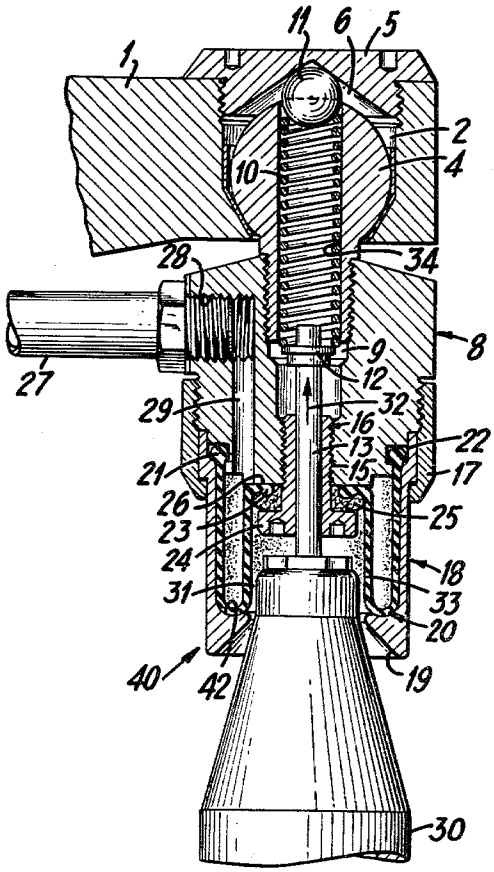
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GRIPPER FOR DOFFING ARRANGEMENTS IN SPINNING MACHINES

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INVENTOR.
SIEGFRIED ROLLER

BY

McGlew & Toren
ATTORNEYS

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GRIPPER FOR DOFFING ARRANGEMENTS IN SPINNING MACHINES

Siegfried Roller, Fellbach, near Stuttgart, Germany, assignor to Firma C. Eugen Maier, Fellbach, Stuttgart, Germany, a German firm

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This invention relates in general to article transporting chucks and, in particular, to a new and useful fluid operated gripper, or chuck, for drawing off or doffing arrangements at bobbin changers for spinning machines.

The present invention has particular application to spinning machines and particularly to a fluid pressure operated gripper, or chuck, for lifting and transporting articles such as for doffing arrangements at bobbin changers of spinning machines. In the more modern embodiments of spinning machines, the doffing, or drawing off, procedure takes place not when the bobbin is at rest, but during the movement of the bobbin changer. For this reason it is important to compensate for any misalignment of the bobbin arrangement in any resultant movement.

In accordance with the invention, there is provided a pneumatically operated gripper or chuck device which is supplied with air pressure through a movable hose, and which includes a gripper head which is mounted in the holding means in an articulated manner. The arrangement is such that the gripper head may be pivoted about its holding or mounting means in order to compensate for variations in the movement, and without affecting the doffing procedure.

In accordance with a preferred arrangement, the holding means advantageously includes an arm member having a bore which tapers inwardly in a downward direction. The gripper head is provided with a ball extension which rides in the bore of the holding means, and the ball is able to be pivoted on the tapered inner portion of the bore of the holding means. The arrangement advantageously includes a cover having a tapered interior wall to accommodate a small ball which rides on the bore defined in the ball-shaped member and is biased against the tapered interior of the cover. The upper small ball acts as a centering means, which is urged upwardly against the center of the taper of the cover by a compression spring to cause the gripper head to be urged into a central position in respect to the holding means.

The invention further includes a gripper head which includes a sleeve member which is inflatable under pressure supplied from a pneumatic hose connection for the purpose of gripping a bobbin. The spring, which is biased against the centering ball, has its opposite end riding on a plunger which is reciprocable in the gripper head. The plunger has a lower end movable in the interior of the sleeve member at a location directly above the top of the bobbin which is grasped by the inflatable sleeve member. The engagement of the bobbin causes upward movement of the plunger and insures that the gripper head will be centered by increasing the force of the biasing spring acting on the cover of the holding means. When the bobbin is released, the plunger moves downwardly to aid in the ejection of the bobbin and, also, to permit easier pivotal movement of the gripper head.

In accordance with a further feature of the invention, the gripper head is constructed with a central bore, which is threaded at the lower end to accommodate a hollow threaded screw member. The hollow screw member is

inserted as a centering element for accommodating a plunger member, which reciprocates in the gripper head and also provides means for securing an inflatable gripping element. The gripping element comprises a sleeve of elastic material which is arranged so that one end is held by the hollow screw member and the intermediate portion is directed downwardly in a U-shape with the upper outer end being held on the exterior portion of the gripper head. The elastic material sleeve will expand when supplied with a pressurized fluid, such as air, to engage a bobbin head when the gripper is operated.

Accordingly, it is an object of this invention to provide an improved article holding and transporting device.

A further object of the invention is to provide a gripper for articles, such as bobbins, which include an inflatable element for engaging the bobbin, mounted within a gripper head in a location to receive pressure from a fluid pressure source.

A further object of the invention is to provide a pneumatic gripper for drawing off, or doffing, arrangements at bobbin changers for spinning machines which includes a gripper head connected with a movable air hose, and wherein the gripper head is mounted for articulated movement in respect to the holding means.

A further object of the invention is to provide a device such as a gripper which is operated from a fluid pressure source supplied to a head portion and wherein the head is swivelably mounted within a bore of a holding arm.

A further object of the invention is to provide a gripper which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawing and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

In the drawing:

The only drawing in the case is a transverse section through a gripper head and holding means constructed in accordance with the invention.

Referring to the drawing in particular, the invention embodied therein comprises a gripper head generally designated 40 which is carried by holding means, partially indicated at 1. The holding means includes a free end which has a bore extending therethrough and which includes a lower portion which is tapered in cone-shaped manner for the purpose of swivelably supporting a ball member 4 of the gripper 40. The top of the bore 2 is closed by a screw cover 5 which has a dish-shaped depression or conical interior wall 6.

In accordance with the invention, the lower portion of the ball member 4 is provided with a cylindrical extension which is threaded into a bore 9 of a gripper head 8. The ball member 4 is provided with a bore 34 in which is positioned a compression spring 10. The upper end of the compression spring 10 bears on a centering ball 11, and the lower end bears on an annular flange 12 of a plunger 13.

The lower end of the bore 9 of the gripper 8 is threaded at 15 to receive a hollow bolt element, or sleeve member 16. The plunger 13 is slidable in the bore of the sleeve member 16 and the lower movement of the plunger is limited by the abutment of the flange portion 12 against the top surface of the sleeve member 16.

A sleeve member or cylindrical gripper cover 18 is held to the lower end of the gripper head 8 by means of a threaded ring 17 which has an inwardly extending end portion which engages around an outwardly extend-

ing upper end portion of the sleeve member to hold it against the gripper head. The lower end of the sleeve member **18** is provided with a frusto-conical portion which forms a guide for centering a bobbin **30** within the sleeve **18** of the gripper **40**.

The sleeve **18** accommodates an annular collar member or sleeve **20** of elastic material, such as rubber, which is arranged within the sleeve in a bent condition forming a substantially U-shaped cross section with the intermediate portion arranged lowermost and supported on a curved annular ledge **42**, formed on the interior side of the guide portion **19** of the sleeve **18**. The annular collar **20** is provided with an end having a bead-like formation **21** which is held in a recess **22** formed between the gripper head **8** and the sleeve **18**. The fitting of the parts is such that this connection is air-tight. The opposite end of the annular collar **20** is provided with a bead portion **23** which is pressed by a flange **24** of the hollow sleeve **16** against an end face **26** of the gripper head **8**. A washer or packing material **25** is inserted between the flange **24** and the bead portion **23** in order to form an air-tight connection at this location.

A movable air hose **27** is connected with the gripper head **8** into a laterally defined bore **28**, which communicates with a longitudinal bore **29** which, in turn, leads to the space defined between the inner and outer bends of the annular collar **20**. When compressed air is supplied through the hose **27**, the annular collar member will expand, causing the interior wall to move outwardly for engagement, for example, with the top of the bobbin **30**. The air may also be discharged out through the tubing **27** in this manner.

The gripper head **40** operates as follows:

The holding means **1**, with the gripper head, is lowered onto the bobbin **30** and the upper end of the bobbin is received within the opening **31** formed by the annular sleeve or collar **20**. The gripper head **8** may be delivered by swinging the ball **4** within the bore of the holding means **1** in order to compensate for any inexactness of the bobbin arrangement and the cone-like guide **19** facilitates directing the upper portion of the bobbin head into the space **31**.

The top of the bobbin **30** presses against the plunger **13** when the gripper head with the holding means is moved downwardly thereover and effects upward movement as indicated by the arrow **32** to cause the spring **10** to exert a stronger pressure on the centering ball **11** and the arresting of the gripper head in its position in a resilient manner. The air hose **27** is then supplied with compressed air by means (not shown) so that the inner portion **33** of the collar **20** is pressed against the bobbin **30**. The bobbin is thus held stationarily in the sleeve **18** and the gripper head **8**.

The holding means **1** then moves together with the gripper head **8** and the bobbin **30** upwardly, whereby the bobbin **30** is doffed or drawn off. In the final position of the holding means **1**, the release of the bobbin **30** takes place by allowing the escape of the compressed air upwardly through the bore **29** and outwardly through the bore **28**. The ejection procedure is accelerated by the movement of the plunger **13** which moves rapidly downwardly in a direction opposite to the arrow **32** to insure positive ejection of the bobbin **30**. Downward movement of the bobbin is effected by the expansion of the spring **10**, and this facilitates the movement of the ball **4** of the head **8** in the bore **2** of the holding means, due to the relaxed force on the spring.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that this invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A gripper for drawing off or doffing arrangements at bobbin changers for spinning machines, comprising holding means, a gripper, means mounting said gripper in said holding means in an articulated manner, a fluid pressure supply hose for actuating said gripper connected to said gripper in a manner to permit movement thereof, said means mounting said gripper including a bore defined in said holding means having a tapered lower end, said gripper having a head portion with a ball member with a bore defined therethrough pivotally movable on the tapered portion on the bore of said holding means, a small ball positioned in the bore of said ball member, a cover on the end of the bore of said holding means opposite from the tapered portion and overlying said small ball, and means biasing said small ball against the cover.

2. A gripper according to claim 1, wherein said cover includes a cone-shaped interior wall against which said small ball is biased.

3. A gripper according to claim 1, including a plunger reciprocable in said head, said means biasing said ball including a compression spring held between said plunger and said ball, said plunger being engageable and movable upwardly by engagement of said head with an article such as a bobbin to be lifted and movable downwardly under the urging of said spring to eject the article.

4. A device for picking up and transporting articles such as a bobbin for doffing in a spinning machine and comprising a holding member having a bore with a tapered lower interior surface, a gripper including a head portion having a central bore, a ball member having a bore defined therethrough and connected to the upper end of said head portion and having a rounded exterior articulated within the bore of said holding member on the tapered lower surface thereof, a fluid pressure supply hose connected to said head portion for supplying fluid under pressure for operating said gripper, guide means carried at the lower end of said head for guiding and centering an article, such as a bobbin, to be picked up in said gripper, expandable gripper means carried within said guide means and connected to said fluid pressure supply hose for receiving pressure therefrom for expanding said gripper means into engagement with an article to be picked up and for holding the article, means associated with said ball member for urging said ball member to a central position in respect to said holding means including a small ball adjacent the top of the bore of said ball member, said holding means having a cover over said small ball, and spring means in said ball member bore biasing said ball upwardly against said cover.

5. A device according to claim 4, wherein said spring means includes a plunger reciprocable in said head, said spring means including a coil spring abutting against one end of said plunger and against said small ball, said plunger having an end portion extending downwardly to said guide means and being movable upwardly to compress said spring upon engagement of said gripper with an article such as a bobbin.

6. A device for picking up and transporting articles, such as bobbins, for doffing purposes in a spinning machine, comprising: a holding member having a bore with the lower portion of the bore being tapered inwardly to form a conical ledge, a cover at the top of said bore, a gripper assembly including a ball member having a central bore defined therethrough and having an exterior ball portion engaged on the conical surface of the bore of said holding member for articulative movement thereon, a small ball member carried on the upper end of the central bore of said ball member, a compression spring in the central bore of said ball member, a gripper head connected to said ball member and having a bore in communication with the central bore thereof, a plunger slidable in the bore of said gripper head and having a top portion abutting against said spring, said spring urging said small ball against said cover, an annular collar member of resilient material bent into a substantially U-shaped sectional configuration with an inner end disposed adja-

cent an end face of said head with an outer end disposed adjacent a recess portion of said head at a location spaced circumferentially outwardly from said inner portion, a sleeve guide connected to the outer portion of said head and extending downwardly therefrom around said collar and having an opening at the lower face for guiding an article into the annular space defined by the interior wall of said collar member, means for sealing each end of said annular collar member adjacent said head and hose member connected to said head for supplying fluid pressure to said annular collar member for inflating the same, and internal bores defined in said head member for communicating with said inflatable collar member for permitting fluid pressure to be directed between the walls thereof for expanding the inner wall into engagement with an article within said guide sleeve.

7. A device according to claim 6, wherein the lower end of said plunger member is disposed in a space defined within said guide sleeve and within the interior wall of said collar member in a position to contact an article being inserted therein, said plunger being movable upwardly to compress the spring against said small ball for urging said gripper into a centered position.

8. A device according to claim 7, wherein the cover of said holding means bore includes an interior wall of frusto-conical configuration, said small ball being adapted to ride up to the center thereof for centering purposes.

9. A device according to claim 7, wherein a hollow sleeve member is threaded into the lower portion of said bore, said sleeve member including a flange sealing the inner end of said annular collar member.

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SAMUEL F. COLEMAN, *Primary Examiner.*

ERNEST A. FALLER, JR., *Examiner.*