Sept. 19, 1961 F. W. FENTON 3,000,295

COMPRESSION DEVICE

Filed March 24, 1958 3 Sheets-Sheet 1

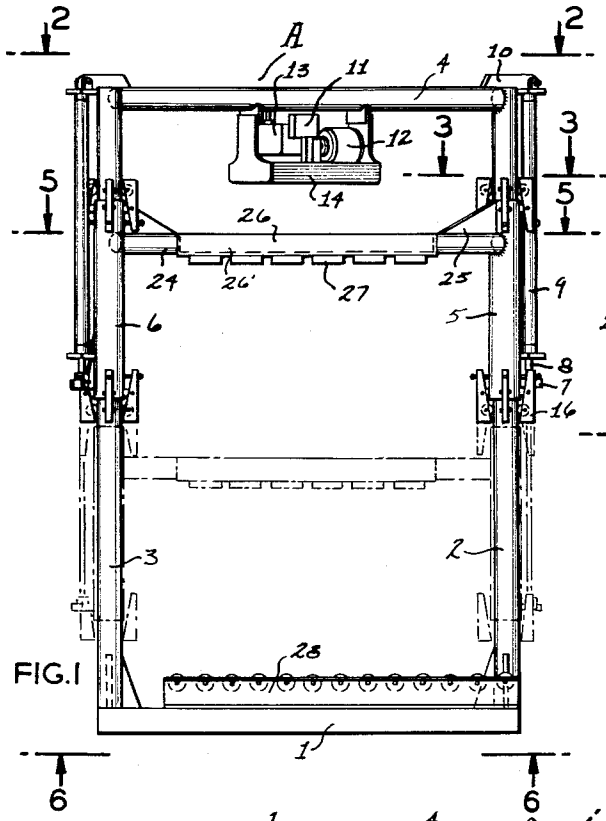

FIG. 1

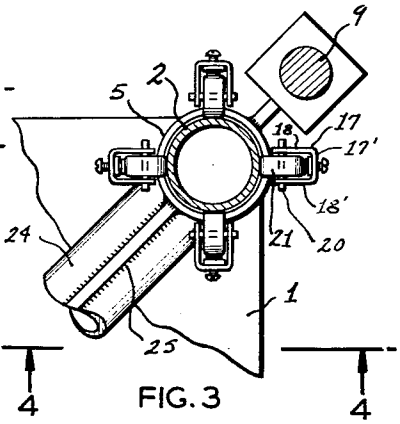

FIG. 3

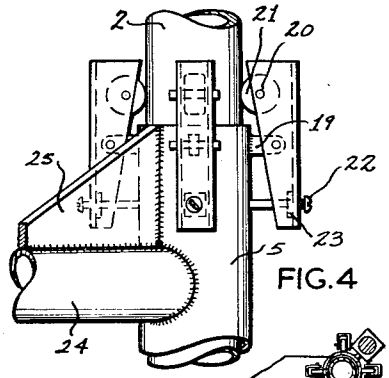

FIG. 4

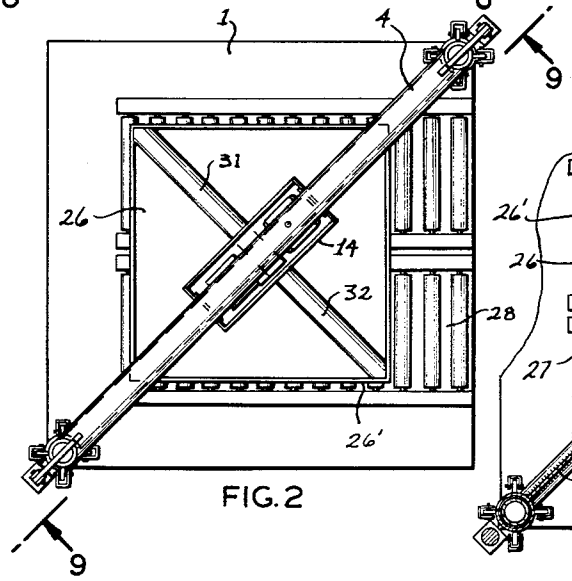

FIG. 2

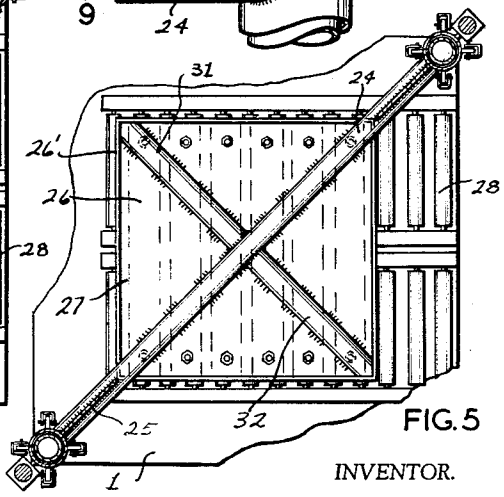

FIG. 5

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COMPRESSION DEVICE

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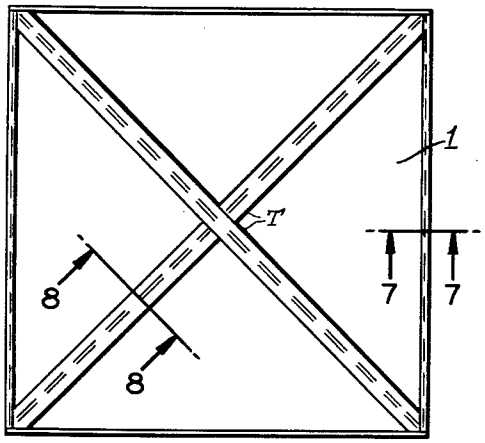

FIG.6

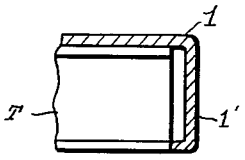

FIG.7

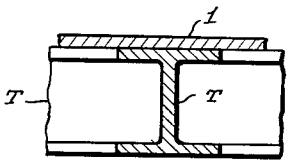

FIG.8

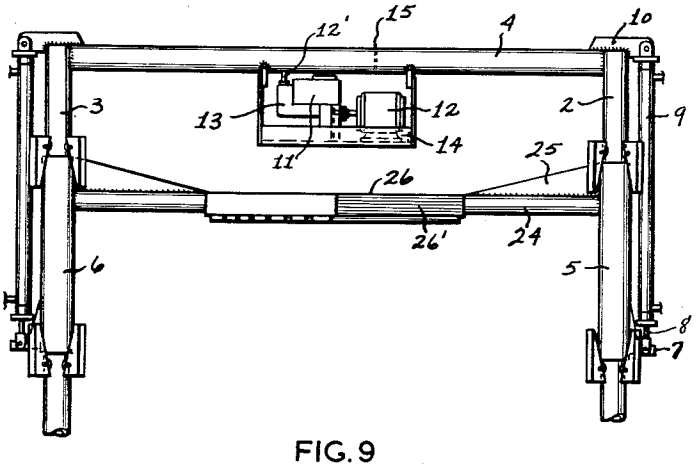

FIG.9

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COMPRESSION DEVICE

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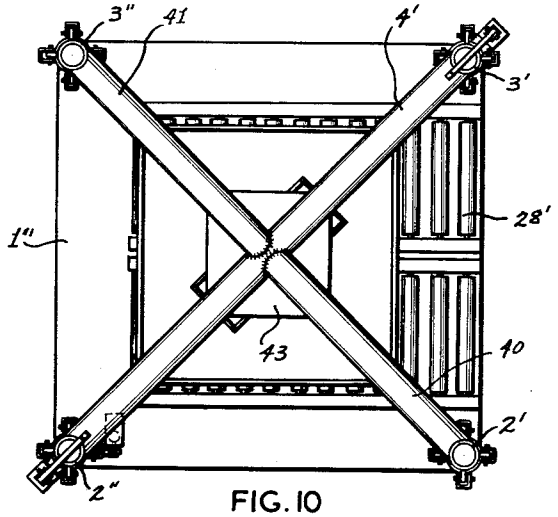

FIG. 10

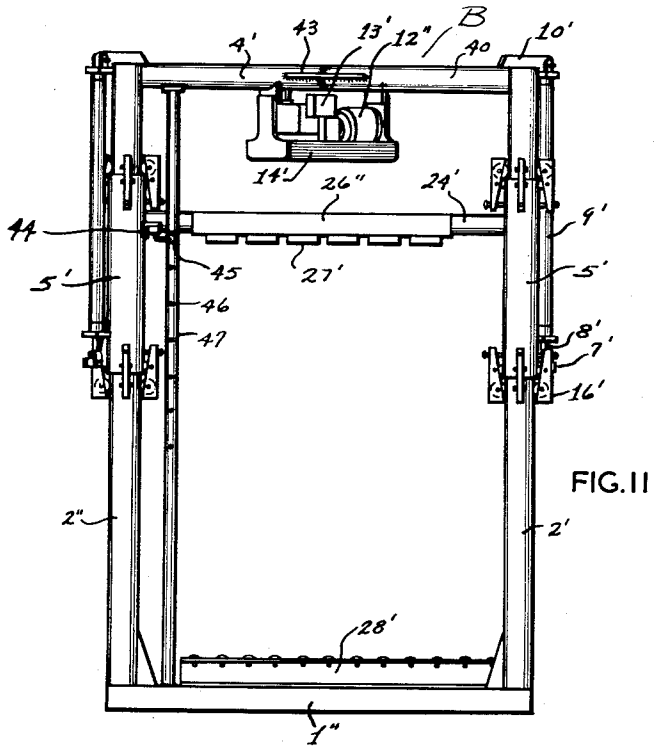

FIG. 11

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United States Patent Office 3,000,295 Patented Sept. 19, 1961

3,000,295

COMPRESSION DEVICE

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Filed Mar. 24, 1958, Ser. No. 723,604
5 Claims. (Cl. 100—214)

This invention relates in general to presses and, more particularly, to a machine for compressing materials preparatory to shipment.

It is an object of the present invention to provide a compression device for maintaining a predetermined quantity of compressible commodities, such as paper products, textiles, and the like, under pressure to allow strapping of same into a compact, unitary load, requiring minimum space and facilitating handling thereof.

It is another object of the present invention to provide a compression device of the character stated which is readily usable with conventional types of strapping equipment.

It is a further object of the present invention to provide a compression device which incorporates a fluid-operated platen having means associated therewith for assuring stabilized, uniform, reciprocal travel thereof.

It is a still further object of the present invention to provide a compression device having a simplicity of parts, which may be relatively inexpensively manufactured, which is durable and reliable in usage, being resistant to breakdown; and the operation of which may be easily controlled by a relatively unskilled personnel.

Other objects and details of the invention will be apparent from the following description, when read in connection with the accompanying drawings (3 sheets) wherein:

FIGURE 1 is an elevation view of a compression device constructed in accordance with and embodying the present invention.

FIGURE 2 is a plan view.

FIGURE 3 is a horizontal transverse section taken on the line 3—3 of FIGURE 1.

FIGURE 4 is a vertical section taken on the line 4—4 of FIGURE 3.

FIGURE 5 is a horizontal transverse section taken on the line 5—5 of FIGURE 1.

FIGURE 6 is a bottom view taken along the line 6—6 of FIGURE 1.

FIGURE 7 is a vertical transverse section taken on the line 7—7 of FIGURE 6, but rotated 180 degrees.

FIGURE 8 is a vertical transverse section taken on the line 8—8 of FIGURE 6, but rotated 180 degrees.

FIGURE 9 is a fragmentary vertical section taken on the line 9—9 of FIGURE 3.

FIGURE 10 is a plan view of another form of compression device constructed in accordance with and embodying the present invention.

FIGURE 11 is a side elevation of the compression device shown in FIGURE 10.

Referring now by reference numerals to the drawings which illustrate practical embodiments of the present invention, A designates a compression device comprising a four-sided, but preferably square, base 1 made of relatively heavy gauge metal and having an integrally formed, depending skirt 1′ (FIGURE 7). As shown in FIGURES 6, 7 and 8, base plate 1 is reinforced in its under portion by cross bracing, indicated T, as of channel stock. Upstanding at obliquely related corners of base plate 1 are posts or uprights 2, 3, both being formed of suitable pipe stock and of annular cross section; said posts 2, 3 being engaged at their upper ends, as by welding, to a cross plate piece 4 extending therebetween, and also, for

purposes presently appearing, being desirably of pipe stock.

Encirclingly disposed about each post 2, 3 for a portion of its length is a sleeve 5, 6 , respectively, on each of which sleeves at their outer, lower ends is mounted a bracket 7 for engagement to the outer, lower end of a piston 8, the upper end portion of which projects within a double-acting fluid cylinder 9. Each cylinder 9 is secured at its upper end to a lug 10 fixed on the upper end of the adjacent post 2, 3 and cross piece 4; said cylinders thus being each presented in axially parallel relationship to the proximate post 2, 3 and with the stroke of the related piston 8 moving in a vertically reciprocal path under influence of the cylinder fluid.

Each cylinder 9 is connected at each of its ends through conventional tubing (not shown) to a pump 11 driven by a motor 12 and having the customary associated reservoir 13. A mounting 14 is suspended from the central portion of cross piece 4 for supporting pump 11, reservoir 13 and motor 12. As may best be seen in FIGURE 9, reservoir 13 is connected as by a short conduit 12′ with the chamber-forming interior of cross piece 4 which latter serves as a surge tank and is vented to the atmosphere, as by an opening 15.

It will thus be seen that upon operation of the fluid system with fluid being directed alternately to the upper end and the lower end of cylinders 9, sleeves 5, 6 will be caused to travel reciprocatingly downwardly and upwardly along their related posts 2, 3 toward and away from base plate 1; with the full downward position, as indicated in dotted lines in FIGURE 1, being determined by the predetermined stroke of pistons 8.

To prevent undesired axially tiltable movement, with consequent restraining engagement with posts 2, 3, each sleeve 5, 6 is provided at each of its ends with four stabilizing devices 16, located at 90 degree intervals about the periphery of the related sleeve (FIGURE 3). Each stabilizing device 16 comprises a vertically presented channel member 17 having a web 17′ and side flanges 18, 18′ which taper toward their inner ends which are inward of the adjacent end of the associated sleeve 5, 6. Channel members 17 are swingably mounted intermediate their length on lugs 19 extending radially from the associated sleeve proximate the adjacent end margin thereof whereby the relatively wider portion of flanges 18, 18′ of members 17 will project beyond the adjacent end of the associated sleeve, as shown in FIGURE 3. Extending transversely between, and fixed at its ends to, flanges 18, 18′ of each channel member 17, in their outer projecting portions, is a shaft 20 on which is mounted for rotation a guide, or so-called skate, wheel 21, which is thus presented for engaging on its peripheral surface the outer face of the proximate post 2, 3. Extending axially perpendicularly through web 17′ of each channel member 17, adjacent its inner end is an adjustment screw 22 received within an internally threaded collar 23 rigidly secured on the inner portion of channel member 17, with screw 22 abutting at its opposite end upon the outer surface of the related sleeve 5, 6 . By turning screw 22 through one direction the contact pressure between the related wheel 21 and the associated post will be increased, while turning in the opposite direction will reduce such contact pressure.

As is apparent from the foregoing, as sleeves 5, 6 travel upwardly and downwardly along their related post 2, 3 guide wheels 21 will maintain said sleeves 5, 6 in appropriately spaced relationship to their related post so that no undue movement-restricting contact will develop therebetween and smooth, uniform operation will be assured.

Extending transversely between sleeves 5, 6 is a frame member, as of pipe stock, welded or otherwise fixed at its ends to said sleeves in their upper end portions; there being

gusset plates 25 re-inforcing the joint between said member and sleeves 5, 6. Rigid on frame member 24 is a quadrilateral, desirably square, platen plate 26, having an upstanding flange 26'; said frame member extending diagonally across the upwardly presented face of said plate 26 and there being axially aligned support members 31, 32, as of channel stock, fixed to platen plate 26 and extending from the opposite corners to the point of intersection with frame member 24, thereby rendering said plate 26 stable.

On the under surface, or downwardly directed face, of platen plate 26 there may be secured a plurality of prearranged strapping-guide members, as indicated generally at 27, or a unitary hardwood platen, for providing directing channels for strappings for the work being compressed by machine A. As indicated in FIGURES 1 and 5, said strapping guide members 27 are shown as comprising a plurality of parallel, spaced apart elongated blocks, preferably of wood, which are bolted or otherwise secured to platen plate 26 with the inter-spacings forming strapping guideways. However, it is to be recognized that such guide members 27 may be of any desired form and arranged in any manner requisite for the particular type of strapping to be accomplished.

Although not shown in the drawings, strapping feeder equipment of conventional design will be mounted upon the upper face of platen plate 26 which equipment will essentially consist of spools of the strapping as well as manually controlled strap directing devices.

Mounted on base plate 1 is a conveyor section 28, which may if desired be powered, being located beneath platen plate 26 and connected to feed conveyor (not shown) for receiving, as on a pallet, a quantity of work to be compressed, such as stacked paper products, e.g. paper bags, corrugated boxes, etc., textiles, mattresses, and any other compressible material. Upon disposition of the work beneath platen plate 26, operation of fluid cylinders 9 is initiated with resulting downward stroke of pistons 8 causing strapping guide members 27 to be brought into abutment upon the upper face of the work load and by the continued downward travel of platen plate 26 to compress the same with the developed pressure, and degree of compression being determined by the extent of travel of platen plate 26. With the work thus fully compact, and being maintained under pressure, the strapping operation is undertaken which may be performed in accordance with well-known techniques whereby the strapping from the feeder equipment will be directed through any openings or voids in the pallets and thence upwardly about the load and through the interspacing of the strapping guide members 27. Upon termination of the strapping operation the flow of fluid to cylinders 9 is reversed, causing upward movement of pistons 8 with platen plate 26 being thereby returned to upward position preparatory to repeating the cycle upon the receipt of a subsequent work load on conveyor section 28.

From the above it is recognized that the machine of the present invention is adapted to maintain a work load under desired compression for simultaneous and effective strapping thereof into a package of minimum size for facilitating efficient handling and economic shipping. By the arrangement presented, the strapping operation may be accomplished in minimum time and effected in several directions simultaneously without moving the work load. It is apparent that the spacing between the uprights 2, 3 may be designed so that machine A can accommodate work loads of varying dimensions.

If desired, a modified type of compression machine indicated at B in the drawings (FIGURES 10 and 11) may be provided. Said machine B comprises a base plate 1'', preferably square, upon which there is provided, at each corner, an upright or post 2', 3', 2'', 3''; said base plate 1'' and the aforesaid uprights being similar in all respects to the base plate 1 and uprights 2, 3 of machine A hereinabove described. Each upright of machine B is provided with sleeve 5' having at each of its ends 4 stabilizing devices 16' and being engaged by a bracket 7' to the piston 8' of a fluid cylinder 9' presented in axially parallel relation to the proximate post and being engaged at its upper end to a lug 10' secured upon the upper end of the related post; said sleeve 5', stabilizing devices 16', bracket 7', piston 8', fluid cylinder 9' and lugs 10' being structurally similar in all respects to the corresponding elements of machine A described hereinabove. Extending between posts 2'' and 3' at their upper ends is a cross member 4' while extending from 3'' and 2' to the central portion of cross piece 4' are frame members 40, 41 which are mutually axially aligned and in axially normal relation to cross member 4'; said members 40, 41 being fixed, as by welding, to cross member 4' on opposite sides thereof. Gusset plates 43 are fixed between the adjacent top frame members adjacent their points of intersection, as may best be seen in FIGURE 10. Machine A is thus provided with a rigidifying cross bracing at its upper end, thereby unifying the structural elements into a stable framework.

Presented for vertical movement toward and away from base 1' consequent to travel of sleeves 5' is a platen plate 26'' mounted upon cross frame members 24' and having secured upon their under surface strapping guide members 27', said elements being comparable in all structural respects to the platen plate 26, strapping guides 27 and frame member 24 of machine A above described.

For control of the flow of fluid to and from cylinders 9' is a pump 13' driven by a motor 12'' supported on a mounting 14' suspended from top cross pieces 4'.

Disposed on base plate 1' beneath platen plate 26'' is a conveyor section 28' for receiving and positioning the work load for compression thereof by downward travel of platen plate 26''.

Mounted upon one of the sleeves 5' is a bracket 44 carrying an impulse switch 45 adapted for triggering by lugs 46 presented in vertically spaced relationship upon a post 47 located in immediate proximity to the related sleeve 5'; said switch 45 being connected to a solenoid (not shown) for operating pump 13' by methods well known. Thus, by triggering of switch 45 through engagement with preselected lugs 46 the increments of vertical travel of platen plate 26'' may be controlled or through particular circuitry such as incorporating a stepping switch, a cyclic progression of steps may be readily accomplished such as the compression of the load, the strapping, and the automatic return of the platen plate 26' to upward position.

Thus, this form of the present invention incorporates four uprights arranged in forming a basically square framework presenting maximum rigidity and conducive to the development of relatively increased compressive forces, as well as permitting the accommodation of loads having relatively great cross sectional areas for which platen plates 26'' of a commensurate area are required.

It should be understood that changes and modifications in the formation, construction, arrangement, and combination of the several parts of the compression device may be made and substituted for these herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a compression device having a base and a plurality of uprights provided on said base with a sleeve member encircling each upright, the improvement comprising a mounting member swingably mounted on the sleeve of the uprights for rockable movement within a vertical plane, each mounting member projecting at one of its ends beyond the adjacent end of the related sleeve, a roller carried on the projecting portion of each mounting member for engaging the peripheral surface of the associated upright, and an adjusting element engaged at the other end of each mounting member for movement

axially perpendicular to the related sleeve for controlling the contact pressure between the roller and the upright.

2. In a compression device having a base and uprights provided on said base with a sleeve member encircling each upright, the improvement as described in claim 1 wherein the mounting member is channel shaped, the adjusting element is a screw for abutment at its inner end against the peripheral surface of the related sleeve, and a threaded collar being fixed in said member for engaging said screw.

3. In a compression device having a base and upright provided on said base with a sleeve member encircling each upright, the improvement described in claim 1 wherein a plurality of mounting members are provided at each end of each sleeve equally spaced apart about the circumference thereof, and wherein each mounting member is adapted for pivoted movement substantially about its midpoint within a vertical plane.

4. A compression device comprising a compressible work-load supporting base, a plurality of uprights mounted on said base, each upright having a sleeve encircling the same, each sleeve having a plurality of roller elements mounted at each of its ends for engaging the outer surface of the related upright and for maintaining said sleeves spacedly therefrom, a platen plate supported from the sleeves, a fluid cylinder mounted on each upright above the upper end of the related sleeve in axial parallel relation thereto, each cylinder having a piston for vertical reciprocal movement, the lower end of each piston being connected to the sleeve of the associated upright, means for providing and directing fluid to the cylinders for effecting relative movement of the sleeves with respect to the uprights, and means for adjusting the contact pressure of the sleeve rollers on the upright outer surfaces.

5. A compression device comprising a compressible work load-supporting base, a plurality of uprights provided on said base, each upright having a sleeve encircling the same, a fluid cylinder having a piston associated with each upright each cylinder being mounted on the related upright above the upper end of the associated sleeve, each piston being engaged at its lower end to the sleeve of the related upright, a platen plate connected to the sleeves of the uprights for movement toward and away from the base responsive to travel of the sleeve upon actuation of the fluid cylinders, a plurality of mounting members swingably mounted on the sleeves of the uprights, each mounting member projecting at one of its ends beyond the adjacent end of the related sleeve, a roller carried on the projecting portion of each mounting member for engaging the peripheral surface of the associated upright, and an adjusting element engaged at the other end of each mounting member for movement axially perpendicular to the related sleeve for engagement at its inner end against said sleeve for controlling the contact pressure between the roller and the upright.

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