (and the safety stop (20) if this is required) and sufficient surface to accommodate the vehicle, and another part containing the load-bearing turntable (7). The power transmission system (or the components which go together to make up the system) can be incorporated in either or both of these two parts, as most convenient, or may be made as a separate third part if desired.

In one form of assembly, the platform section (1) is first positioned adjacent to the turntable (7) so that the rollers (4) and (5) extend parallel to a tangent of the turntable (7), with the slightly higher roller nearest to the turntable. One end of the rollers is then connected with the mechanism which supports and rotates the loadbearing turntable (7), by means of a belt or chain drive (10) which passes through an opening in the platform side.

In Figures 2 to 6, the reference numbers for the parts are the same as for Figure 1.

In each of the assemblies represented there are shown a platform section (1) and a ramp section (2), with power offtake rollers (4) and (5), load-bearing turntables (7) and a stop or barrier (20). In Figure 2, there are also shown retaining bars (23) at the sides of the platform section (1) to help to keep the vehicle on the platform. In Figure 6 the sets of rollers [(4) and (5)] shown in Figures 1 to 5 are replaced by small turntables (24) which serve, by engagement with the vehicle's drive wheels, to take power from the vehicle to rotate the load-bearing turntables (7).

The broken lines in Figures 2 to 6 indicate examples of the positions at which the assemblies may be separated into units or modules. Such units or modules can be made so that, although they are each independent structures, they can be joined together for use and, if desired some of the modules can be used for incorporation in more than one form of assembly. This versatility of the modular form of construction may use, for example, a common unit containing the load-bearing turntable so that one or two of these can be joined (possibly by way of a suitable junction section) to a common platform section. Similarly one form of load-bearing turntable module may be replaced by another (for example to accommodate a different type of load to be packaged) or a faulty module can be replaced by another. This also enables a part of the assembly to be replaced easily if an improved module becomes available.

The outstanding advantage of the present invention is that it can be easily used in almost any required location such as dockside, railhead, factory or warehouse, or even in the open in places far away from most sources of power. Furthermore, in most cases the vehicle will be capable of transporting and positioning the remaining components of the assembly prior to use at any particular site. This will be so, even when the load-wrapping unit is all in one complete assembly. It is even more true when a form of modular construction is adopted, as the smaller sub-units (which go together to make up the whole) can be made small enough to be very easy to handle, for example small enough to be taken through small openings (for example doorways) which would not allow passage for larger machinery. With modular construction, the user can also enjoy greater economy and freedom of choice in deciding which units he needs to have available to meet changing requirements.

Unitising has the advantage of maximising the effectiveness of warehousing, forwarding, freighting, distribution and manpower resources. The present invention enables this advantage to be achieved in a more cost-effective way, with a reduction in the expense and the amount of additional equipment hitherto required.

Claims

1. A method for packaging a load by applying a wrapping material around it, characterised in that the load is placed on transportable machinery for receiving and manipulating the load (18) which is operated in order to perform the wrapping and driven by the wheel-driving power of a front wheel of a separate stationary vehicle (12).

2. A method for packaging a load as claimed in Claim 1, characterised in that the vehicle (12) used is a fork-lift truck.

3. A method for packaging a load as claimed in Claim 1 or Claim 2, characterised in that the machinery for receiving and manipulating the load comprises one or more rollers to support and rotate the load during the operation of packaging.

4. A method for packaging a load, as claimed in Claim 3, characterised in that the machinery incorporates side extensions adjacent to the ends of the rollers to assist in manipulating of the load.

5. A method for packaging a load as claimed in Claim 1 or Claim 2, characterised in that the transportable machinery for receiving and manipulating the load comprises a load-bearing turntable (7) to support and rotate the load (18) during the operation of packaging.

6. A method for packaging a load, as claimed in Claim 5, characterised in that the load-bearing turntable used has one or more flaps pivotally connected relative to its upper surface so as to be capable of being swung upwards to restrain movement of a load (18) on the turntable (7).

7. A method for packaging a load as claimed in Claim 5 or Claim 6, characterised in that the machinery used incorporates a mechanism for turning or tipping the turntable (together with the load on it) through an angle so as to enable the load to be packaged by being wrapped first in one direction and then in another direction.

8. A method for packaging a load, as claimed in any of Claims 1 to 7, characterised in that the machinery used incorporates a mechanism for enabling the load to be inverted between a first and a second wrapping operation.

9. A method for packaging a load as claimed in any of Claims 1 to 8, characterised in that the vehicle used (12) has a dispenser for packaging material (15) adjustably mounted thereon.

10. A method for packaging a load as claimed in any of Claims 1 to 9, characterised in that there is provided a load stabiliser (22), preferably mounted on a mast (13) of the vehicle (12) and adapted to be lowered into contact with the top of the load (18).

11. A method for packaging a load as claimed in any of claims 1 to 10, characterised in that the machinery used incorporates a cage, adjustably mounted on the vehicle and adapted to descend to encircle the load so that a dispenser device connected to the cage can wrap the load with a packaging material, for example strapping, as the load is rotated.

12. A method for packaging a load as claimed in any of Claims 1 to 11, characterised in that there is used, as the packaging material, a synthetic plastics film of the so-called "shrink wrap" or "stretch wrap" type.

13. A method for packaging a load as claimed in any of Claims 1 to 11, characterised in that there is used, as the packaging material, a form of netting or its equivalent.

14. A method for packaging a load as claimed in any of Claims 1 to 11, characterised in that the load is packaged by being enveloped by a packaging material which is formed *in situ*.

15. A method for packaging a load as claimed in any of Claims 1 to 14, characterised in that the packaging material used is a flexible material stored in the form of a roll or coil (15).

16. A method for packaging a load, as claimed in Claim 15, characterised in that the machinery used includes a restraint mechanism to control the dispensing of flexible material.

17. A method for packaging a load as claimed in any of Claims 1 to 16, characterised in that the roll or coil of the flexible packaging material (15) is retained on a mounting which comprises an attachment for the vehicle and from which it can be dispensed as required.

18. A method for packaging a load as claimed in Claim 17, characterised in that the mounting used is adjustable.

19. A method for packaging a load, as claimed in Claim 17 or 18, characterised in that the mounting comprises a spigot attachment (16) adapted to be fitted in a position on the forks (14) of a fork lift truck (12).

20. A method for packaging a load as claimed in any of Claims 1 to 19, characterised in that the wheel-driving power of the front-wheel-drive vehicle (12) operates the machinery by way of rollers (4, 5) engaging with the front wheels (23) of the vehicle.

21. A method for packaging a load as claimed in any of Claims 1 to 19, characterised in that the wheel-driving power of the front-wheel-drive vehicle (12) operates the machinery by way of one or more turntables engaging with the front wheels (23) of the vehicle.

22. A method for packaging a load as claimed in any of Claims 1 to 21, characterised in that the machinery used incorporates more than one set of machinery for receiving and manipulating a load and is powered by a single vehicle.

23. A method for packaging a load as claimed in Claim 22, characterised in that the machinery used incorporates two load-bearing turntables which are used alternately for receiving loads to be packaged.

24. A method for packaging a load as claimed in any of Claims 1 to 23, characterised in that the machinery used is made in modular form, for example with a turntable or roller unit, a drive mechanism and a platform made as separate modules which can be connected together.

25. A method for packaging a load as claimed in any of Claims 1 to 24, characterised in that the support is incorporated with the load to improve the packaging of the load.

26. A method for packaging a load as claimed in Claim 25, characterised in that the support used comprises sheet material folded into a configuration which, when wrapped around with flexible wrapping material, increases the rigidity and support to the load.

27. Transportable machinery for packaging a load by applying a wrapping material around it characterised in that it comprises:

(a) means for receiving and manipulating the load to be wrapped;

(b) means for effecting power offtake from a front wheel of a front-wheel-driven vehicle; and

(c) means for using the power offtake derived by means (b) above to operate the load receiving and manipulating means (a) above in order to perform the wrapping.

28. Transportable machinery for packaging a load as claimed in Claim 27, characterised in that it is made in modular form.

Patentansprüche

1. Verfahren zur Verpackung einer Ladung durch Aufbringen eines Verpackungsmaterials um dieselbe, dadurch gekennzeichnet, daß die Ladung auf einen transportierbaren Mechanismus gelegt wird, der zum Empfang und Manipulieren der Ladung (18) vorgesehen ist, und der vom radtreibenden Kraftantrieb eines Vorderrades eines getrennten stationären Fahrzeuges (12), betrieben wird, um den Einwickelvorgang durchzuführen.

2. Verfahren zu Verpackung einer Ladung gemäß Anspruch 1, dadurch gekennzeichnet, daß das verwendete Fahrzeug (12) ein Gabelstabler ist.

3. Verfahren zur Verpackung einer Ladung gemäß Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß der Mechanismus zum Empfang und Manipulieren der Ladung eine oder mehrere Walzen besitzt, um die Ladung während des Verpackungsvorganges zu stützen und zu drehen.

4. Verfahren zu Verpackung einer Ladung gemäß Anspruch 3, dadurch gekennzeichnet, daß der Mechanismus seitliche, an die Walzenenden angrenzende Ausdehnungen besitzt, um das Manipulieren der Ladung zu unterstützen.

5. Verfahren zur Verpackung einer Ladung gemäß Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß der transportierbare Mechanismus zum Empfang und Manipulieren der Ladung einen lasttragenden Drehtisch (7) enthält zur Unterstützung und zum Drehen der Ladung (18) während des Verpackungsvorgangs.

6. Verfahren zur Verpackung einer Ladung gemäß Anspruch 5, dadurch gekennzeichnet, daß der verwendete, lasttragende Drehtisch eine oder mehrere Klappen besitzt, die relativ zu ihrer oberen Obefläche schwenkbar angebracht sind, damit sie nach oben geschwenkt werden können, um die Bewegung einer Ladung (18) auf dem Drehtisch (7) einzuschränken.

7. Verfahren zur Verpackung einer Ladung gemäß Anspruch 5 oder Anspruch 6, dadurch gekennzeichnet, daß der verwendete Mechanismus eine Vorrichtung zum Drehen oder Kippen des Drehtisches (zusammen mit der darauf befindlichen Ladung) in einem Winkel besitzt, damit die Ladung verpackt werden kann, indem sie zuerst in einer Richtung und dann in einer anderen Richtung eingewickelt wird.

8. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 7, dadurch gekenzeichnet, daß der verwendete Mechanismus eine Vorrichtung enthält, die es gestattet, die Ladung zwischen einem ersten und einem zweiten Wickelvorgang umzukehren.

9. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansrpüche 1 bis 8, dadurch gekennzeichnet, daß das verwendete Fahrzeug (12) ein verstellbar darauf angebrachtes Ausgabegerät für Packmaterial (15) besitzt.

10. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß eine Ladungsfesthaltevorrichtung (22) vorgesehen ist, die vorzugsweise an einem Mast (13) des Fahrzeuges (12) angebracht und so ausgelegt ist, daß sie bis zum Kontakt mit der Oberseite der Ladung (18) herabgelassen werden kann.

11. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 10, dadurch gekennzeichnet, daß der verwendete Mechanismus einen Käfig enthält, der verstellbar auf dem Fahrzeug montiert ist und so ausgelegt, daß er herabgelassen werden kann, um die Ladung so zu umgeben, daß eine mit dem Käfig verbundene Abgabevorrichtung die Ladung mit einem Verpackungsmaterial, beispielsweise Wikkelband, umwickeln kann, während die Ladung gedreht wird.

12. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 11, dadurch gekennzeichnet, daß als Verpackungsmaterial eine synthetische Plastikfolie der Art der sogenannten "Schrumpfverpackung" oder "Spannpackung" verwendet wird.

13. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 11, dadurch gekennzeichnet, daß als Verpackungsmaterial eine Form von Geflecht oder etwas dementsprechendes verwendet wird.

14. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 11, dadurch gekennzeichnet, daß die Ladung durch ein Verpackungsmaterial, das an *Ort und Stelle* gebildet wird, eingehüllt wird.

15. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 14, dadurch gekennzeichnet, daß das verwendete Verpackungsmaterial ein flexibles Material ist, das in Form in Form einer Rolle oder spule (15) gelagert wird.

16. Verfahren zur Verpackung einer Ladung gemäß Anspruch 15, dadurch gekennzeichnet, daß der verwendete Mechanismus eine Zurückhaltevorrichtung besitzt zum Regeln der Ausgabe des flexiblen Materials.

17. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 16, dadurch gekennzeichnet, daß die Rolle oder Spule des flexiblen Verpackungsmaterials (15) auf einem Gestell gehalten wird, das ein Zubehör für das Fahrzeug darstellt, und von dem aus es nach Bedarf abgegeben werden kann.

18. Verfahren zur Verpackung einer Ladung gemäß Anspruch 17, dadurch gekennzeichnet, daß das verwendete Gestell verstellbar ist.

19. Verfahren zu Verpackung einer Ladung gemäß Anspruch 17 oder 18, dadurch gekennzeichnet, daß zu dem Gestell eine zusätzliche Zapfenbefestigung (16) gehört, die so ausgelegt ist, daß sie auf den Gabelzinken (14) eines Gabelstaplers (12) in eine Stellung anzubringen ist.

20. Verfahren zu Verpackung einer Ladung

gemäß irgendeinem der Ansprüche 1 bis 19, dadurch gekennzeichnet, daß die radantreibende Triebkraft des Fahrzeuges (12) mit Vorderradantrieb den Mechanismus über Walzen (4, 5), die mit den Vorderrädern (23) des Fahrzeuges eingreifen, betätigt.

21. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 19, dadurch gekennzeichnet, daß die radantreibende Triebkraft des Fahrzeuges (12) mit Vorderradantrieb den Mechanismus über einen oder mehrere Drehscheiben, die mit den Vorderrädern (23) des Fahrzeuges eingreifen, betätigt.

22. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Anuprüche 1 bis 21, dadurch gekennzeichnet, daß der verwendete Mechanismus mehr als einen Satz des Mechanismus zum Empfang und zur Manipulierung einer Ladung enthält und durch ein einziges Fahrzeug angetrieben wird.

23. Verfahren zur Verpackung einer Ladung gemäß Anspruch 22, dadurch gekennzeichnet, daß der verwendete Mechanismus zwei lasttragende Drehscheiben enthält, die abwechselnd zum Empfang der zu verpackenden Ladungen verwendet werden.

24. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 23, dadurch gekenneichnet, daß der verwendete Mechanismus im Baukastensystem hergestellt ist beispielsweise mit einer Drehscheiben-oder Walzeneinheit, einer Antriebsvorrichtung und einem Podium, die als getrennte Bausteine hergestellt wurden und miteinander verbunden werden können.

25. Verfahren zur Verpackung einer Ladung gemäß irgendeinem der Ansprüche 1 bis 24, dadurch gekennzeichnet, daß eine Stütze zusammen mit der Ladung eingefaßt wird, um die Verpackung der Ladung zu verbessern.

26. Verfahren zur Verpackung einer Ladung gemäß Anspruch 25, dadurch gekennzeichnet, daß die verwendete Stütze eine aus Bogen bestehendes Material enthält, das in solch einer Anordung gefaltet wurde, das es die Steifigkeit und die Stütze der Ladung steigert, wenn est mit flexiblem Verpackungsmaterial umwickelt wird.

27. Transportierbarer Mechanismus zum Verpacken einer Ladung durch Anbringung eines Verpackungsmaterials um dieselbe, um das Einwickeln durchzuführen, dadurch gekennzeichnet, daß er enthält:

(a) Mittel zum Empfang und zum Manipulieren der zu Verpackenden Ladung;

(b) Mittel zur Bewirkung einer Kraftabnahme von einem Vorderrad eines Fahrzeuges mit Vorderradantrieb, und

(c) Mittel zum Einsatz der Kraftabnahme erzielt durch die obengenannten Mittel (b), um die obengenannten Mittel zum Empfang und zum Manipulieren (a) der Ladung zu betätigen.

28. Transportierbarer Mechanismus zur Verpackung einer Ladung gemäß Anspruch 27, dadurch gekennzeichnet, daß er in Baukastenform hergestellt wurde.

Revendications

1. Une méthode pour l'emballage d'une charge consistant à poser une enveloppe tout autour, caractérisée par le fait que la charge est placée sur un engin transportable aux fins de réception et de manipulation de la charge (18) et cet engin est activé afin d'exécuter l'enveloppement et il est entraîné par une roue motrice à l'avant d'un véhicule (12) statioinnaire séparé.

2. Une méthode pour l'emballage d'une charge, comme indiqué dans la revendication 1, caractérisée par la fait que le véhicule (12) utilisé est un chariot élévateur.

3. Une méthode pour l'emballage d'une charge comme indiqué dans la revendication 1 ou la revendication 2, caractérisée par le fait que l'engin qui reçoit et qui manipule la charge comprend un plusieurs rouleaux qui supportent et qui font tourner la charge pendant l'opération d'emballage.

4. Une méthode pour l'emballage d'une charge, comme indiqué dans la revendication 3, caractérisée par le fait que l'engin comprend des prolongements latéraux adjacents aux extrémités des rouleaux afin d'assister à la manipulation de la charge.

5. Une méthode pour l'emballage d'une charge, comme indiqué dans la revendication 1 ou la revendication 2, caractérisée par le fait que l'engin transportable qui reçoit et manipule la charge comprend un plateau tournant (7) qui supporte et fait tourner la charge (18) pendant l'opération d'emballage.

6. Une méthode pour l'emballage d'une charge, comme indiqué dans la revendication 5, caractérisée par le fait que le plateau tournant utilisé a un ou plusieurs rabats, reliés de manière pivotante à la surface supérieure de façon à pouvoir être basculés vers le haut pour retenir le mouvement d'une charge (18) sur le plateau tournant (7).

7. Une méthode pour l'emballage d'une charge, comme indiqué dans la revendication 5 ou la revendication 6, caractérisée par le fait que l'engin utilisé incorpore un mécanisme pour faire tourner ou pour basculer le plateau (avec sa charge) à un angle tel qu'il permette à la charge à emballer d'être enveloppée d'abord dans un sens puis dans l'autre.

8. Une méthode pour l'emballage d'une charge, comme indiqué dans n'importe laquelle des revendications de 1 à 7, caractérisée par le fait que l'engin utilisé comprend un mécanisme pour permettre d'inverser la charge entre une première et une seconde opération d'enveloppement.

9. Une méthode pour l'emballage d'une charge, comme indiqué dans n'importe laquelle des revendiations de 1 à 8, caractérisée par le fait que le véchicule utilisé (12) a un distributeur pour le matériau d'enveloppement (15), qui est réglable et monté sur le véhicule.

10. Une méthode pour l'emballage d'une charge comme indiqué dans n'importe laquelle des revendications de 1 à 9, caractérisée par le fait qu'il est prévu un stabilisateur (22) de charge,

monté de préférence sur un mât (13) du véhicule (12) et adapté de manière à être abaissé pour faire contact avec le haut de la charge (18).

11. Une méthode pour l'emballage d'une charge comme indiqué dans n'importe laquelle des revendications de 1 à 10, caractérisée par le fait que l'engin utilisé incorpore une cage, montée de manière à être ajustée, sur le véhicule, et réglée de façon à descendre pour encercler la charge afin que le dispositif distributeur relié à la cage puisse envelopper la charge d'un matériau d'emballage, par exemple des bandes, tandis que la charge tourne.

12. Une méthode pour l'emballage d'une charge comme indiqué dans n'importe laquelle des revendiations de 1 à 11, caractérisée par le fait qu'on utilise, en tant que matériau d'emballage, une pellicule synthétique en plastique, du type désigné par l'expression "rétractable" ou sous tension, "stretch".

13. Une méthode pour l'emballage d'une charge, comme indiqué dans n'importe laquelle des revendications de 1 à 11, caractérisée par le fait qu'on utilise, en tant que matériau d'emballage, une forme de filet ou un équivalent.

14. Une méthode pour l'emballage d'une charge comme indiqué dans n'importe laquelle des revendiations de 1 à 11, caractérisée par le fait que la charge est emballée en étant enveloppée par un matériau d'enveloppement qui est formé *sur place*.

15. Une méthode pour l'emballage d'une charge comme indiqué dans n'importe laquelle des revendications de 1 à 14, caractérisée par le fait que le matériau d'emballage utilisé est un matériau flexible posé sur un rouleau ou une bobine (15).

16. Une méthode pour l'emballage d'une charge, comme indiqué dans la revendication 15, caractérisée par le fait que l'engin utilisé comprend un mécanisme de retenue qui contrôle la distribution du matériau flexible.

17. Une méthode pour l'emballage d'une charge, comme indiqué dans n'importe laquelle des revendications de 1 à 16, caractérisée par le fait que le rouleau ou la bobine du matériau d'emballage flexible (15) est retenu sur une monture qui comprend une fixation pour le véhicule et à partir de laquelle il peut distribuer selon les besoins.

18. Une méthode pour l'emballage d'une charge, comme indiqué dans la revendication 17, caractérisée par le fait que la monture utilisée est réglable.

19. Une méthode pour l'emballage d'une charge, comme indiqué dans la revendication 17 ou 18, caractérisée par le fait que la monture comprend un dispositif d'attache par un boulon (16) adapté qui doit être mis en place sur la fourche (14) d'un chariot élévateur (12).

20. Une méthode pour l'emballage d'une charge, comme indiqué dans n'importe laquelle des revendications de 1 à 19, caractérisée par le fait que la puissance de la roue motrice du véhicule à traction avant (12) fait fonctionner l'engin au moyen de galets (4, 5) qui s'engagent dans les roues avant (23) du véhicule.

21. Une méthode pour l'emballage d'une charge, comme indiqué dans n'importe laquelle des revendications de 1 à 19, caractérisée par le fait que la puissance de la roue motrice du véhicule à traction avant (12) fait fonctionner l'engin au moyen d'un ou plusieurs plateaux tournants s'engageant avec les roues avant (23) du véhicule.

22. Une méthode pour l'emballage d'une charge, comme indiquée dans n'importe laquelle des revendications de 1 à 21, caractérisée par le fait que l'engine utilisé comprend plus d'un jeu d'engins pour recevoir et manipuler une charge et qu'il est entraîné par un seul véhicule.

(23) Une méthode pour l'emballage d'une charge, comme indiqué dans la revendiation 22, caractérisée par le fait que l'engin utilisé comprend deux plateaux tournants qui servent alternativement pour recevoir les charges à emballer.

24. Une méthode pour l'emballage d'une charge, comme indiqué dans n'importe laquelle des revendications de 1 à 23, caractérisée par le fait que l'engin utlisé est fabriqué sous forme modulaire, par example avec une unité de plateaux tournants ou de galets, un mécanisme d'entraînement et une plateforme, fabriqués en tant que modules séparés et qui sont reliés ensemble.

25. Une méthode pour l'emballage d'une charge, comme indiqué dans n'importe laquelle des revendications de 1 à 24, caractérisée par le fait qu'un support est incorporé à la charge pour améliorer l'emballage de la charge.

26. Une méthode pour l'emballage d'une charge, comme indiquée dans le revendication 25, caractérisée par le fait que le support utilisé comprend le matériau en feuille, pliée en une configuration qui, une fois enveloppée avec un matériau d'enveloppement flexible, augmente la rigidité et le support de la charge.

27. Un engin transportable pour l'emballage d'une charge en posant un matériau d'enveloppement autour de la charge afin de réaliser l'enveloppement, caractérisé par le fait qu'il comprend:

a) les moyens de recevoir et de manipuler la charge à envelopper;

b) les moyens d'effectuer la prise de puissance d'une roue motrice avant d'un véchicule à traction avant; et

c) les moyens d'utiliser la puissance de prise dérivé grâce à (b) ci-dessus afin de faire fonctionner les moyens de réception et de manipulation de la charge ci-dessus.

28. Un engin transportable pour l'emballage d'une charge comme indiqué dans la revendication 27, caractérisée par le fait qu'il est fabriqué sous forme modulaire.

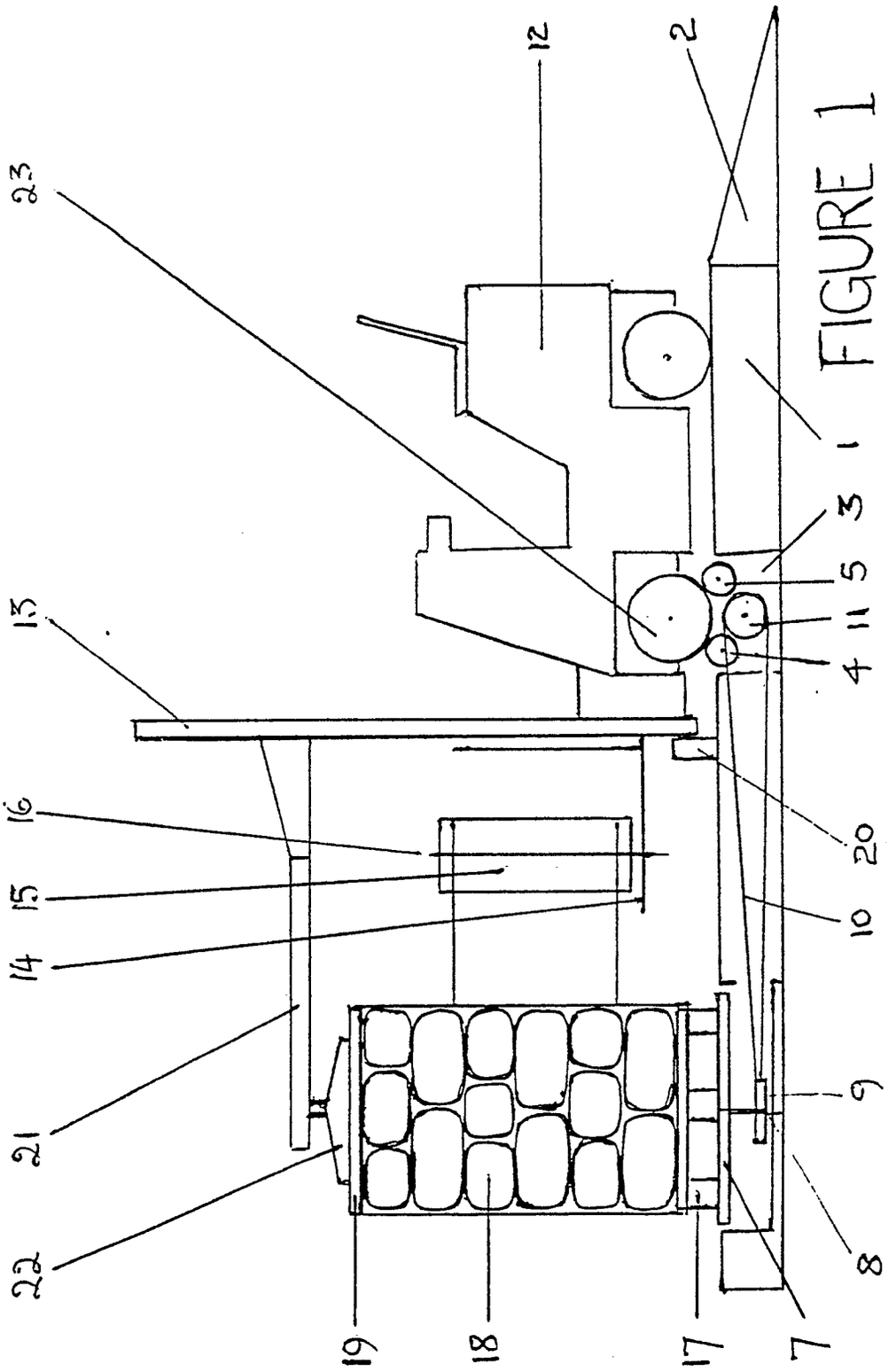

FIGURE 1

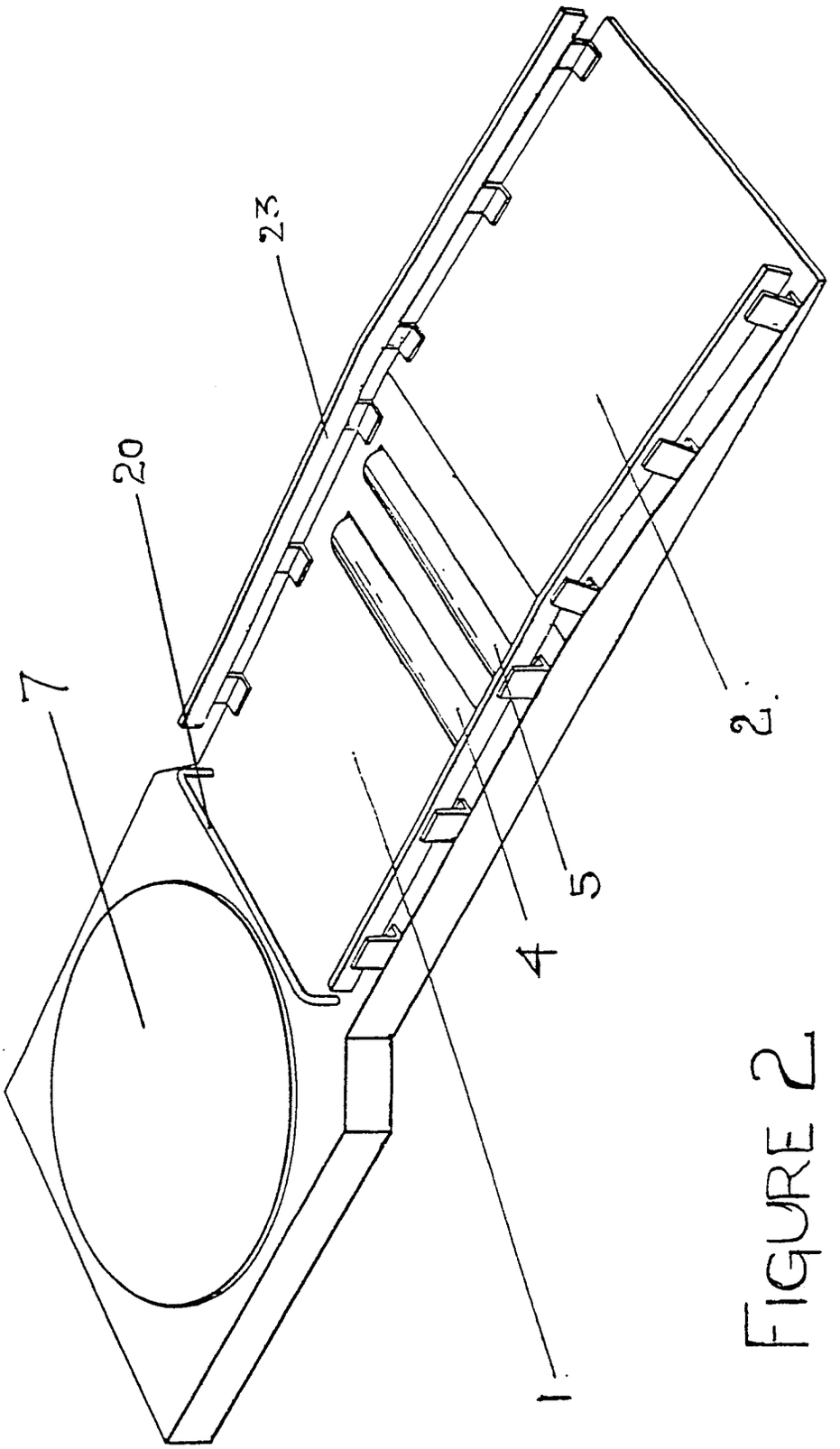

FIGURE 2

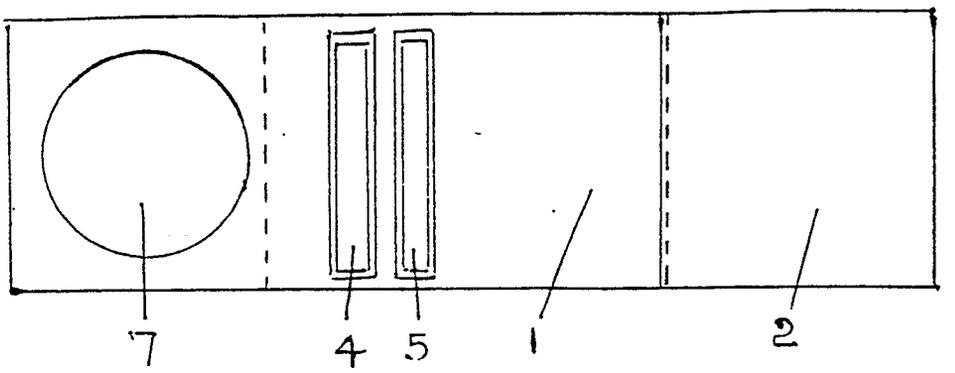

FIGURE 3

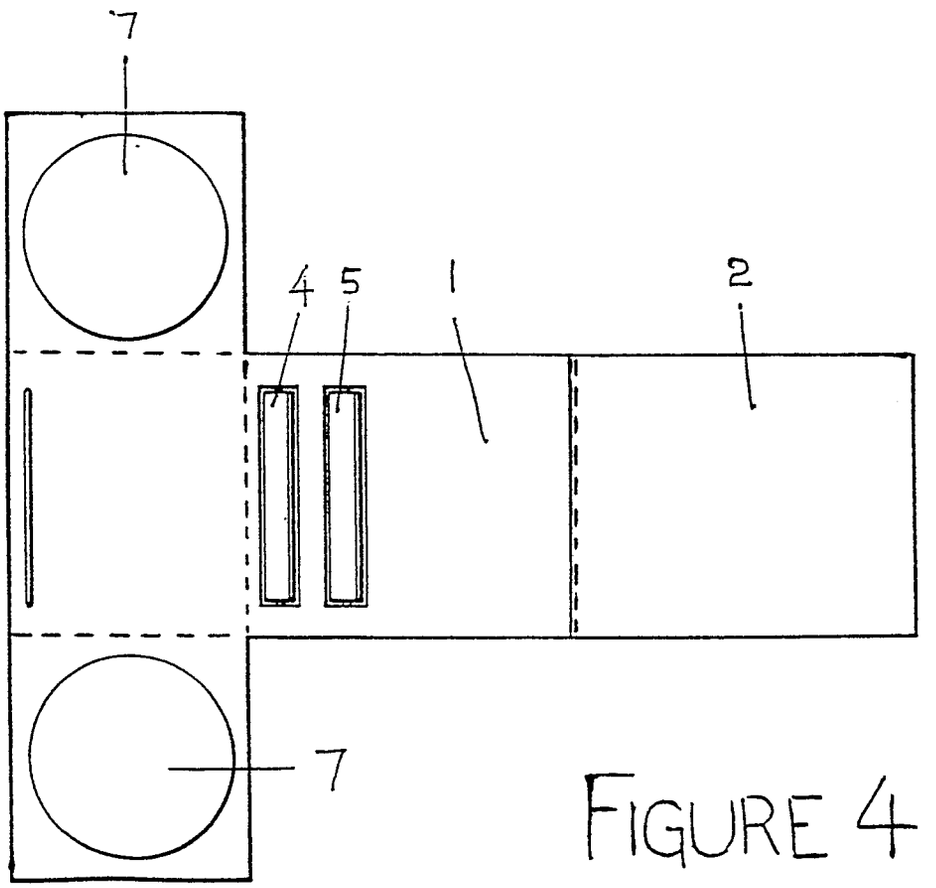

FIGURE 4

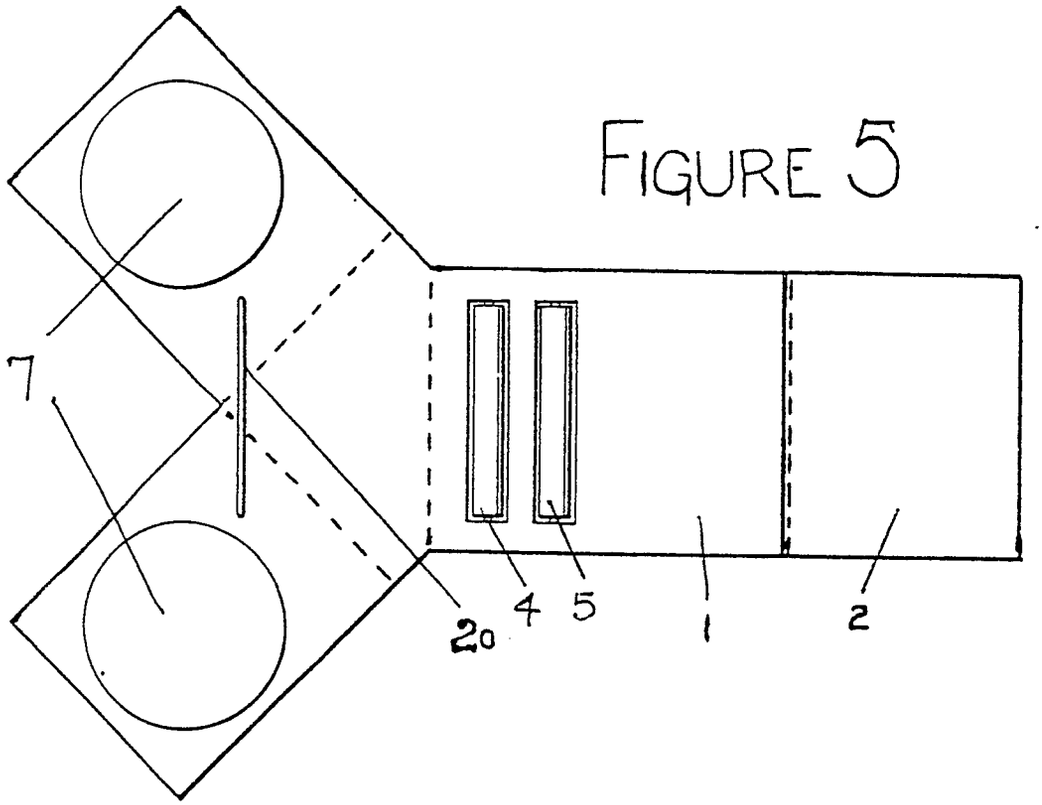

FIGURE 5

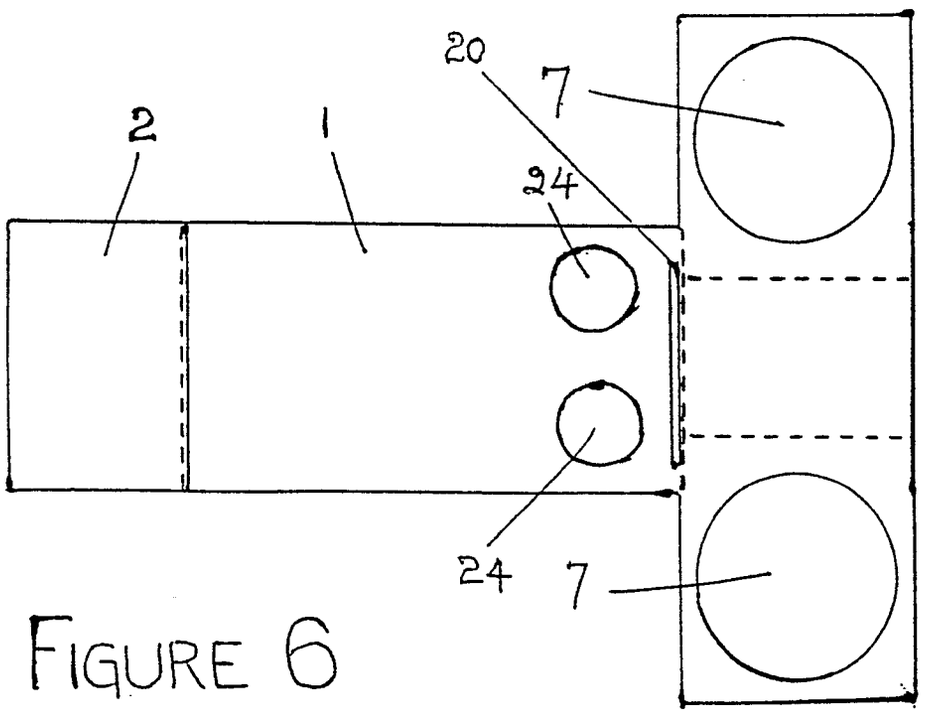

FIGURE 6