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Profet

[11] **3,707,885**

[45] **Jan. 2, 1973**

[54] **HOIST HANDLE**

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[21] Appl. No.: **188,109**

[52] **U.S. Cl.** **74/524,** 74/543

[51] **Int. Cl.** **G05g 1/04**

[58] **Field of Search** ..... 74/524, 523, 543; 81/52.4 R; 254/167

[56] **References Cited**

UNITED STATES PATENTS

3,561,285	2/1971	Hallen	74/524
3,597,995	8/1971	Hawkins et al.	74/523

Primary Examiner—Meyer Perlin
Assistant Examiner—F. D. Shoemaker
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[57] **ABSTRACT**

A bending element and hoist handle, the latter preferably having a hollow tubular plastic lever portion. A bending element body fitted within one end of the lever. The diameter at a connecting portion designed to a given overload. An adapter fits to the bending element and is fitted to the hoist. The result is a hoist handle in which the bending element will fail before the hoist is overloaded by the operator.

15 Claims, 12 Drawing Figures

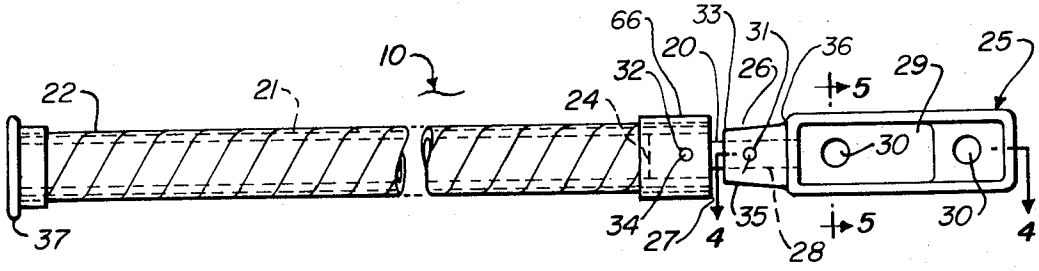


FIG. 1

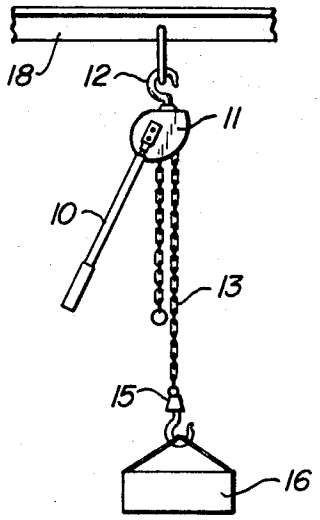
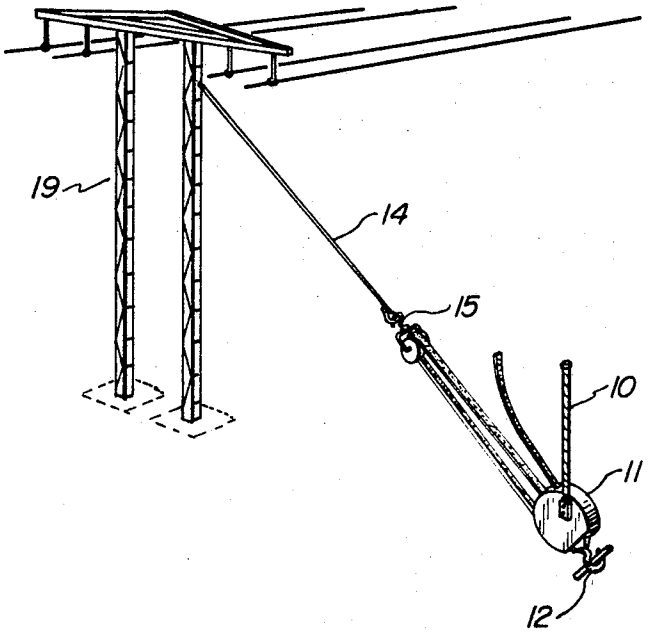


FIG. 2



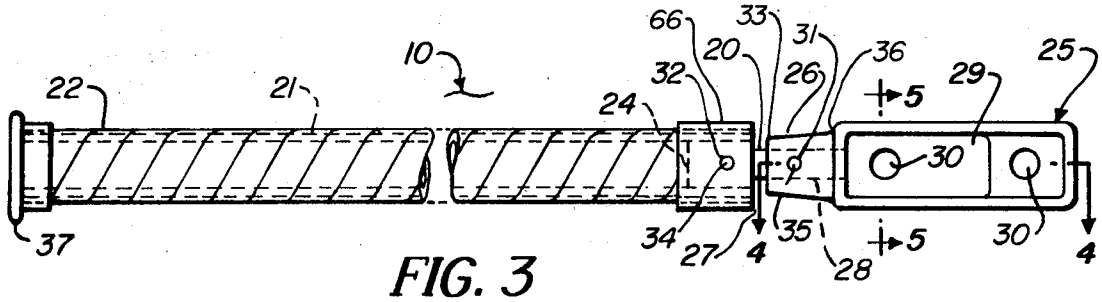


FIG. 3

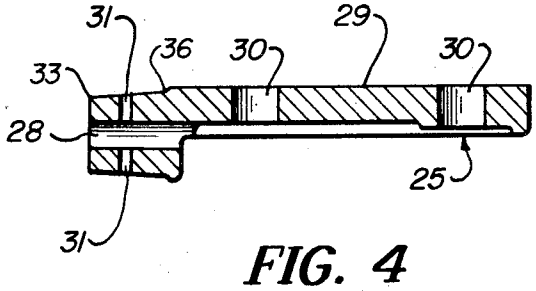


FIG. 4

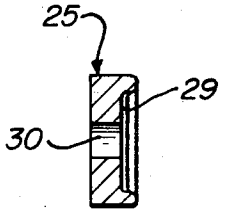


FIG. 5

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FIG. 6

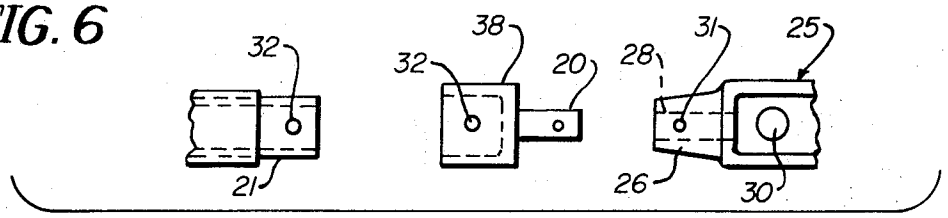


FIG. 7

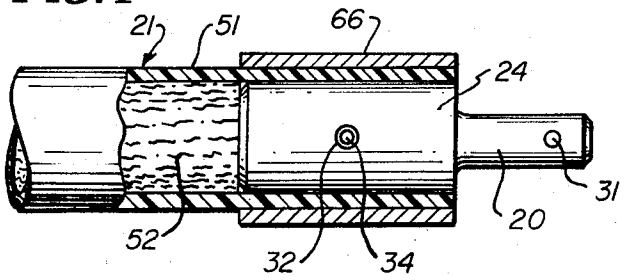


FIG. 8

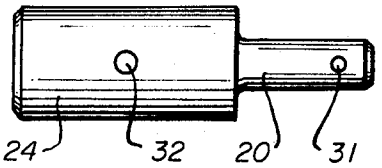


FIG. 9

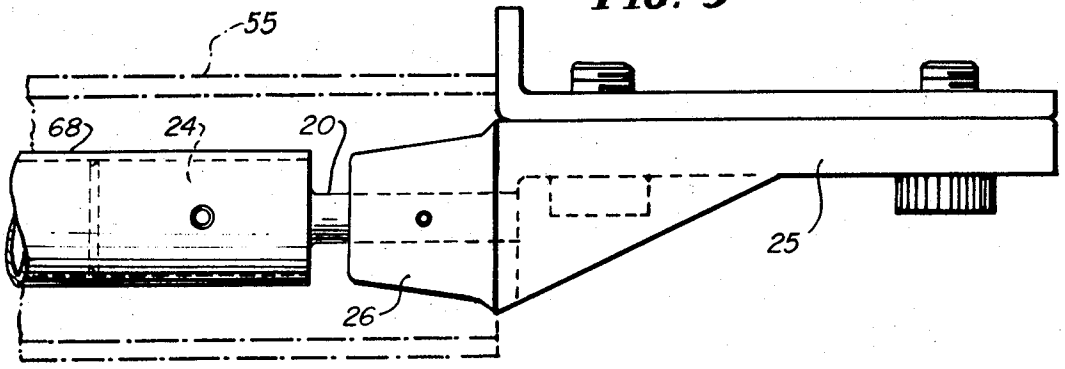


FIG. 10

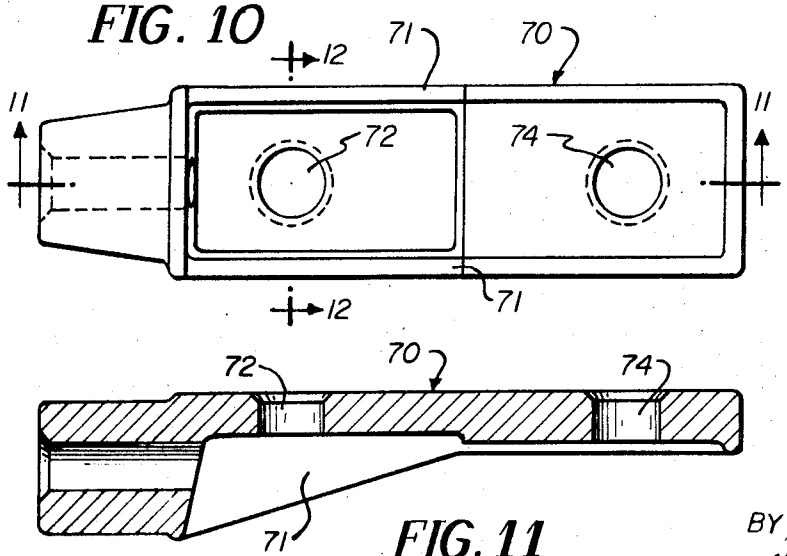
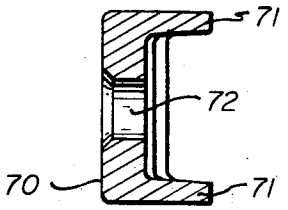


FIG. 11

FIG. 12



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HOIST HANDLE

FIELD OF INVENTION

The present invention relates to a hoist handle, and more particularly that type of hoist handle which has a bending element contained therein which disables the handle when it has a load applied to it at a preselected excess over rated hoist capacity. The handle also may be provided with a non-metallic member which, under most circumstances, has an electrical insulating characteristic.

DESCRIPTION OF THE PRIOR ART

In the construction of handles for ratchet lever hoists and the like, it is well known that the normal static load applied to the handle is doubled if the load is applied suddenly. With the average working man, it is entirely possible for him to double the design load of the handle, and with larger individuals who are more enthusiastic about the operation of the hoist, they can exceed a 100 percent overload condition. Some hoists have been designed with weakened sections in the handle, slip rings, and the like. These are supposed to accommodate the overload. Exemplary of such devices in U.S. Pat. No. 3,561,285 in which a pair of links are employed, one of which is notched and frangible. In this construction, the handle is not immediately disabled upon the overload, but can still be used in an even more dangerous condition.

SUMMARY OF INVENTION

The present invention stems from the combination of a bending element which is a circular pin which joins a handle adapted with a circular shaft, preferably formed of a non-metallic material such as plastic. The synergistic effect of combining the two features results in a handle which is electrically insulated and highly desirable for public utility usage in handling high voltages, and at the same time has a preferably metallic pin which serves to bend and disable the handle when a predetermined design overload is applied by the operator.

OBJECTS OF INVENTION

One of the principal objects of the present invention in view of the above, is to provide a hoist handle which has an overload element contained therein, which serves the twofold purpose of disabling the hoist during overload, and securing the metallic member to a non-metallic member thereby providing an electrically insulated handle.

An additional advantage of the present invention looks to the provision of a handle which is circular in nature, including the bending element, and accordingly the hoist is disabled irrespective of the direction of the force producing the overload.

Still additional and a more detailed object of the present invention is to provide a reduced section on the handle adapter so that "cheaters" such as long lengths of pipe, cannot be applied by the operator to "short cut" the bending element and thereby place an overload beyond designed capacity on the hoist and/or the hoist handle. Also, the large section at the lever end is such that a cheater of even greater diameter than the lever would be required, thus making it impossible to by-pass the bending element.

Still another broad object of the present invention is to provide a handle construction of the character described which is readily adaptable to a complete line of ratchet lever hoists without major modification in the hoist design.

A further object of the present invention looks to the provision of a non-slip type hand grip handle which can be fabricated on the main body of the hoist lever.

As will be observed in the detailed description which follows, hoist handles made in accordance with the exemplary construction described herein oftentimes are lighter in weight than corresponding metallic hoist handles which are conductive of electricity and do not contain the overload bending element as is contemplated in the embodiment exemplary of the invention.

Finally, a specific object of the present invention looks to the provision of a variety of bending elements which are designed by size and heat-treatment to fit only in certain hoist handles which, in turn, are adapted for use with preselected design capacities of hoists to the end that the operator cannot get the improper bending element into the hoist handle if the same is replaced and thereby substantially overload the hoist without bending and disabling the handle.

DESCRIPTION OF DRAWINGS

Further objects and advantages of the present invention will become apparent as the following description of an illustrative embodiment proceeds in which:

FIG. 1 is a partially diagrammatic view illustrating a handle exemplary of the present invention employed in its normal operation of lifting a load.

FIG. 2 is a partially diagrammatic view showing the hoist handle and the hoist in an electrical application in which the twofold advantage of the invention of providing a non-electric handle and bending element is illustrated.

FIG. 3 is a front elevation of the handle construction in its assembled configuration.

FIG. 4 is a transverse sectional view of the handle adapter taken along Section Line 4—4 of FIG. 3.

FIG. 5 is a cross-sectional view of the handle adapter shown in FIG. 4 taken along Section Line 5—5 of FIG. 3.

FIG. 6 is an alternative embodiment in which the bending element and handle coupling element have been combined.

FIG. 7 shows still an alternative embodiment of the bending element connection to the handle reinforced by a peripheral sleeve.

FIG. 8 is a front elevation of the bending element shown in FIG. 7.

FIG. 9 is still a further alternative showing the bending element inserted in a steel tube rather than a plastic type dialectric tube handle such as shown in FIG. 7.

FIG. 10 is a plan view of the handle adaptor employed with the embodiment shown in FIGS. 7 and 9.

FIG. 11 is a longitudinal sectional view of the adaptor shown in FIG. 10, taken along Section Line 11—11 of FIG. 10.

FIG. 12 is a transverse sectional view of the handle adaptor shown in FIG. 10 taken along Section Line 12—12 of FIG. 10.

DESCRIPTION OF PREFERRED EMBODIMENT

Two exemplary illustrations of the subject illustrative hoist handle **10** are shown in FIGS. **1** and **2**. In FIG. **1**, it will be seen that the hoist handle **10** is secured to hoist **11**, the support hook **12** of which is secured to a beam **18**. The hoist chain or cable **13** extends downwardly to the load hook **15**. The chain or cable which may be doubled-reeved in a manner similar to FIG. **2**, includes a pulley, and is secured to the load **16**. In operation, if the load **16** is excessive, a heavy operator in a burst of enthusiasm can apply an overload to the hoist handle **10** damaging the hoist **11** and/or the structure on which it is suspended (or pulling). Thus the provision of a safety element in the hoist handle itself which will bend and disable the handle prior to applying an excessive overload to the hoist **11** or the support structure is highly desirable, and as the following description proceeds, the provision of such a bending element will be described in detail.

In the illustration shown in FIG. **2**, the hoist **11** is operated in an inverted configuration where the support hook **12** may be a "dead man" in the ground and the load hook **15** applied to a load **14** which is in this instance a support guy for a high tension structure **19**. The operator in this configuration not only has the problem of overloading the hoist **11**, but also in insulating himself from possible current leakage off the high tension system or often the system may not be energized, but induced voltage from adjacent high voltage lines may exist. By providing the hoist handle **10** with a non-electric lever portion as will be described hereinafter, the operator achieves a threefold advantage of safety in the bending element which prevents an overload on the structure, or an overload on the hoist, and also being insulated from the high tension system **19**. In the event the chain or cable **13** of the hoist illustrated in FIG. **1** is replaced by a plastic woven belt which is coated to eliminate water adsorption or absorption, further insulation is provided from a load which may be of high electric potential.

In FIG. **3** it will be seen that the hoist handle **10** includes a bending element **20** in the form of a circular rod which joins the non-electric non-conducting lever **21** to the handle adapter **25**. Desirably the lever **21** is a round plastic rod or tube thereby offering uniform strength in all directions of bending. A grip surface **22** is fabricated over the entire length of the lever **21**. The bending element body **24** is proportional for snug fit insertion into the lever **21** at the end opposite from the cap **37** and thus secures the bending element **20** in axial alinement with the lever **21**. To further strengthen the connection between the lever **21** and bending element **20**, a tubular sleeve **66** sandwiches the end of the lever **21** and the bending element body into a strong joint (see also FIG. **7**).

An alternative construction is shown in FIG. **6** where the bending element **20** is combined with the sleeve **38** for a snug fit over the end of the lever **21**. A pin bore **32** is provided in the end of the lever **21** and in the sleeve **38** to receive the lever drive pin **34** as in the embodiment shown in FIG. **3**. The remaining elements of the handle construction are the same in the alternative embodiment as the similar reference numbers in FIG. **6** attest.

The handle adapter **25** terminates at one end in a handle adapter bending element shank **26** which is circular at the bending element end and has a somewhat smaller cross-section than the lever **21**. This reduced section is provided on the handle adapter bending element shank **26** so that a careless operator cannot slip a pipe over the length of the lever **21** and obtain a good grip on the handle adapter **25**, thereby overloading the hoist by "short circuiting" the bending element **20**. Also, an enlarged section is provided by the cap **37** at the opposite end of the lever **21** for the same purpose. The shank through bore **28** is provided to snugly receive the bending element **20** in the handle adapter bending element shank **26**.

In the embodiment shown, the hoist securing section **29** is in the form of a relatively flat plate having two mounting holes **30**. In a hoist where variable positioning of the handle is desirable, the hoist will be provided with one pin which is secured to the remote mounting hole **30** and is not threadedly engaged thereon. The mounting hole **30** which is closest to the shank is received by one of two or more pins on the hoist itself thereby providing arcuate flexibility in the mounting of the handle to the hoist.

As will be noted particularly in FIG. **9**, the hoist securing section **29** is mounted to the yoke of a typical hoist. As will be observed in the phantom lines, if the bending element **20** has been bent, and the hoist is disabled, the yoke serves as a stop which prevents a cheater **55** from bridging the span in which the bending element **20** serves as the only connecting element. Irrespective of which way the cheater **55** is moved, it continues to ride on the bending element shank **26** and cannot override readily the disability occasioned by the bending element **20**.

It will be further observed that the circular end **33** of the adapter shank **26** flares outwardly to an elliptical cross section **36**, the major axis of which is perpendicular to the plane of the mounting hole **30** axis. In a commercial embodiment, the bending element end **33** of the adapter shank **26** has a diameter of 1.125 inches. The elliptical cross section **36** has a major axis of 1.625 inches and a minor axis of 1.250 inches. These dimensions effectively double the strength of the shank **26**, and further tend to discourage the use of "cheaters" to overload the hoist by short circuiting the bending element **20**. Furthermore, the 1.500 inches outside diameter of the tubular sleeve **66** provides a 0.375 inches step down between the bending element end of the lever **21** and the bending element end **33** of the shank **26**.

One of the distinct advantages of the invention is achieved by means of providing a pin bore **31** the adapter shank **26**, and a pin bore **32** in the lever **21** and bending element body **24** so that a lever drive pin **34** and an adapter drive pin **35** may be passed through the bending element **20** and the same secured in place joining the handle adapter **25** to the lever **21**. The bending element is desirably designed for a predetermined overload of the hoist, and when such overload is applied, the bending element **20** will bend gently and change the axial alignment of the lever **21** with regard to the handle adapter **25** by closing the bending element gap **27** provided between the adapter shank **26** and the end of the lever **21**. In the event the bending element is bent in overload, a relatively inexpensive repair may be made

by removing the drive pins **34, 35**, replacing the bending element **20** and resecuring the drive pins **34, 35**.

Where an inventory of several hoist handles for varying capacity hoists is maintained, the lowest capacity will be provided with the smallest diameter bending element **20**. Thus a bending element **20** which is designed for a larger hoist cannot be positioned in a handle bored for a smaller diameter and thus unwittingly "over-fuse" the handle assembly. Also, since the bending elements are heat-treated to a predetermined hardness, for a very high strength, a user cannot readily substitute a stronger material element.

In a typical illustrative commercial embodiment, the plastic rod or tube forming the lever **21** is formed out of 1¼ inches plastic shape and provided with a ½-inch diameter bending element **20**. The bending element body **24** is of sufficient length so that an engagement length of at least one diameter of the bending element body **24** is obtained in the lever **21**. The handle adapter **25** may be economically molded from an aluminum die casting thereby reducing the weight of the over-all construction of the handle **10**. In such a commercial embodiment it will be observed that no controls are on the handle **10**, and the handle weight in many instances is 25 to 50 percent lighter than that of conventional handles not containing the advantage of the safety assured by the subject bending element, and the non-electric, non-conducting lever **21**. Repairs in the field are facilitated by readily replacing the bending element **20**, and safety against overload is assured by progressively increasing the diameter of the bending element **20** as the capacity of the hoist for which the handle is intended is increased. The preclusion of non-interchangeability of the bending elements insures that only the designed safety of the hoist handle for a given hoist is subject to the predetermined overload factor provided by the bending element **20**. The heat-treating requirement insures against material substitution for the bending element.

Upon review of the above, and testing all elements for strength as well as dielectric capabilities, it becomes apparent that the final design gives rise to three possible ways of joining the bending element to the handle. These appear below in order of maximum strengths obtainable:

1. The bending element is inserted inside the hollow plastic handle and a sleeve is placed on the outside of the plastic thereby sandwiching the annular plastic handle body between the bending element body and the sleeve. The result achieves full strength at the joint.

2. The bending element forms a socket (such as shown in FIG. **6**) with the plastic tubular handle portion. The outside diameter of the plastic tube is then inserted inside the enlarged cup-like section of the round steel bending element. In actual testing, one-half strength is achieved.

3. The bending element is inserted inside the plastic tubular type handle such as shown in FIG. **7**, but the outer sleeve is omitted. The result achieves one-quarter full strength.

Varying results of the above have been tested with the sleeve longer and shorter than the bending element; more and less socket engagement; and one, two or three diameters engagement of the bending element and the plastic tube. The ultimate strength is achieved where the exterior sleeve (such as shown in FIGS. **3** and **7** to be described below) and the bending element insert are of the same length, and the engagement is for at least one diameter of the plastic handle.

This construction, along with the adaptor is shown in enlarged detail from that of FIG. **3** in FIGS. **7** through **12** which will be described briefly below, bearing in mind that the general organization is comparable with that already set forth above. There it will be seen that the lever **21** (FIG. **7**) has an exterior portion of filament wound plastic **51**, in the commercial embodiment having an inside diameter of 0.990 inch and an outside diameter of 1.25 inches, and an over-all length approximating 28 inches. A styrofoam insert **52** of unicellular styrofoam is employed.

The bending element **20** as shown in FIG. **8** is made of heat-treated steel, having a body portion **24** narrowing to a bending element portion **20**, each of which has mounting pin holes **32, 31** for securing the same respectively to the lever **21** and the adaptor **25**. The preferred overload design strength is 50 percent to comply with the OS & H laws. As will be observed in FIG. **7**, an aluminum sleeve **66** is employed on the outside of the plastic **51** and together with the body portion **24** of the bending element **20** sandwiches, on a two-diameter length, the plastic material to the bending element body **24**. Full strength is achieved in this construction.

An alternative construction is shown in FIG. **9** where a steel handle tube **68** is employed, otherwise being the same as the construction shown in FIG. **7** with the omission of an exterior sleeve since the same is not required with the strength afforded by the steel tube **68**.

The handle adaptor **70** shown in modified form functions in the same manner as that described relating to FIGS. **4** and **5** above. It differs primarily, as illustrated in FIGS. **10** through **12**, in providing a strengthening pair of flanking webs **71** at the coupling area of the mounting hole **72** closest to the bending element **20**. The anchor mounting hole **74** and its connection to the associated hoist being less subjected to lateral forces, is located in a thinner section of the body of the adaptor **70** as shown best in FIG. **11**.

While the invention has been described in connection with specific embodiments and application, no intention to restrict the invention to the examples shown is contemplated, but rather to include within the invention all of the subject matter defined by the spirit as well as the letter of the annexed claims.

I CLAIM:

1. A hoist handle comprising, in combination,
a handle adapter,
a bending element,
an elongate lever member,
said adapter having a securing member,
said securing member terminating in a shank having a cylindrical bore,
said bending element being cylindrical and proportioned to fit within said bore to a depth of at least one diameter,
said lever constituting a cylindrical member and having a cylindrical bore at one end proportioned to receive said bending element,

means for removably securing the bending element in the handle adapter shank bore and the handle bore,

said bending element being chosen from a material and having a diameter preselected to bend at a predetermined overload of the associated hoist,

whereby exceeding such overload will disable the hoist by bending the bending element which may thereafter be replaced by removing and inserting another bending element secured in place by the removable securing means.

2. In the handle of claim 1, said lever member being formed of a non-metallic material thereby insulating that portion remote from the bending element from electrical contact with the adapter.

3. In the handle of claim 1, said lever bending element end having a diameter larger than the adapter shank, thereby preventing the "short-circuiting" of the bending element by placing a pipe over the lever and adapter shank of inside diameter necessarily larger than the outside diameter of the lever and adapter shank so that the pipe end is precluded from contacting the adapter shank until the bending element is deformed.

4. In the handle of claim 1, an enlarged section at the end of the handle remote from the adapter shank which renders difficult the placing of a pipe over the handle and adapter shank to "short circuit" the bending element.

5. In the handle of claim 1, the bending element being designed to a 50 percent overload.

6. In the handle of claim 1, said securing section comprising a flat plate having two longitudinally aligned mounting holes.

7. In the handle of claim 1, a combined coupling sleeve and bending element, said sleeve portion having an interior, bore proportioned to receive the handle end, and means for securing the sleeve to the handle end.

8. In the handle of claim 2, said lever bending element end having a diameter larger than the adapter shank thereby preventing the "short-circuiting" of the bending element by placing a pipe over the lever and adapter shank of inside diameter necessarily larger than the outside diameter of the lever and adapter shank so that the pipe end is precluded from contacting the adapter shank until the bending element is deformed.

9. In the handle of claim 3, an enlarged section at the end of the handle remote from the adapter shaft which renders difficult the placing of a pipe over the handle and adapter shaft to "short circuit" the bending element.

10. In the handle of claim 7, an enlarged section at the end of the handle remote from the adapter shaft which renders difficult the placing of a pipe over the handle and adapter shaft to "short circuit" the bending element.

11. In the handle of claim 2, a combined coupling sleeve and bending element, said sleeve portion having an interior, bore proportioned to receive the handle end, and means for securing the sleeve to the handle end.

12. In the handle of claim 1, said bending element having an enlarged body portion for insertion within the cylindrical bore of the handle.

13. In the handle of claim 12, a sleeve extensive in length with said enlarged body portion and proportioned for and in intimate contact fit with the lever thereby sandwiching the lever end portion between the sleeve and enlarged body.

14. In the handle of claim 13, the length of the sleeve and enlarged body portion approximating two diameters of the lever.

15. In the handle of claim 1,

said handle adapter having means for securing the same to its associated hoist such that the hoist portion immediately adjacent the handle adapter serves as a stop to prevent a sleeve-like cheater from extending over the full length of the adapter thereby permitting the cheater to override the effect of the disabling of the handle due to the bending of the bending element.

* * * * *