June 17, 1947. M. GREENBAUM 2,422,408

WRAPPING DIE

Filed Oct. 12, 1944 2 Sheets-Sheet 1

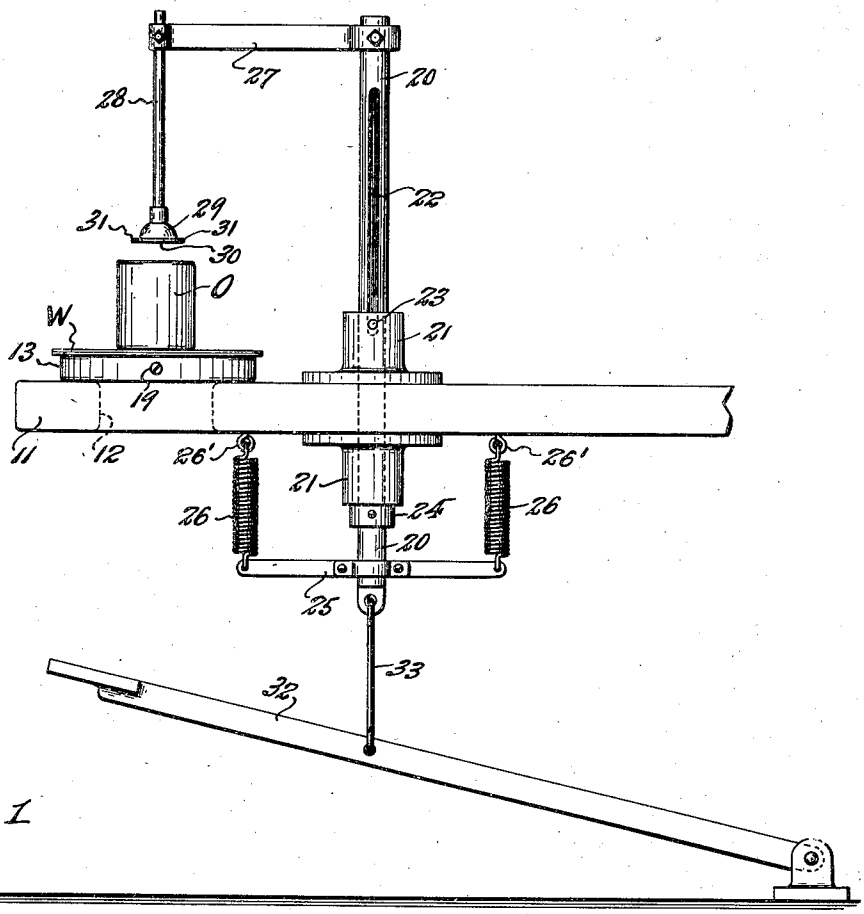


Fig. 1

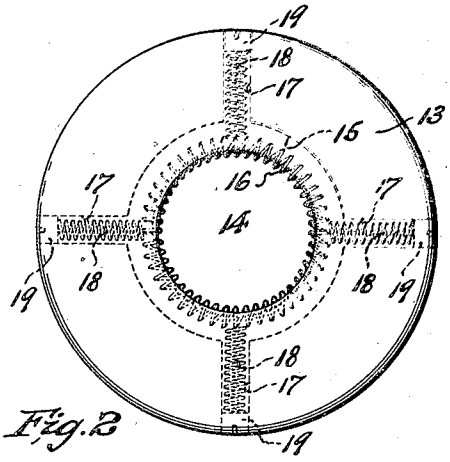


Fig. 2

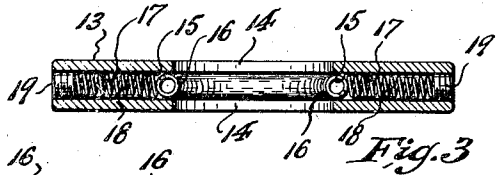


Fig. 3

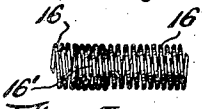


Fig. 4

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Fig. 5

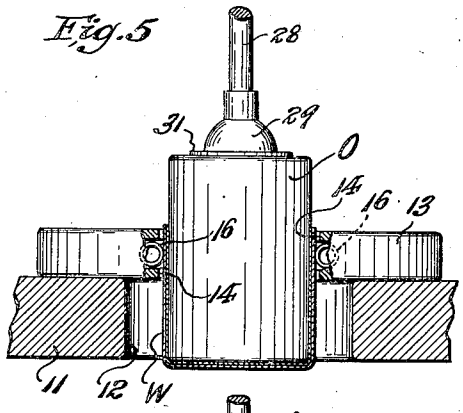


Fig. 8

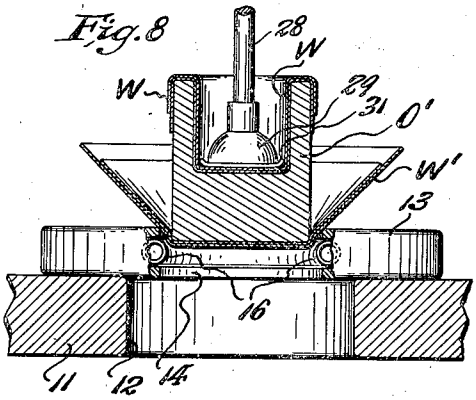


Fig. 6

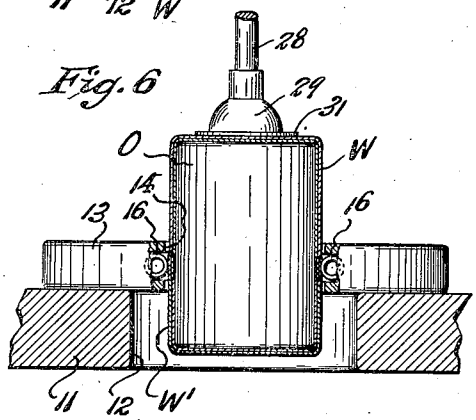


Fig. 9

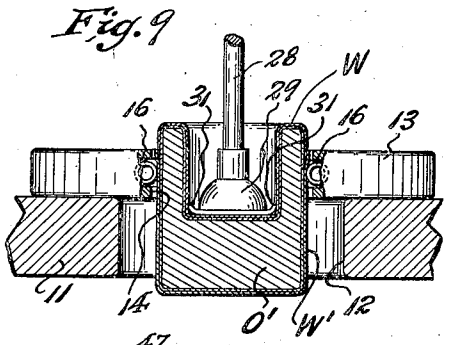
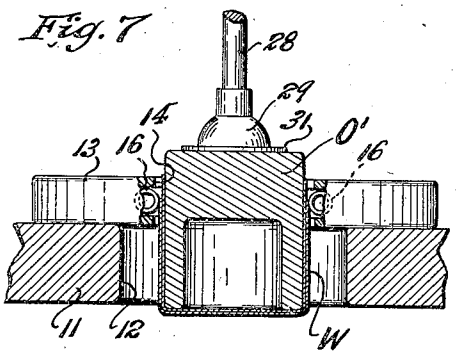


Fig. 7



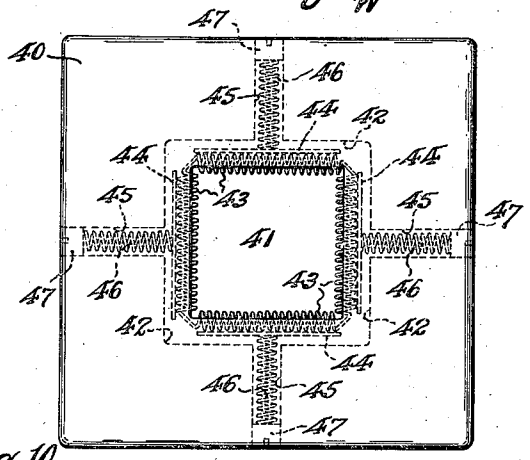


Fig. 10

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WRAPPING DIE

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Application October 12, 1944, Serial No. 558,473

3 Claims. (Cl. 93—2)

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This invention relates, generally, to apparatus for wrapping objects in protective enclosures; and the invention has reference, more particularly, to a semi-automatic mechanism operative to apply flexible wrapping material about an object desired to be protectively enclosed therein.

The invention has for an object to provide a novel mechanism designed to facilitate the application of flexible wrapping material to and about an object to be protectively enclosed therein, said mechanism including a novel wrapping die through which may be passed the object to be wrapped together with the wrapping material whereby not only to fold said material about the object but to closely and snugly fit the material to said object.

Another object of the invention is to provide in combination with a supported wrapping die, through which an object and wrapping material desired to be applied thereto may be passed, mechanical means for applying thrusting force to the object and wrapping material whereby to operatively pass the latter through the die.

The invention has for a further object to provide a novel wrapping die having an aperture through which the object to be wrapped and the wrapping material may be passed, said aperture being bounded by tensionally yieldable means adapted to exert an elastic constrictive pressure upon the wrapping material, whereby to both fold the latter about the object and at the same time draw and iron out the wrapping material into snug and tight fitting relation to the surfaces of the object.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

Illustrative embodiments of this invention are shown in the accompanying drawings, in which:

Fig. 1 is a side elevational view of wrapping apparatus made according to this invention; Fig. 2 is a top plan view of the wrapping die of said apparatus, drawn on a somewhat enlarged scale; Fig. 3 is a transverse vertical sectional view through the wrapping die of Fig. 2; and Fig. 4 is an enlarged fragmentary view showing one form of joint for joining the ends of a spiral spring body whereby to form from the latter the tensionally yieldable constrictive pressure exerting member of the wrapping die.

Figs. 5 and 6 are fragmentary views in part section illustrating stages of the operations whereby a cylindrical object and wrapping material therefor are passed through the wrapping die for application of said wrapping material to said object.

Figs. 7, 8 and 9 are similar fragmentary views in part section illustrating stages of the operations whereby a hollow cylindrical object and

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wrapping material therefor are passed through the wrapping die for application of said wrapping material to said hollow object.

Fig. 10 is a plan view of a modified form of the novel wrapping die of this invention.

Similar characters of reference are employed in the hereinabove described views to indicate corresponding parts.

Referring to the drawings, the reference character 11 indicates a table, bench top or similar work place in connection with which the novel wrapping apparatus of this invention is arranged.

Said table or bench top 11 is provided with an opening 12 of suitable dimensions. Fixed on the table or bench top 11 is an apertured wrapping die, the aperture of which is axially aligned with said opening 12 of the table or bench top. Said wrapping die comprises a flat-faced body 13 of suitable thickness, having a central aperture 14. When the wrapping die is designed for the reception of cylindrical objects, said aperture 14 is of circular shape and of somewhat larger diameter than that of the cylindrical object desired to be passed therethrough for application to the object of protective wrapping material. Indenting the sides of said aperture 14 is an internal annular channel 15. Seated in the annular channel 15, so as to be embraced and held against vertical displacement by the walls thereof, is a tensionally and radially yieldable elastic die ring 16 comprising a spiral spring annulus, the internal diameter of which is normally somewhat less than the diameter of the cylindrical object to be wrapped, and consequently the internal peripheral portions of said spring annulus project into the aperture 14 of the die body 13 freely beyond the mouth margins of said annular channel 15, within the interior of which channel 15 the external peripheral portion of the spring annulus is lodged. Said spiral spring annulus is formed from a suitable length of metallic spiral spring which is wrought into a continuous circular shape by suitably joining its meeting end portions. One satisfactory method of joining the meeting end portions of the spring is shown in Fig. 4, and comprises the provision, at one end thereof, of a coupling portion 16' of reduced diameter, which is adapted to be screwed into the opposite open end portion of the spring, thus coupling the meeting ends of the latter together in such manner that the cross-sectional diameter of the resulting spring annulus is uniform throughout its circular extent. Extending from the internal annular channel 15 to the external periphery of the die body 13 are a plurality of equi-spaced radial passages 17. Within these passages are a series of compression springs 18, the outer ends of which are backed by stop plugs 19, the latter being threaded into the outer end portions of said passages 17, and thus being fixed to the die body

13. These compression springs 18 exert inward yieldable thrust upon the die ring 16 at spaced points around its circumference, thus functioning to maintain said die ring centered in axial alignment with the die body aperture 14, and yet free to contract and expand in performance of a wrapping operation.

Suitable mechanism is provided for applying axially directed thrusting force to the object and wrapping material desired to be passed through the wrapping disc. An illustrative form of such mechanism, as shown, comprises a vertically reciprocable shaft 20 passes slidably mounted in guide members 21 which are affixed to the table or bench top 11, in such manner that said shaft 20 perpendicularly through said table or bench from the underside thereof for projection upwardly above the same. Said shaft is provided with a spline 22 or equivalent means which cooperates with a key pin 23 so as to retain the shaft against rotation while nevertheless free for vertical reciprocatory sliding movement. Affixed to the lower portion of said shaft 20 is a stop collar 24, which by abutment upon the guide means limits the upward sliding movement of the shaft. The shaft 20 is normally but yieldably held in up-slid position, as limited by said stop collar. To this end, the lower portion of the shaft 20 has affixed thereto a cross-head 25 to the extremities of which are connected pull springs 26, the upper ends of which are suitably anchored to the underside of the table or bench top 11, as by anchoring eyes 26'. Affixed to the upper end portion of said shaft 20 is a laterally extending arm 27, and to the outer end portion of said arm 27 is fixed a plunger rod 28 dependent therefrom. Said plunger rod 28 is directed toward and is disposed in axial alignment with the aperture 14 of the die body 13. Affixed to the lower extremity of said plunger rod 28 is a plunger head 29, the same being equipped at its free end or under face with a body or disk 30 of flexibly resilient material, such e. g. as rubber, said body or disk 30 exceeding in diameter that of the plunger head 29, so that freely extending annular marginal portions thereof provide flexibly yieldable lip portions 31 for purposes subsequently to be described. Suitable means is provided for actuating the shaft 20 and plunger means supported therefrom, which means, in a preferred form thereof, comprises a pivoted foot-treadle lever 32 mounted on the floor beneath the table or bench top 11. The lower end of said shaft 20 is suitably connected to said foot-treadle 32, as e. g. by a connecting link 33.

The wrapping apparatus, as thus far described, is especially adapted for service in wrapping solid or hollow cylindrical or substantially cylindrical objects. The apparatus is particularly well adapted for the wrapping of highly finished machine parts or like metallic objects for shipment or other transport, storage, etc., whereby during the period of storage or of transport and all handling preliminary to use thereof, said parts or other objects and their highly finished surfaces may be protected against exposure to the elements, corrosion, marring or other injury, especially throughout periods of marine or air transport overseas. Although any suitable kind of flexible wrapping material may be employed, according to the degree and kind of protection desired to be afforded in any given case, for the protection of highly finished metallic objects it has been found that a composite wrapping material comprising an inner layer of oiled or other non-absorbent paper and an outer layer of wax or paraffin impregnated textile fabric best serves the purpose, especially when the object is to be subjected to the conditions of marine or air overseas transport. A wrapping material of such general character is indicated in the accompanying drawings by the reference character W.

In the use and operation of the wrapping apparatus of this invention, when employed e. g. for the wrapping of a solid cylindrical or substantially cylindrical object, the following procedure is carried out. A sheet of wrapping material W, preferably of circular form and of suitable predetermined diametrical size, is laid upon the top of the die body 13 so as to be centered over the die body aperture 14. The solid cylindrical object O is then imposed over the wrapping sheet W so as to be substantially aligned between the raised plunger head 29 and said die body aperture 14 (see Fig. 1). When the wrapping sheet W and object O have been thus disposed, the operator swings down the foot-treadle 32, thus effecting a down-sliding movement of the shaft 20 and its arm 27, and thereby imparting a downthrusting movement to the plunger head 29. The downwardly moved plunger head 29 engages the upper end of the object O and thereby pushes the latter downwardly through the die body aperture 14, carrying therewith the wrapping material W. As the object and wrapping material move into and through the embrace of the spiral spring annulus or die ring 16, the latter will expandingly yield to such movement and yet will exert constrictive pressure thereupon which operates to draw the wrapping material upwardly around and against the sides of the object so as to press the same into snug and tight fitting relation thereto. The wrapping material is sized to embrace the lower part of the object O through a major portion of the total length of said object (see Fig. 5). Preferably either the inner face of the wrapping material W or the surfaces of the object is coated with a substance of adhesive effect, whereby the applied wrapping material will be caused to adhere to the object. Such wrapping of the lower part of the object O is completed by preferably passing the object entirely through the wrapping die, the operator then receiving the same as it emerges from the latter. To complete the wrapping operation, the operator again places a second sheet of wrapping material W' over the die body, and thereupon inverts the object O and imposes it over said wrapping material and die body, and by repetition of the above described operations, applies the wrapping material W to the opposite end portion of the object O, so that the second sheet of wrapping material W will lap the first applied sheet thereof (see Fig. 6). When the thus fully wrapped object is ejected from the under side of the die body it is received by the operator, and laid aside for packing or other disposal. If desired, the thus wrapped article may be dipped in melted wax or paraffin, so as to be enclosed in an integral covering thereof.

The procedure followed when using the apparatus of this invention for wrapping hollow cylindrical objects, such e. g. as engine pistons, comprises applying the wrapping material W over the die body 13 and then superposing a hollow cylindrical object O', hollow end downward, over the wrapping material in substantially axially aligned relation to die body aperture 14, thereupon actuating the plunger head 29 to thrust the object O' and accompanying wrapping material W through the spiral spring annulus or

die ring 16, thus effecting an initial wrapping of the hollow end part of said object O' (see Fig. 7). The operator after receiving the thus initially wrapped object O' from the underside of the die body, applies a second sheet of wrapping material W' over the die body, and then inverts the object O', hollow end upward, for disposition over the die body and applied wrapping material, ready to again induce an operative downward stroke of the plunger head 29. The plunger head 29 and its flexible bottom disk 30 is sized to enter the hollow interior of the object O'. On the initial descent of the plunger head 29, the same will first enter the hollow interior of the object O', carrying with it the initially applied wrapping material W, which due to yielding or slipping of adhesive coating, slides over the surfaces of the object O', thereby entering said wrapping material W into lining relation to the interior surfaces of the object O' (see Fig. 8). During this phase of the operation, the flexible lip portions 31 of the bottom disk 30 of the plunger head will yield and thus exert a tensionally wiping effect upon the portions of the wrapping material W contacted thereby, whereby to iron the latter snugly and adherently to the internal surfaces of the object O'. Continued downward movement of the plunger head 29 will thereafter move the object O' again through the spiral spring annulus or die ring 16 of the wrapping die, thereby applying the same to the remaining uncovered external surfaces of said object O', and in such manner as to suitably lap the applied members W and W' of the wrapping material (see Fig. 9).

While the wrapping die, in the circular form thereof previously described, is adapted for the wrapping of cylindrical or substantially cylindrical objects, the wrapping die may be shaped to accommodate objects of square or other polygonal cross-sectional shape. An illustrative wrapping die modified to accommodate objects of square or rectangular cross-sectional shape is shown in Fig. 10, and comprises a die body 40 having a central rectangular aperture 41 of desired dimensions, the sides of which are indented by interconnecting channel sections 42 opening into said aperture. Arranged within the embrace of the channel sections 42 is an elastic or yieldable die ring formed by a connected series of spiral spring sections 43, the interior side portions of which project into the die body aperture 41. Within the channel sections 42 to extend along the die ring spring sections 43 are thrust plates 44. Extending from each channel section 42 outwardly to the external periphery of the die body 40 are passages 45. Within each passage 45 is a compression spring 46, the outer ends of which are backed by stop plugs 47 which are threaded into the outer end portions of said passages 45. Said compression springs yieldably centralize the die ring in the die body aperture, and the thrust thereof is applied equally to the respective spring sections 43, substantially throughout the lengths of the latter, by the intervening thrust plates 44. It will be understood, that when an object to be wrapped is passed with suitable wrapping material through the die body aperture and past the spring sections 43, the latter will function to draw and iron out the wrapping material into covering engagement with the object, any forming corner folds of the wrapping material being manually folded against the object by the operator during the progress of the object and wrapping material through the wrapping die.

Having now described my invention, what I claim is:

1. In apparatus for the purposes described, a wrapping die comprising an apertured die body of substantial thickness through which wrapping material together with a superimposed object to be wrapped therein may be passed, said aperture being bounded by tensionally yieldable die means adapted to exert elastic constrictive pressure upon the object moved therethrough, whereby to draw and iron out the accompanying wrapping material into snug covering relation to the latter, and compression spring means housed in the die body outwardly of said die means operative to yieldably exert inward thrust upon the latter to normally center the same relative and conformably to the die body aperture.

2. In apparatus for the purposes described, a wrapping die comprising an apertured die body of substantial thickness through which wrapping material together with a superimposed object to be wrapped therein may be passed, the wall of said die body aperture having an indenting channel coextensive therewith, an elastic die ring formed by a continuous spiral spring body housed in said channel with its internal peripheral portions projecting into and bounding said die body aperture, said die ring being adapted to exert elastic constrictive pressure upon the object moved therethrough, whereby to draw and iron out the accompanying wrapping material into snug covering relation to the latter, and equi-spaced compression spring members housed in the die body outwardly of and radially to said die ring operative to yieldably exert inward thrust upon the latter to normally center the same relative and conformably to the die body aperture.

3. In apparatus for the purposes described, a wrapping die comprising an apertured die body of substantial thickness through which wrapping material together with a superimposed object to be wrapped therein may be passed, the wall of said die body aperture having an indenting channel coextensive therewith, an elastic die ring formed by a continuous spiral spring body housed in said channel with its internal peripheral portions projecting into and bounding said die body aperture, said channel being of substantial depth with its bottom spaced away from the external circumferential periphery of the die ring, said die ring being adapted to exert elastic constrictive pressure upon the object moved therethrough, whereby to draw and iron out the accompanying wrapping material into snug covering relation to the latter, and equi-spaced compression spring members housed in the die body outwardly of and radially to said die ring operative to yieldably exert inward thrust upon the latter to normally center the same relative and conformably to the die body aperture.

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