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Smith

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[54] **OVERLOAD PREVENTION HANDLE**

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[52] **U.S. Cl.** ..... **74/523;** 74/524; 74/526; 74/543; 81/52.4 R

[51] **Int. Cl.²** **G05G 1/04;** B25B 23/142

[58] **Field of Search** ..... 74/524, 523, 543; 81/52.4 R, 52.4 S

[56] **References Cited**

UNITED STATES PATENTS

3,140,623	7/1964	Van Hoose	81/52.4 R
3,633,444	1/1972	Aijala	81/52.5
3,722,316	3/1973	Hawkins et al.	74/524
3,839,928	10/1974	Bergquist	81/52.4 R

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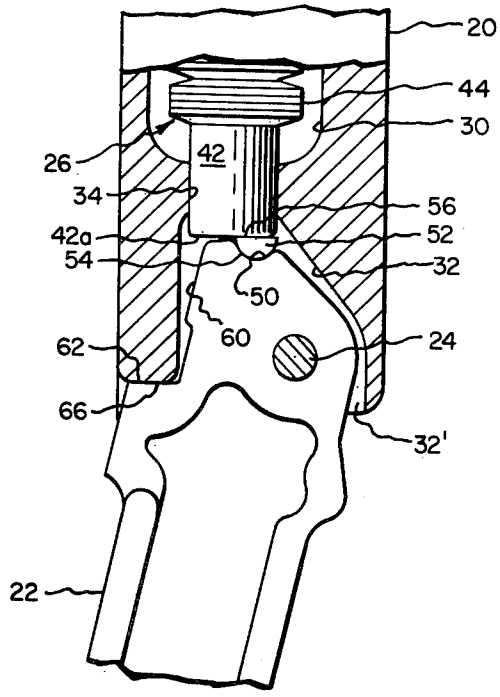
[57] **ABSTRACT**

A handle particularly adapted to prevent overloading of chain hoists operated thereby. The handle has an operator grasping extension portion pivotally supported on the main body portion of the handle, a spring device deformable to permit movement of the extension portion relative to the main body portion whenever a hoist overload condition producing operating force is applied to the extension portion, and an improved connection between the extension portion and spring device.

3 Claims, 4 Drawing Figures



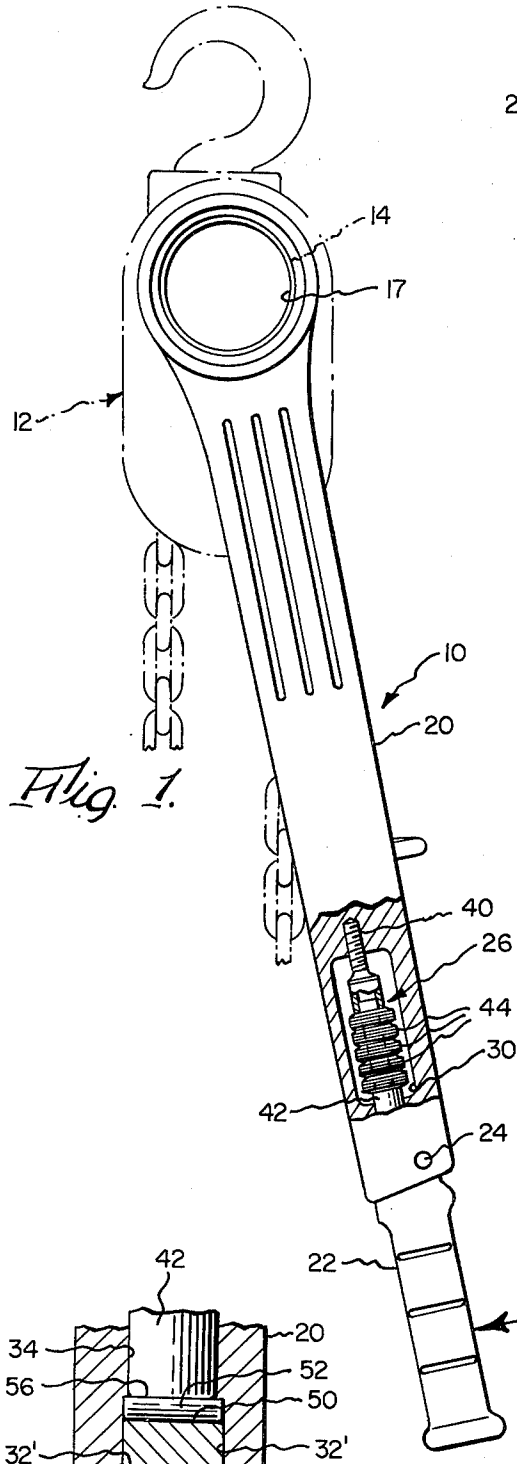


Fig. 1.

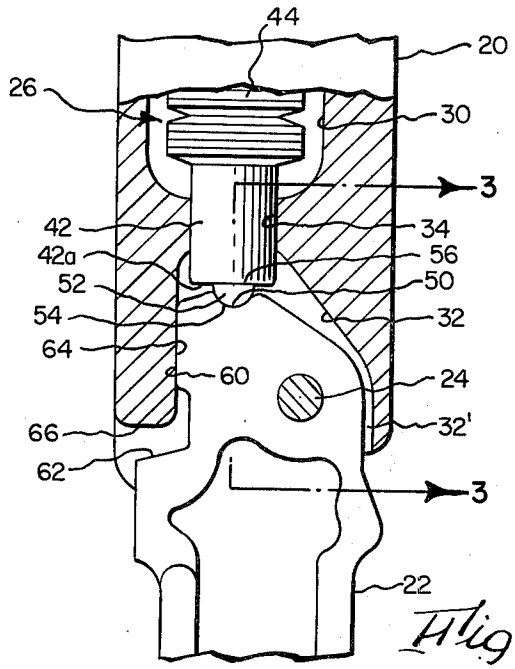


Fig. 2.

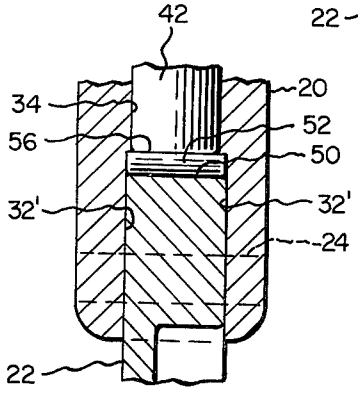


Fig. 3.

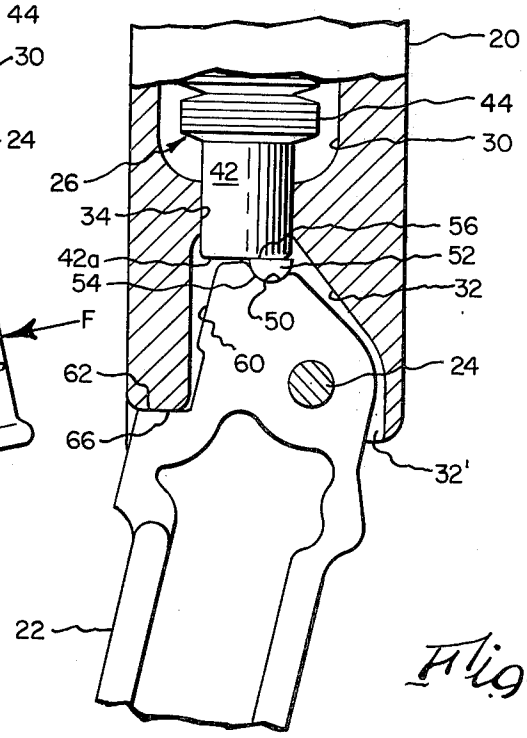


Fig. 4.

OVERLOAD PREVENTION HANDLE

BACKGROUND OF THE INVENTION

In commonly assigned U.S. Pat. No. 3,722,316, there is disclosed an overload prevention handle having utility in preventing overloading of chain hoists actuated thereby.

This prior handle construction basically includes an extension portion pivotally supported on a main body portion of the handle, which is in turn adapted to be suitably connected to the hoist mechanism to be operated. Pivotal movement of the extension portion relative to the main body portion is normally prevented by a constraining device, which may be in the form of a stack of Belleville type spring discs; a roller being employed to operably interconnect the extension portion and a spring compression member. Commercial experience with this form of the prior structure indicates that the utilization of a roller device possesses practical disadvantages in respect to consistency and thus safety of operation.

SUMMARY OF THE INVENTION

The present invention is directed to an improvement in an overload prevention handle of the type disclosed in U.S. Pat. No. 3,722,316. More particularly, the present invention provides for improved handle operating characteristics by employing a "slipper" connection between the extension and Belleville spring operating members.

The present construction featuring the utilization of the "slipper" for controlling compression of a stack of Belleville spring discs possesses particular advantages including consistency and controllability of the operating of the handle.

DRAWINGS

The nature and mode of the present invention will now be more fully described in the following detailed description taken with the accompanying drawings wherein:

FIG. **1** is a side view of a preferred embodiment of the overload prevention handle of the present invention showing it mounted on a chain hoist to be operated thereby;

FIG. **2** is a fragmentary, sectionalized view of the handle shown in FIG. **1**;

FIG. **3** is a sectional view taken generally along line **3—3** in FIG. **2**; and

FIG. **4** is a view similar to FIG. **2** but showing the operator hand grip or extension portion of the handle in overload position.

DETAILED DESCRIPTION

To facilitate understanding of the overload prevention handle of the present invention, which is generally designated as **10** in the drawings, particular reference will be made to its use for operating a hoist **12,** which is shown in phantom line only in FIG. **1.** Hoist **12** may be of any conventional construction, such as for instance a chain hoist of the type having a hub portion **14** adapted to mount handle **10** for hoist operating pivotal movements about an axis defined by the hub portion. Depending upon the construction of hoist **12,** any suitable means may be employed to drivingly interconnect handle **10** with hub portion **14,** such as a hub portion receiving circular recess **17** and an associated indexing

pawl mechanism, not shown, the latter being removably receivable within cooperating hub portion recesses, also not shown. It will be understood that the specific construction of hoist **12** and the drive arrangement for interconnecting handle **10** therewith is conventional and forms no part of the present invention. Moreover, it will be appreciated that, while the present handle has particular utility in preventing the overloading of hoists, it may with slight modification to the mounting arrangement be used as a torque-limiting handle or wrench.

More specifically, handle **10** includes a main body portion **20,** which is formed adjacent one end thereof with opening **17** and serves to mount the above-mentioned pawl mechanism; an extension or operator hand grip portion **22,** which is carried adjacent another end of body portion **20** by a pin shaft **24** for relative pivotal movement about a second axis disposed essentially parallel to the axis of hub portion **14,** that is, the axis about which the handle turns or swings; and a constraining device **26.** Constraining device **26** normally serves to bias extension portion **22** into a normal or operating position relative to body portion **20,** as shown in full line in FIGS. **1** and **2,** but permits pivotal movement of the extension portion about the axis of pin shaft **24** into an overload position, shown in FIG. **4,** whenever an operator applies a predetermined operating force F thereto. It will be understood that such predetermined operating force is intermediate that force which will permit the hoist to be operated at its rated load capacity and that force which would result in overloading of the hoist. Also, it will be understood that pivotal movement of the extension portion **22** provides a clear visual indication to the hoist operator that a hoist overload condition is about to be encountered, and serves to reduce the moment arm through which the operating force is applied, thereby to proportionally increase the operating force required to apply to the same load to the hoist.

More specifically, body portion **20** is in the form of a metal casting having a side opening cavity **30,** and end opening cavity or recess **32** and a through bore opening **34,** which extends in a direction lengthwise of the body portion for placing cavities **30** and **32** in communication. As shown in FIGS. **2–4,** extension **22** extends outwardly from within recess **32** and pivot shaft **24** is end supported by a pair of opposite walls **32'** bounding such recess.

Constraining device **26** includes a first member **40,** which is adjustably fixed to body portion **20** so as to extend into cavity **30** in substantial axial alignment with opening **34;** a second member **42,** which is slideably received within opening **34** so as to have a first end portion extend into cavity **30** for slideably supported engagement with member **40** and a second end portion extend into cavity **32;** and a stack of Belleville type spring washers or discs **44,** which is carried by members **40** and **42** and compressible therebetween upon movement of member **42** towards member **40.** The second end portion of member **42** is disposed to operatively bear on extension **22** in the manner to be described.

Member **40** is threadably connected to body portion **20** for the purpose of adjustably pre-loading stack **44.** By this arrangement, the value of the predetermined operating force, which will effect compression of stack **44** to permit pivotal movement of extension **22** into its overload position may be readily varied. Upon removal

of the predetermined operating force from handle extension **22**, stack **44** will expand and serve to automatically return extension **22** to its normal operating position.

The handle construction of the present invention features an improved manner of operatively connecting member **42** and extension **22**. Specifically, extension **22** is shown in FIGS. **2–4** as being formed with a partial, cylindrically shaped, concave recess **50**, which opens towards the second end portion of member **42** and has its axis disposed parallel to the axis of pin shaft **24**. A "slipper" or split-pin friction member **52** is formed with a partial cylindrically shaped bearing surface **54**, which is dimensioned to be partially and rotatably accommodated within recess **50** and a lengthwise extending planar bearing surface **56** arranged is sliding face-to-face surface contact with a planar end surface **42**a of member **42**, which is disposed at right angles to the path of movement of such member. As will be apparent from viewing FIGS. **2** and **4**, pivotal movements of extension **22** about the axis of pin shaft **24** result in simultaneous movements of "slipper" **52** relative to both the extension and member **42**; the "slipper" rotating within recess **50** as it slides transversely across member end surface **42***a*. Displacements of the "slipper" axially from within recess **50** are prevented by bounding walls **32'** of recess **32**.

The friction braking effects of "slipper" **52** relative to both of surfaces **42**a and **50** provides for smooth, self-damping movements of extension **22** as it is moved away from or returned to its operating position. Also, friction braking effects, which dissipate energy as opposed to storing energy, serve to permit a reduction in the value of spring force which would otherwise be required to releasably constrain the extension in its operating position and thus to reduce the value of "stored" spring force available to "snap back" the extension into its operating position upon accidental release thereof. As by way of example, a handle having a construction identical to that shown in the drawings and designed to operate in response to the application of an overload force of about 140 pounds, only requires that an operator maintain a force of about 40 pounds on the extension to prevent its "snapping-back" into its normal position.

Also, in accordance with the present invention, extension **22** is formed with a pair of essentially planar abutment surfaces **60** and **62**, which cooperatively engage with essentially planar main body portion recess and end stop surfaces **64** and **66** to define the operating and overload positions of the extension, as shown in FIGS. **2** and **4**, respectively. Surfaces **60** and **62** are arranged essentially parallel to the axis of pivot pin **24** and arranged at a slightly obtuse angle relative to one another in order to permit face-to-face engagement with stop surfaces **64** and **66**.

Another important feature of the design of the "slipper" is that it may be of a relatively small size, whereby to reduce its space requirements and to permit a corresponding increase in the size or the amount of metal used in forming adjacent ends of both handle **20** and extension **22**. This resultant construction is therefor stronger and less liable to damage than prior forms of the invention, which do not employ a "slipper" connection.

I claim:

1. In a handle for preventing overloading of a handle operated mechanism by undergoing a change in shape upon application of a predetermined mechanism operating force thereto, wherein the handle includes an elongated main body portion having one end thereof adapted for operable connection to said mechanism for rotation about a first axis extending transversely of said body portion, an extension portion to which mechanism operating forces are to be applied, pivot shaft means for mounting said extension portion on another end of said body portion for relative pivotal movement about a second axis arranged essentially parallel to said first axis, and constraining means for normally maintaining said extension portion in a normal mechanism operating position in substantial alignment with said body portion while releasing said extension portion for pivotal movement about said second axis away from said normal position into an overload position upon application of said predetermined operating force thereto, said constraining means tending to return said extension portion to said normal position from said overload position upon removal of said predetermined operating force therefrom, said constraining means including a stack of spring discs and means for mounting said discs on said body portion, said mounting means including first and second members fixedly and movably mounted on said body portion, respectively, said second member having an end arranged for cooperative engagement by said extension portion, whereby said stack is compressed between said members to permit movement of said extension portion from said normal position when said predetermined operating force is applied to said extension portion; the improvement wherein said extension portion is formed with a concave recess opening towards said end of said second member, said recess being of partial cylindrically shaped configuration and having its axis disposed essentially parallel to said second axis, said end of said second member is an essentially planar surface and disposed transversely of the direction of movement of said second member relative to said body portion, and there is further provided a friction member formed with a partial cylindrically shaped bearing surface dimensioned to be partially received in surface to surface rotary frictional engagement within said recess and lengthwise extending planar bearing surface arranged in sliding face to face frictional engagement with said planar surface of said second member, whereby pivotal movement of said extension about said second axis results in simultaneous rotations of said friction member within said recess and sliding movements of said friction member across said planar surface of said second member.

2. A handle according to claim **1**, wherein said extension portion is mounted to extend outwardly from within an end opening recess of said body portion, said pivot shaft means is end supported by a pair of opposite walls bounding said end opening recess, and said friction member is maintained within said concave recess against displacement axially thereof by said opposite walls.

3. A handle according to claim **2**, wherein said extension portion is formed with a pair of abutment surfaces arranged to alternatively engage with a pair of stop surfaces defined by said body portion to define said normal and overload positions.

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