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Fanguy et al.

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(54) **SAFETY WRENCH FOR CONDUIT UNION AND METHOD OF USE**

(71) Applicants: **Robert P. Fanguy**, Broussard, LA (US); **David J. Tilley**, Franklin, LA (US)

(72) Inventors: **Robert P. Fanguy**, Broussard, LA (US); **David J. Tilley**, Franklin, LA (US)

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B25B 21/00 (2006.01)

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CPC ***B25B 21/02*** (2013.01); ***B25B 21/002*** (2013.01); ***B25B 21/005*** (2013.01)

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USPC 81/63.2, 33, 466, 463, 82; 173/202, 203, 173/128, 104; 227/132
See application file for complete search history.

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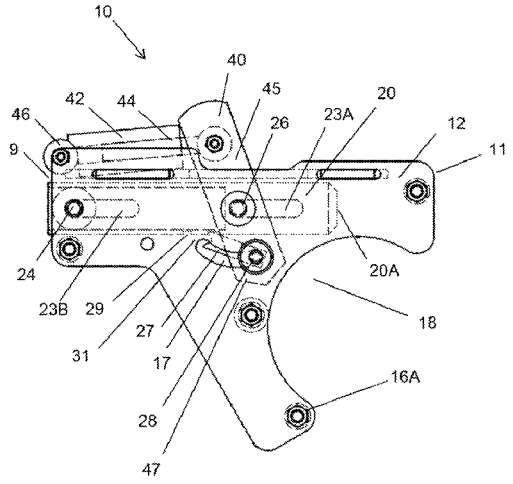
Primary Examiner — Monica S Carter
Assistant Examiner — Makena Markman
(74) *Attorney, Agent, or Firm* — William W. Stagg

(57) **ABSTRACT**

A safety wrench for coupling and uncoupling hammer union type connections employs a spring biased retractable bolt to apply a blow to the union lug. In use the bolt is retracted rearward to compress compression springs positioned within an internal spring bore in the bolt to a position away from the lug of the union to be rotated. When the bolt is disengaged from the ratchet mechanism, the compression springs rapidly extend to rapidly move the bolt forward to impact the union lug and rotate the union. The bolt may be retracted by a hydraulic or pneumatic cylinder, a hand lever, or a rack and pinion mechanism. Reversing the position of the safety wrench on the union lug will allow the union to be rotated in the opposite direction.

17 Claims, 12 Drawing Sheets



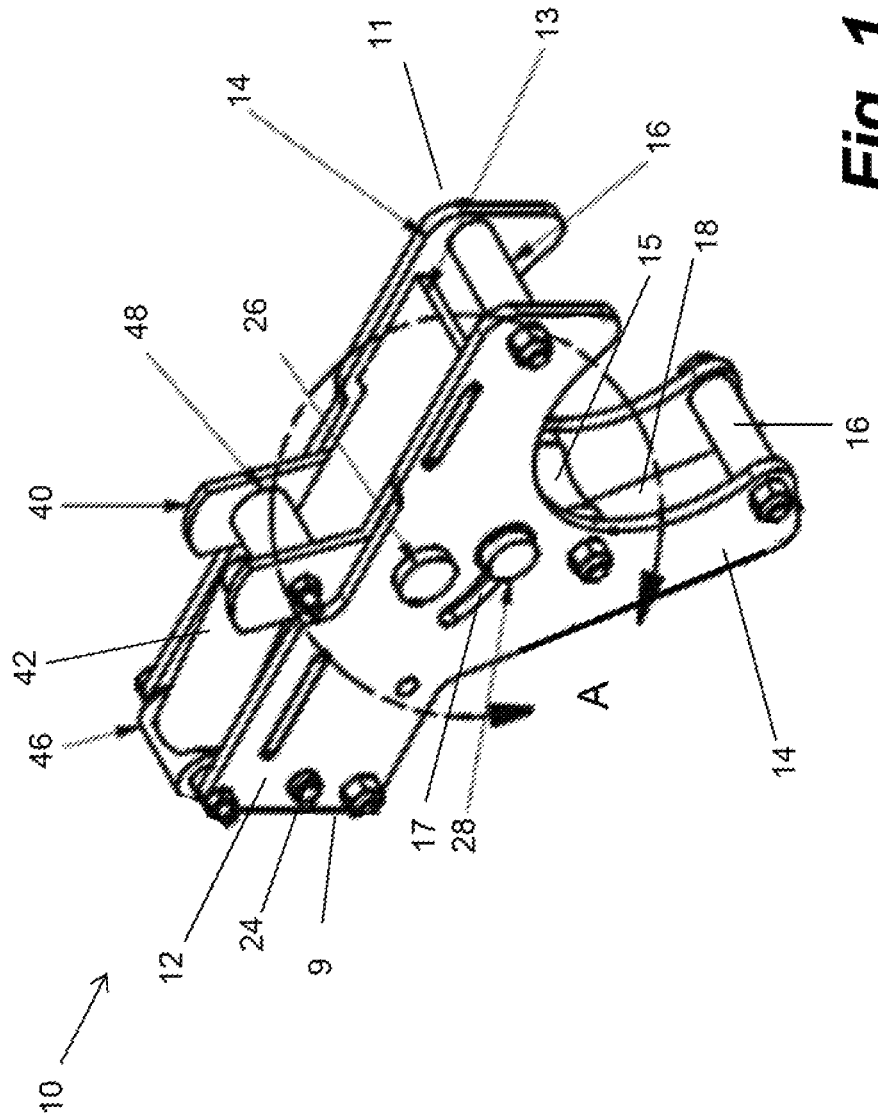


Fig. 1

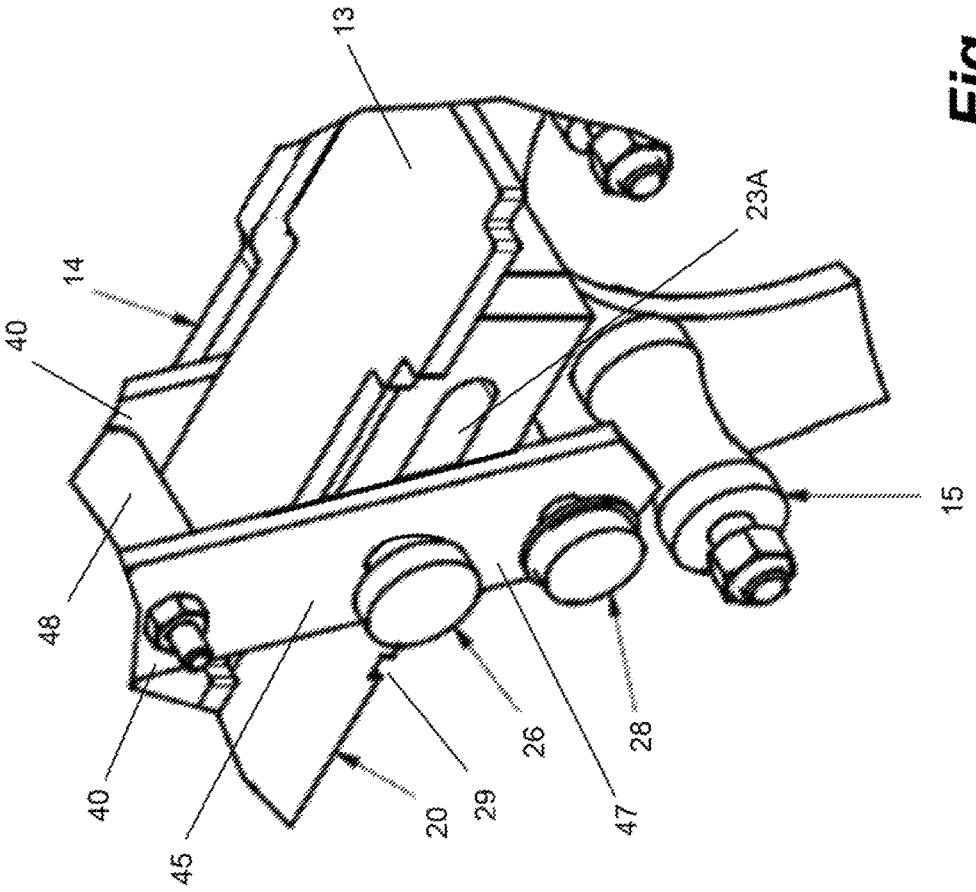
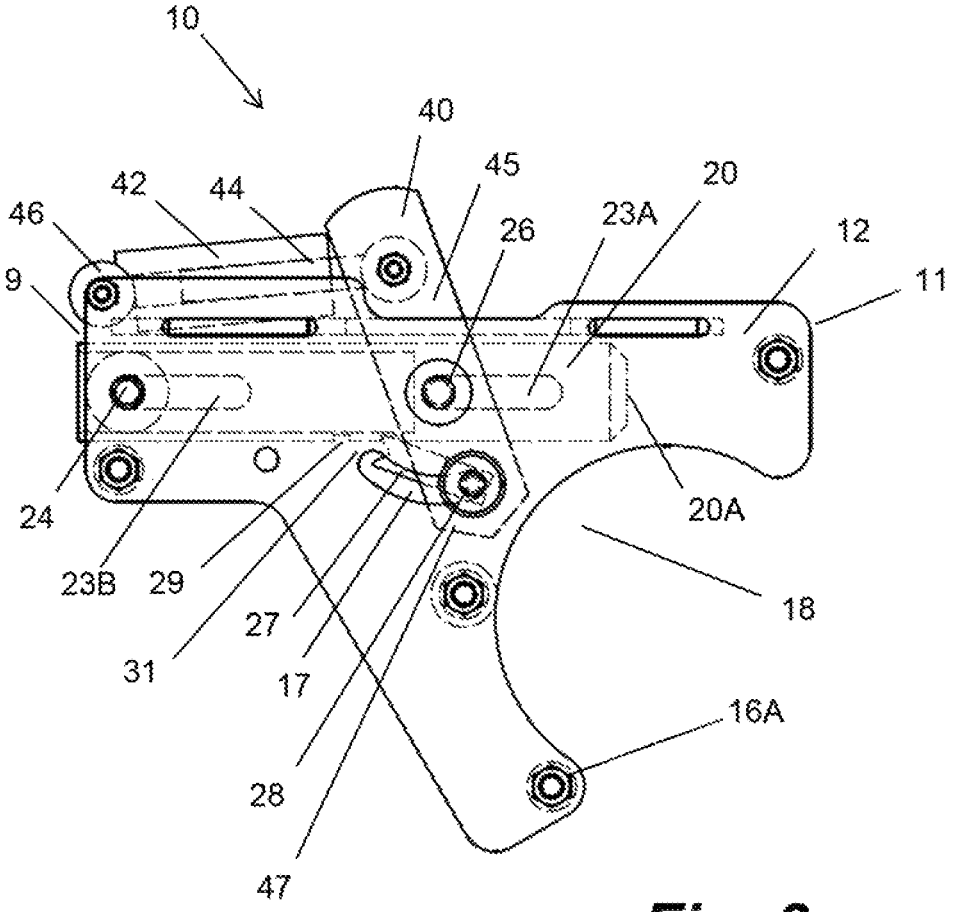


Fig. 2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23A
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16A
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Fig. 3

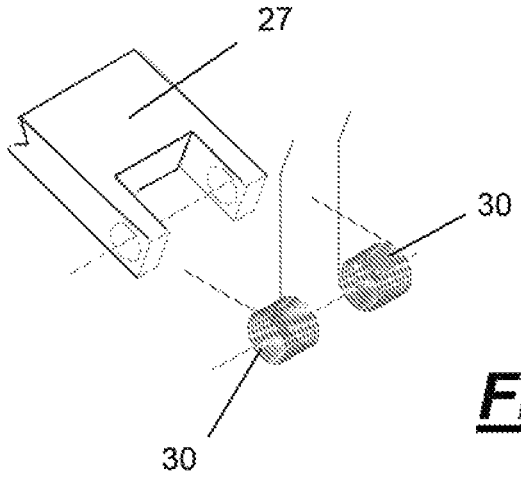
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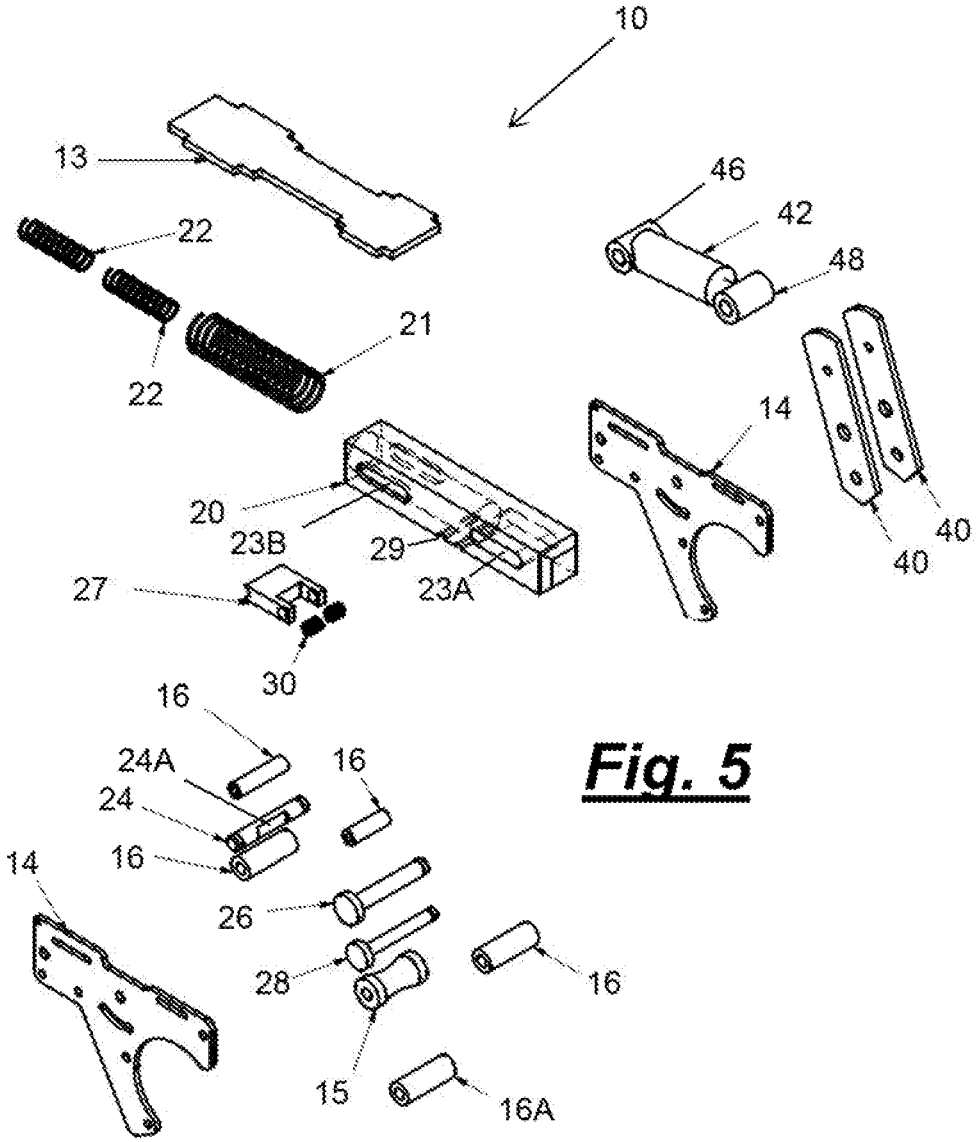
Fig. 4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16
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16A

Fig. 5

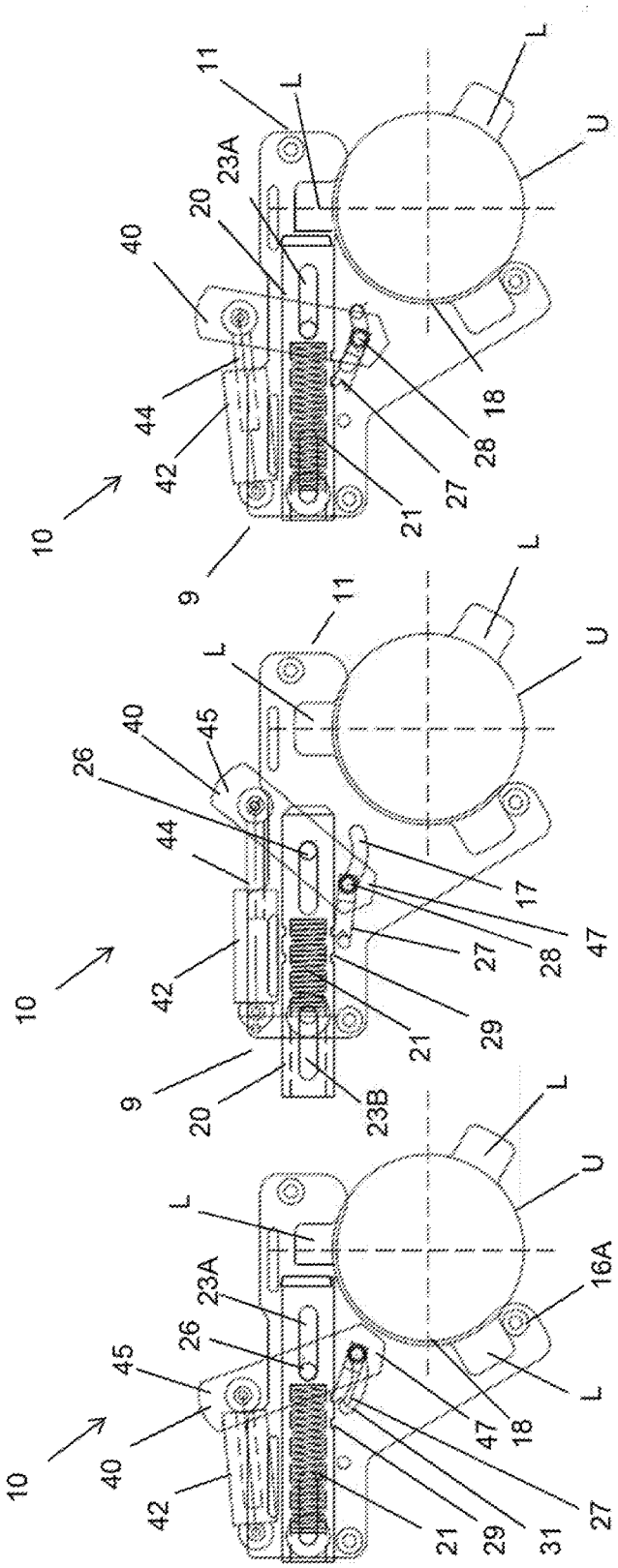
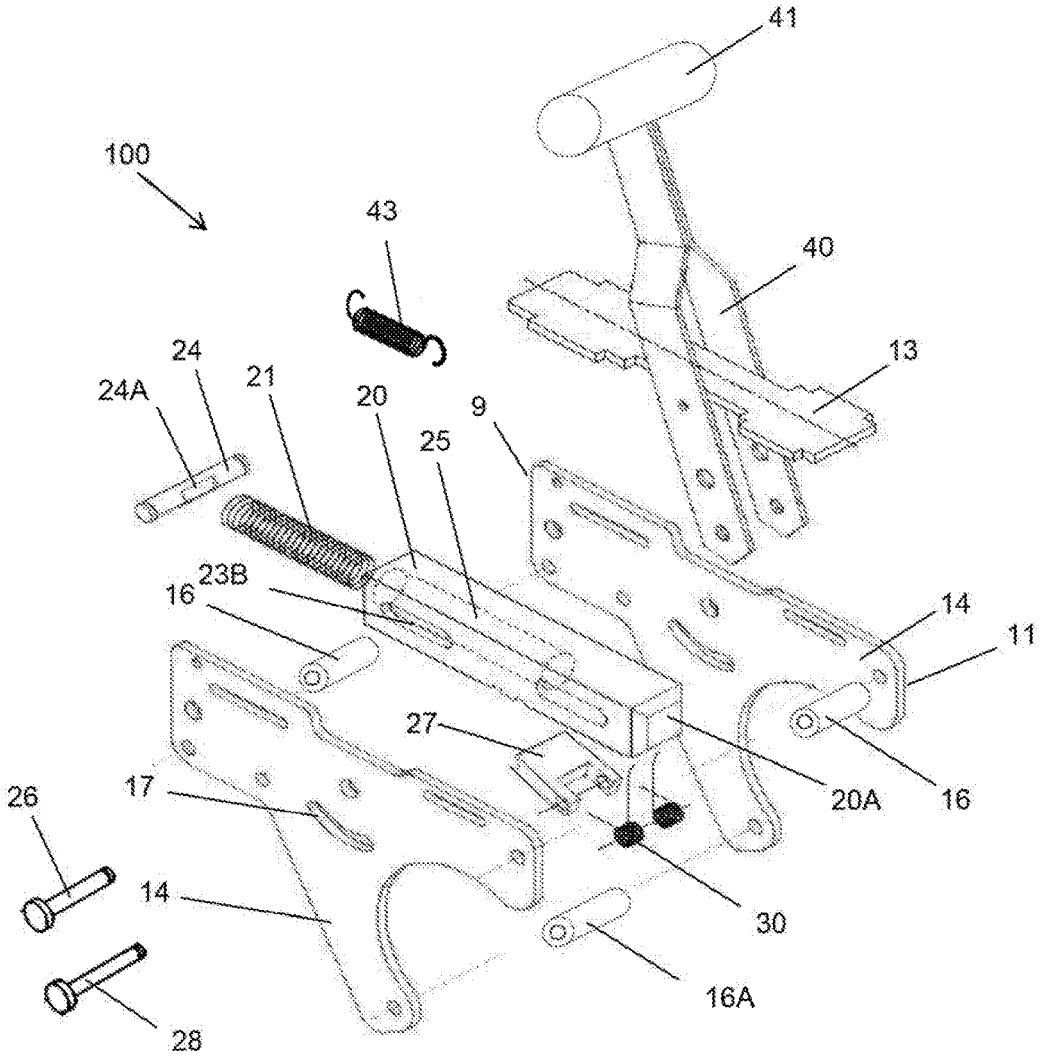


Fig. 6C

Fig. 6B

Fig. 6A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24A
21
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9
25
23B
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14
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16A
28

Fig. 7

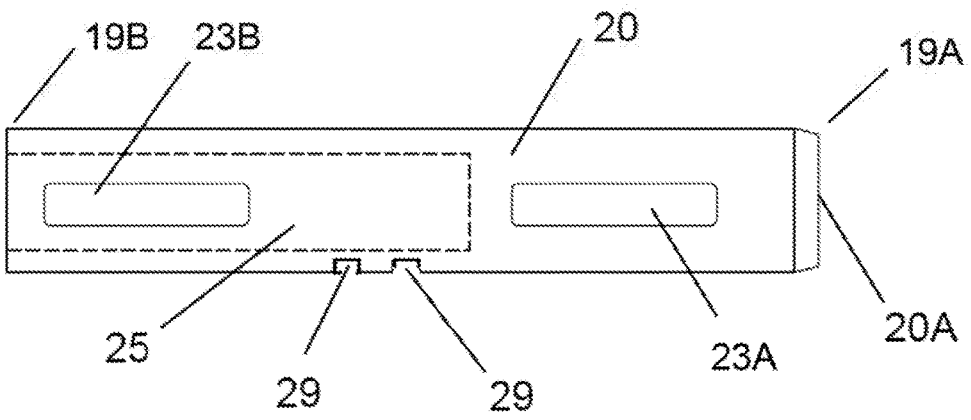


Fig. 8

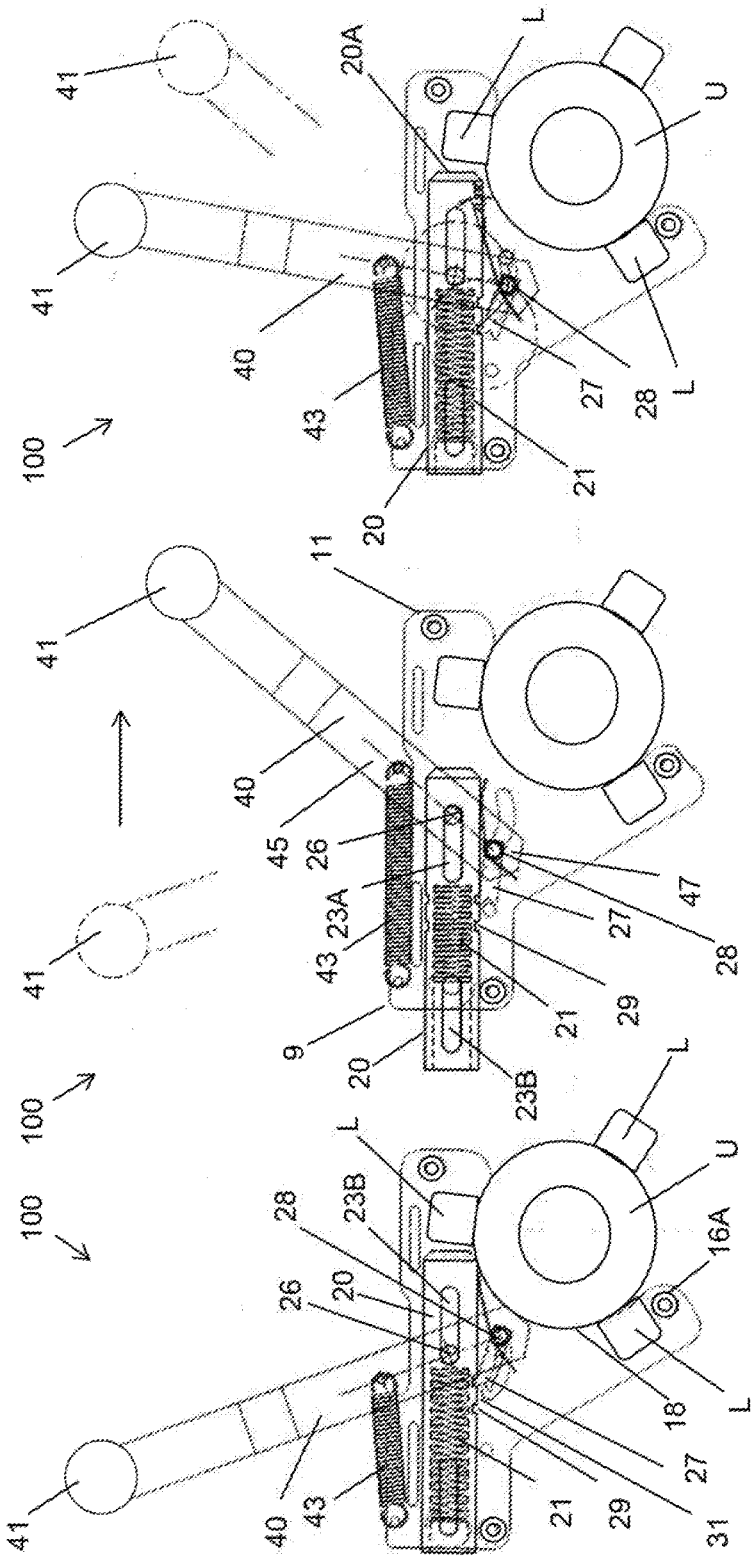


Fig. 9C

Fig. 9B

Fig. 9A

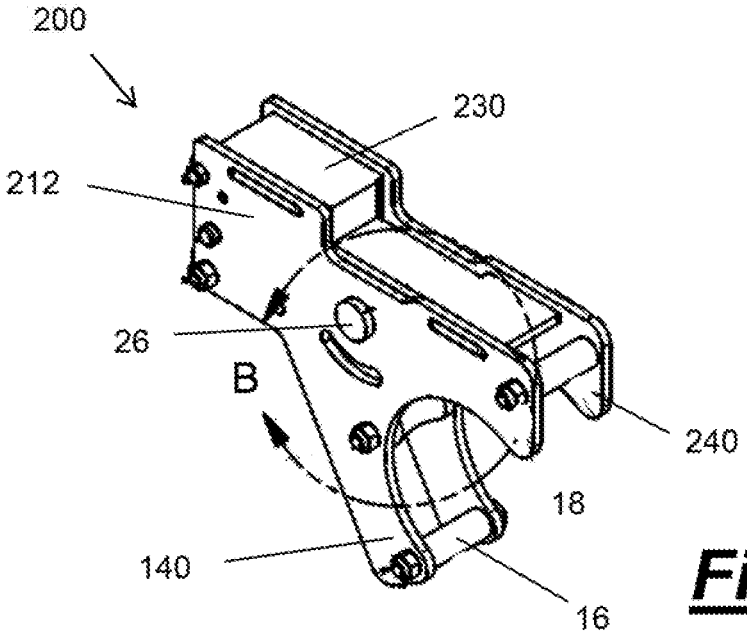


Fig. 10

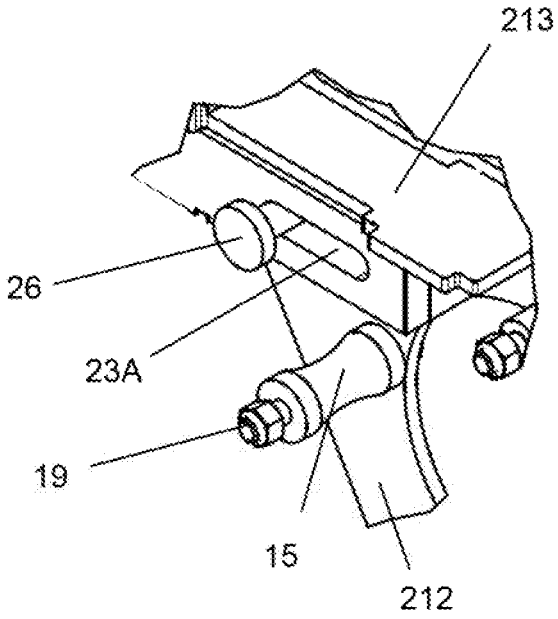


Fig. 11

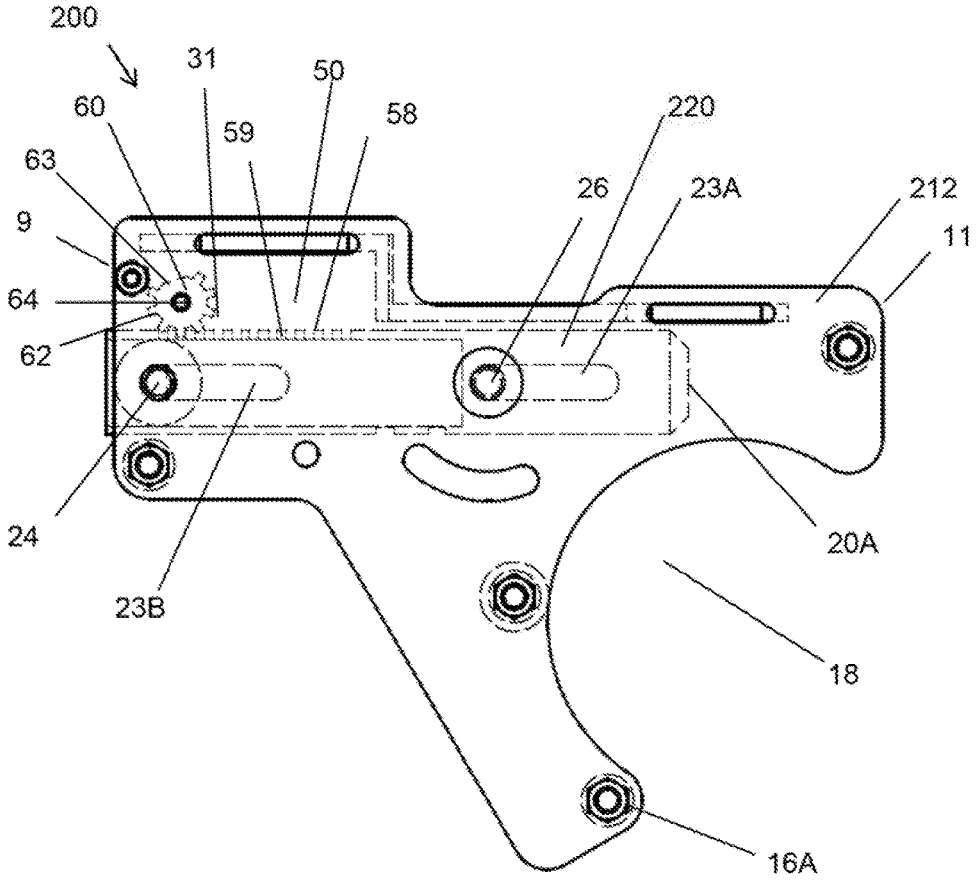
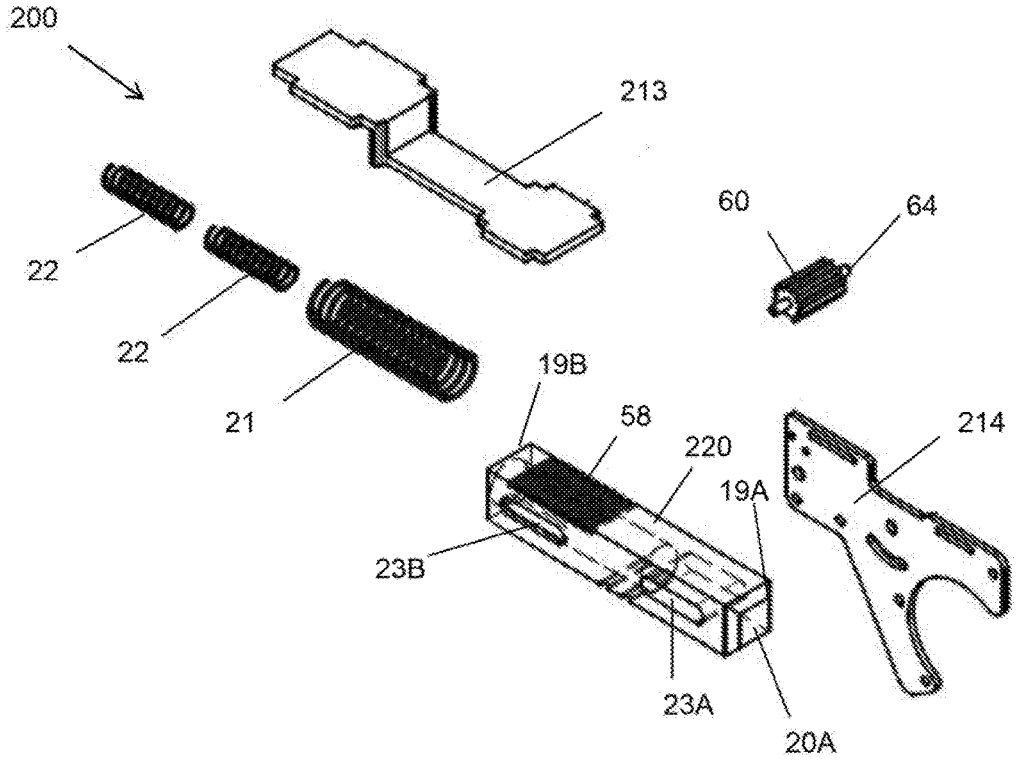


Fig. 12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64
19B
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220
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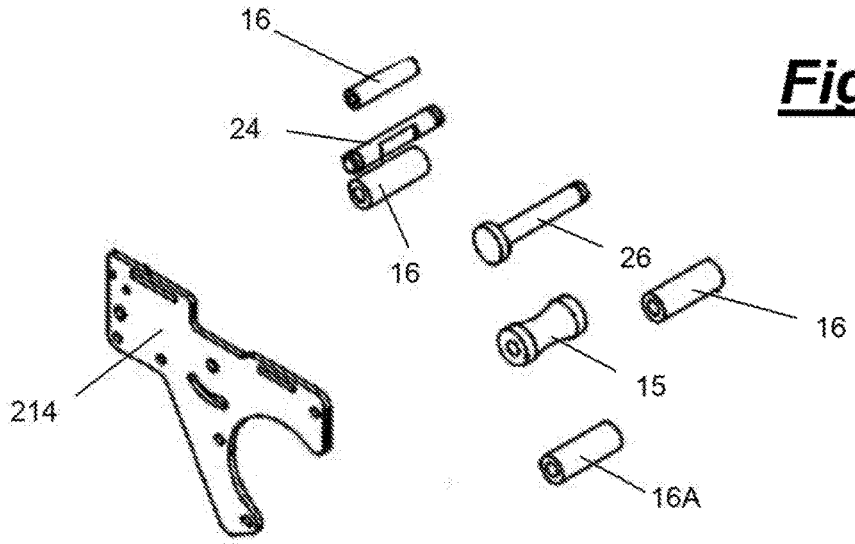
214
23B
23A
20A


16
24
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26
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214
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16A

Fig. 13

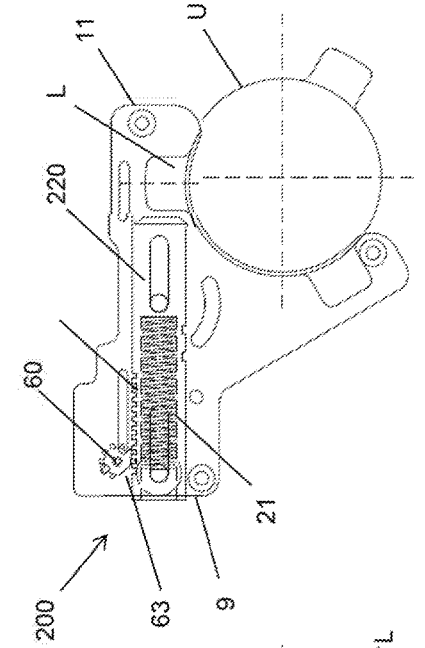

Fig. 14B

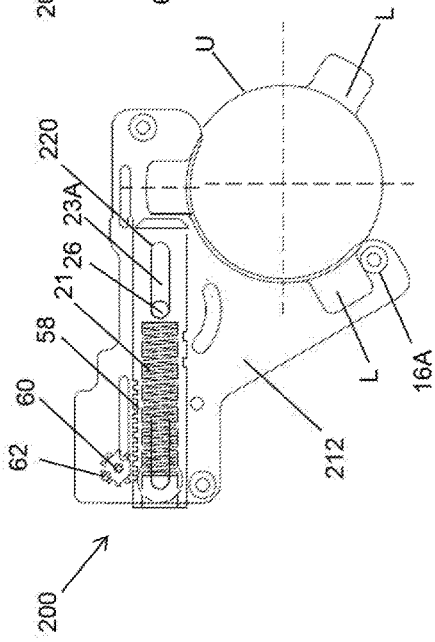

Fig. 14A

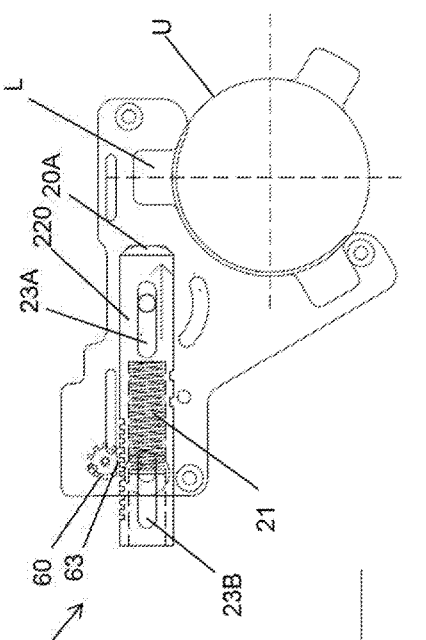

Fig. 14D

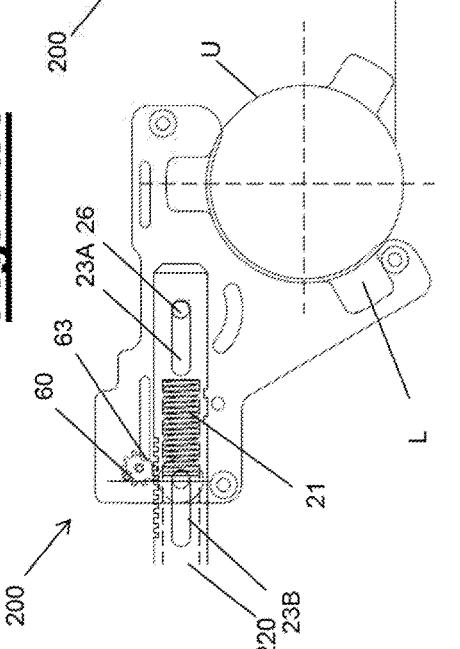

Fig. 14C

SAFETY WRENCH FOR CONDUIT UNION AND METHOD OF USE

FIELD OF THE INVENTION

This invention relates to tools for making up and breaking out conduit connections and more particularly to a safety wrench for coupling and uncoupling hammer union type pipe connections.

BACKGROUND OF THE INVENTION

Fluids, gases, and solids are often transported through conduits such as pipe and hoses which can be subjected to internal pressures. These conduits are typically comprised of multiple conduit segments that are connected together by threaded couplings. One such threaded coupling, a hammer union, utilizes an internally threaded nut having a plurality of lugs extending from its outer peripheral surface to threadedly secure conduit segments having corresponding adjoining male and female ends. A typical threaded union may have only 3 to 4 threads per inch so as to provide a robust connection with the least amount of nut rotation necessary in order to reduce the time required for tightening and loosening the union nut and correspondingly reduce the cost of assembling and disassembling conduit segments. However, the nut must still be tightened to a torque sufficient to avoid leakage of the fluids, gases, and solids being contained and to withstand the anticipated conduit internal fluid pressure to prevent the risks associated with unwanted disengagement of the connected adjoining conduits. Rotation of the lugged nut in one direction will tighten or makeup the union to couple the adjoining conduit segments together at a desired torque to prevent leaks. Rotation of the lugged nut in the opposite direction will loosen or breakout the union for uncoupling of the connected conduit segments. The lugged nut of a hammer union may be rotated by a variety of devices and methods.

One device used to rotate the lugged nuts is a manual handheld wrench or tong that has an elongated handle attached to a head that engages one or more of the outer lugs on the nut. The lugged nut is rotated by securing the wrench head to the lugs on the union nut and applying force to the elongated handle in the desired direction of rotation. Another device and method use to rotate union nut is a handheld sledge-type hammer. A worker uses the handheld hammer to strike the extending lugs on the union nut in a desired direction to rotate the nut to makeup and breakout the hammer union connection.

When conduit connections are made with a hammer or wrench it is often difficult to achieve or verify the torque required or desired for effectively mating the adjoining conduit segments. This is partially due to the differences is size, strength, and fatigue of the worker using the hammer. A larger worker may strike the union lug with more force than a smaller worker thus producing inconsistent torque values to the union being connected. Further, use of a handheld hammer is among the top causes of on-the-job injuries to workers. A worker swinging a hammer or striking or dropping a hammer can cause muscle strains, pinch points, broken limbs, smashed or broken fingers, or other injuries to the worker or others that may get in the way of the hammer. A hammer blow may also cause the hammer or union components to separate and produce shrapnel-like shards of flying metal that may cause eye injuries or other physical injuries to the worker or others in the vicinity. This danger is readily apparent because the makeup or breakdown of lugged nut on a hammer union requires a worker to apply repeated hammer blows to the lugs of the hammer union nut when workers or others are in close proximity. Workers working in such close proximity is common because it is often necessary to have one or more workers holding the conduit segments when another worker is striking the union lugs with the hammer in order to makeup or breakout the conduit connection.

Further, conduits are often assembled or disassembled in an area where flammable gases may be present. Striking a lug on a union nut with the head of a sledgehammer may lead to a glancing blow that creates sparks. These sparks can ignite such flammable gases. The use of such manual hammers increases the risk of explosions and fires that can cause severe burns or even death of surrounding workers and extensive property damage at the location.

Other problems are created when manual tongs or wrenches are used to makeup and breakdown the lugged nuts of hammer unions. Such manual tongs or wrenches require a worker to apply a torque with the handle of the tong or wrench sufficient to turn the lugged nut to a desired torque to makeup the connection of adjoining conduit segments and then to turn the lugged nut in the opposite direction with a torque sufficient to breakout the connection of the adjoining pipe segments. Often the moment force or torque applied to the threaded union by the tong jaws is not sufficient to adequately seal the conduit ends together which may result in leaks or cause the conduit to decouple under pressure. Further, a manual tong or wrench exposes the worker to the risk of back injuries when applying force on the handle of the tong or wrench the necessary to makeup or breakout the connection. Often the conduit segments are located in areas were a worker cannot be in a position to apply sufficient or consistent torque with a manual tong or wrench to properly makeup or breakout a union connection. Variables associated with the size and strength of a worker using a manual tong or wrench may result in the application of improper torque on the union connections and lead to inconsistent results when the connections are madeup. A union connection madeup with the application of improper torque may lead the connection to fail causing leakage of conduit contents and increase the risk of personal injuries and property damage associated with such leakage.

From the above it can be seen that there is a need for a replacement of conventional handheld hammers and manual wrenches and tongs used to makeup and breakdown the unions used to connect adjoining conduit segments in order to reduce the time to make conduit connections, reduce conduit sealing problems, and reduce the risk of harm for the workers and the risk of property damage at the work site location.

SUMMARY OF THE INVENTION

The present invention provides a safety wrench for coupling and uncoupling hammer union type connections that will eliminate the need for workers to use manual wrenches or tongs or manual hammers to makeup or breakout a threaded hammer union connection. The safety wrench is generally intended for use on unions having a plurality of lugs that extend radially from the outer peripheral surface of the union. Such unions are used to connect the adjacent threaded ends of conduit segments.

The safety wrench has a retractable bolt made from ferrous or non-ferrous metals with a hammer face that applies an impact force to the union lugs for rotation of the union. The bolt of the safety wrench is cocked or engaged to

apply a blow to a union lug by a ratchet mechanism. When the bolt is cocked or engaged by the ratchet mechanism, the bolt is retracted against a compression spring positioned within a spring bore in the bolt to a position away from the lug of the union to be rotated. When the bolt is disengaged from the ratchet mechanism, the compression spring moves the bolt rapidly so that the bolt is extended toward the lug of the union to impact the bolt hammer face against the union lug with a predetermined impact force. The impact of the hammer face of the extended bolt on the union lug will rotate the union to threadedly connect or makeup the adjoining threaded conduit segments. The safety wrench may also be positioned on the union to allow the hammer face of the retractable bolt to impact the union lug in the opposite direction in order to rotate the union to disconnect or breakdown adjoining conduit segments.

The retractable bolt is slidably retained within the frame of the safety wrench in a bolt race slot to facilitate retraction and extension of the bolt within the hammer frame. In one embodiment the ratchet mechanism employed to engage and disengage the bolt includes a hydraulic or pneumatic cylinder and piston. In an alternate embodiment the ratchet mechanism employed to engage and disengage the bolt includes a hand operated lever. In still another embodiment the ratchet mechanism employed to engage and disengage the bolt includes a pinion gear mechanism.

Use of safety wrench will eliminate the need for worker to use manual hammers and manually manipulated wrenches and tongs and serve to insure that all unions are consistently madeup to a predetermined desired torque. Use of the safety wrench will thus reduce the aforementioned risks of injuries to workers or damage to property and will result in an overall reduction in the costs associated with the use of hammer union connections.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric view of a first embodiment of the safety wrench of Applicant's invention.

FIG. **2** is a partial cross-section detail view of the safety wrench shown in FIG. **1**.

FIG. **3** is a side view of the safety wrench shown in FIG. **1**.

FIG. **4** is an isometric view of the pawl and torsion spring of the safety wrench shown in FIG. **1**.

FIG. **5** is an exploded view showing the essential features of the safety wrench shown in FIG. **1**.

FIGS. **6**A, **6**B, and **6**C show the sequence of operation of the safety wrench shown in FIG. **1**.

FIG. **7** is an exploded view showing the essential features of a second embodiment of the safety wrench of Applicant's invention.

FIG. **8** is a schematic side-view of the retractable bolt of the safety wrench of Applicant's invention.

FIGS. **9**A, **9**B, and **9**C show the sequence of operation of the second embodiment safety wrench shown in FIG. **7**.

FIG. **10** is an isometric view of a third embodiment of the safety wrench of Applicant's invention.

FIG. **11** is a partial cross-section detail view the third embodiment of the safety wrench shown in FIG. **10**.

FIG. **12** is a side view of the third embodiment of the safety wrench shown in FIG. **10**.

FIG. **13** is an exploded view showing the essential features of the third embodiment of the safety wrench shown in FIG. **10**.

FIGS. **14**A, **14**B, **14**C, and **14**D show the sequence of operation of the third embodiment safety wrench shown in FIG. **10**.

DETAILED DESCRIPTION OF THE EMBODIMENTS

In the drawings, features that are well established in the art and do not bear upon points of novelty are omitted in the interest of descriptive clarity. Such omitted features may include the details for operation of hydraulic or pneumatic cylinders such as pumps, fluid lines, and valves and connection components such bolts, nuts, screws, washers, bearings, screws, threaded junctures, weld lines, sealing elements.

FIGS. **1** through **5** show a first embodiment of the safety wrench **10**. As shown in FIG. **1**, an isometric view, and FIG. **5**, an exploded view, safety wrench **10** has a rearward end **9** and a forward end **11** and is comprised of a frame **12** with a pair of corresponding spaced apart side plates **14** that are curved to create a lug pocket **18**, and a top frame plate **13**. Tubular spacers **15**, **16**, and **16**A held in place by attachment bolts and nuts maintain the desired space between side plates **14** and serve to hold the safety wrench **10** in position on the lugs of a union. Positioned between the side plates **14** is a longitudinally extending retractable bolt **20**.

Bolt **20**, shown in FIG. **8**, has a forward end **19**A, a rearward end **19**B, forward bolt race slots **23**A and rearward bolt race slots **23**B. Bolt **20** also has an internal spring bore **25**, a plurality of ratchet teeth **29** arrayed longitudinally along its lower surface, and a bolt face **20**A at its forward end **19**A.

As shown in FIG. **2**, a cutaway view at the forward end **11** of safety wrench **10** shown as Detail A of FIG. **1**, and in FIG. **3**, bolt **20** is slidably retained within the frame **12** by rearward pin **24** that extend transversely between the side plates **14** of the frame **12** and through rearward bolt race slots **23**B in the bolt **20**. A compression spring **21** is positioned in the internal spring bore **25** of the bolt **20** where it is retained in place by retaining pin **24**. A flat surface **24**A as shown in FIG. **5** may be machined on the side of retaining pin **24** to aid in retaining compression spring **21** within the internal spring bore **25** of bolt **20**.

Lever plates **40** are pivotally mounted between the side plates **14** of the frame **12** to pivot on bolt pin **26** that extends transversely between side plates **14** of frame **12** through the lever plates **40** and the forward bolt race slots **23**A of bolt **20**. Lever plates **40** have an upper section **45** above bolt pin **26** and a lower section **47** below bolt pin **26**. A pawl pin **28** is mounted on the lower section **47** of the lever plates **40** so that pawl pin **28** will extend transversely between side plates **14** of frame **12** through in lever slots **17** in the side plates **14**. When the upper section **45** of lever plates **40** are pivoted on bolt pin **26** toward the forward end **11** of safety wrench **10**, the lower section **47** of the lever plates **40** are pivoted toward the rearward end **9** of safety wrench **10** to move pawl pin **28** rearward along the lever slots **17**.

The bolt **20** is releasable restrained from forward movement and engaged for rearward movement with respect to frame **12** by bolt restraint **31**. The bolt restraint **31** is comprised of pawl **27** pivotally mounted on pawl pin **28**. Pawl **27** is biased toward the lower surface of the bolt **20** by torsion springs **30**, shown separately in FIG. **4**. The pawl **27** engages successive bolt ratchet teeth **29** at the lower surface of bolt **20**. This engagement restrains forward movement of bolt **20** while allowing bolt **20** to be moved rearward within

frame **12** in response to the forward pivotal movement of the upper section **45** of the lever plates **40**.

A hydraulic cylinder and piston assembly comprised of a cylinder **42** and a piston rod **44** is provided to pivot the lever plates **40**. The cylinder **42** is pivotally attached to the frame **12** by cylinder mount **46**. The piston rod **44** is pivotally attached to the lever **40** by piston mount **48**.

FIGS. **6**A, **6**B, and **6**C show the operation sequence of the safety wrench **10**. As shown in FIG. **6**A, a union U with a lug L is positioned with lug pocket **18** of safety wrench **10** so that spacer **16**A is engaged with lug L. In this position the compression spring **21** is extended and bolt **20** is in a forward position. Extension of the piston rod **44** from the cylinder **42** will pivot the upper section **45** of lever plates **40** forward about bolt pin **26** and move the pawl pin **28** rearward in lever slots **17** as shown in FIG. **6**B. This rearward movement of pawl pin **28** will engage pawl **27** with one of the ratchet teeth **29** on the bolt **20** and slide the bolt **20** toward the rearward end **9** of the frame **12** along bolt race slots **23**A and **23**B. The rearward movement of bolt **20** will compress spring **21** within the internal spring bore **25** of bolt **20** against retaining pin **24**.

When the pawl **27** is engaged in the most rearward ratchet tooth **29**, continued forward pivotal movement of the upper section **45** the lever plates **40** will disengage pawl **27** from the bolt restraint **31** causing compression spring **21** to rapidly extend, which in turn will rapidly move bolt **20** toward the forward end **11** of frame **12** as shown in FIG. **6**C. This forward movement of bolt **20** will impact and cause the bolt face **20**A to impact against lug L. This impact will serve to rotate the union U. The impact of the bolt face **20**A on the lug L can be repeated by extending the piston rod **44** from the cylinder **42** to compress the spring **21** to start the sequence over.

Compression spring **21** is shown as a coiled compression spring but may be any type of compression spring including a gas compression spring. Compression spring **21** may be selected to provide a desired predetermined spring force on bolt **20**. Additional compression springs **22** as shown in FIG. **5** may be inserted into the internal spring bore **25** of bolt **20** to increase the spring force and corresponding impact of the bolt **20** on the lug L. While compression springs **21** and **22** may be any type of compression spring, in most instances compression springs **21** and **22** will be die springs.

FIG. **7** shows an exploded view of a second embodiment of the safety wrench **10** designated as safety wrench **100**. In this embodiment the hydraulic cylinder assembly has been replaced by a lever handle **41** attached to lever plates **40** and a lever tension spring **43** attached to frame **12** and the lever plates **40**. The remaining components of safety wrench **100** are the same as those of safety wrench **10**.

The sequence of operation of safety wrench embodiment **100** is shown in FIGS. **9**A, **9**B, and **9**C and is substantially the same as that shown in FIGS. **6**A, **6**B, and **6**C. FIG. **9**A shows the safety wrench **100** with a union U positioned in lug pocket **18** with spacer **16**A engaged with a lug L. In this position the compression spring **21** is extended and bolt **20** is in a forward position.

Moving the lever handle **41** toward the forward end **11** of safety wrench **100** will pivot the lever plates **40** about bolt pin **26** and move the lower section **47** of the lever plates **40** rearward. The rearward movement of lower section **47** of the lever plates **40** will move the pawl pin **28** rearward in lever slots **17** as shown in FIG. **9**B. This rearward movement of pawl pin **28** will engage pawl **27** with one of the ratchet teeth **29** on the bolt **20** and slide the bolt **20** toward the rearward end **9** of the frame **12** along bolt race slots **23**A and **23**B. The rearward movement of bolt **20** will compress spring **21** within the internal spring bore **25** of bolt **20** against retaining pin **24**.

When the pawl **27** is engaged in the most rearward ratchet tooth **29**, continued forward pivotal movement of the upper section **45** the lever plates **40** will disengage pawl **27** from the bolt restraint **31** causing compression spring **21** to rapidly extend, which in turn will rapidly move bolt **20** toward the forward end **11** of frame **12** as shown in FIG. **9**C. This forward movement of bolt **20** will impact and cause the bolt face **20**A to impact against lug L. This impact will serve to rotate the union U. The impact of the bolt face **20**A on the lug L can be repeated by extending the piston rod **44** from the cylinder **42** to compress spring **21** to start the sequence over.

FIG. **10** through **13** show a third embodiment of the safety wrench **10** designated as safety wrench **200**. As shown in FIG. **10**, an isometric view, and FIG. **13**, an exploded view, the side plates **214** and the top plate **213** of frame **212** are modified to retain the components of rack and pinion mechanism **50** best shown in the side view of FIG. **12** that replaces the hydraulic cylinder assembly and lever mechanisms of the previously described embodiments. In safety wrench **200**, frame **212** is otherwise configured with a lug pocket **18** and tubular spacers **15**, **16**, and **16**A held in place by attachment bolts and nuts to maintain the desired space between side plates **214**. Slidably positioned within frame **212** of safety wrench **200** is a longitudinally extending bolt **220** having a forward end **19**A and a rearward end **191**, an internal spring bore **25**, longitudinally extending rearward bolt race slots **23**B, longitudinally extending forward bolt race slot **23**A, and a bolt face **20**A at forward end **19**A.

As best illustrated in FIG. **11**, a cutaway view at the forward end **11** of safety wrench **200**, shown as Detail B of FIG. **10**, the bolt **220** is slidably retained within the frame **212** by bolt pin **26** that extends transversely between side plates **214** of frame **212** through the forward bolt race slot **23**A of bolt **20**. Toward the rearward end **9** of frame **212**, a retaining pin **24** extends transversely between the side plates **214** and through corresponding rearward bolt race slots **23**B in the bolt **220** to slidably restrain the bolt **220** and to retain a compression spring **21** in the internal spring bore **25** of bolt **220**. A flat surface **24**A may be machined on the side of retaining pin **24** to aid in placement of compression spring **21** within the bolt **220**.

The rack and pinion mechanism **50** of safety wrench **200** shown in FIG. **12** is comprised of a linear gear rack **58** on the top surface of the retractable bolt **220** that engages with a pinion gear **60** mounted to frame **212**. The linear gear rack **58** has a plurality rack gear teeth **59** that engage with a plurality of equally spaced pinion gear teeth **62** arrayed around pinion gear **60**. A tooth gap **63** on pinion gear **60** separates the array of pinion gear teeth **62**. The rack and pinion mechanism **50** serves as alternate embodiment of bolt restraint **31** and as a mechanism to retract bolt **20** toward the rearward end **9** of Frame **212**.

The pinion gear **60** has an extending gear shaft **64** shown in FIG. **13**. The gear shaft **64** allows the pinion gear **60** to be connected for rotation by a variety of rotation devices such as hand operated power drills, drill drivers, or hammer drills. The pinion gear teeth **62** mesh with the spaced gear teeth **59** of the rack **58** on the bolt **220**.

FIGS. **14**A, **14**B, **14**C, and **6**D show the operation sequence of the safety wrench **200**. FIG. **14**A shows the safety wrench **200** positioned with lug pocket **18** receiving a union U with spacer **16**A engaged with lug L. In this position the compression spring **21** in the internal spring

bore **25** is extended and bolt **220** is in a forward position. Rotation of the pinion gear **60** will engage the pinion gear teeth **62** with the gear teeth **59** of the bolt gear rack **58** to begin to move the bolt **220** rearward along bolt race slots **23**A and **23**B as shown in FIG. **14**B. Continued rotation of the pinion gear **60** will continue rearward movement of the bolt **220** and will compress spring **21** within internal spring bore **25** against retaining pin **24** as the bolt **220** retracts reward along bolt race slots **23**A and **23**B as shown in FIG. **14**C. Further rotation of pinion gear **60** will position the tooth gap **63** in line with the gear rack **58** and disengage the pinion gear **60** from the gear rack **58** and release the bolt **220**. Releasing bolt **220** will allow the compressed spring **21** to rapidly extend, which in turn will move bolt **220** forward rapidly to impact the bolt face **20**A against a lug L as shown in FIG. **14**D. This impact will rotate the union U. The impact of bolt face **20**A on lug L can be repeated by continued rotation of the pinion gear **60** to engage pinion gear teeth **62** with the rack gear teeth **59** on bolt **220** to compress spring **21** to start the sequence over.

Because many varying and different embodiments may be made within the scope of the inventive concept disclosed in this specification, and because many modifications may be made in the described embodiments, it is to be understood that the details herein are to be interpreted as illustrative and not in any limiting sense.

We claim:

1. An apparatus for rotating a union having a plurality of radially extending lugs comprising:

a) a frame having a forward end and a rearward end;

b) a longitudinally extending bolt slidably mounted within said frame, said bolt having a forward end and a rearward end, a lower surface, an internal spring bore at said rearward end of said bolt, a forward bolt race slot, a rearward bolt race slot, and a plurality of bolt ratchet teeth arrayed longitudinally along said lower surface of said bolt;

c) a compression spring positioned in said spring bore of said bolt;

d) a retaining pin positioned transversely in said rearward bolt race slot of said bolt retaining said compression spring within said spring bore;

e) a lever having an upper section and a lower section;

f) a bolt pin pivotally mounting said lever between said upper and said lower sections of said lever, said bolt pin positioned transversely in said forward bolt race slot of said bolt;

g) a pawl pivotally attached to said lower section of said lever, said pawl biased toward said lower surface of said bolt;

h) whereby movement of said lever toward said forward end of said frame will pivot said lower section of said lever rearward to engage said pawl with said bolt ratchet teeth on said bolt to releasably restrain said bolt from forward motion and move said bolt rearward within said frame along said forward and rearward bolt race slots thereby compressing said compression spring against said retaining pin; and

i) wherein disengagement of said bolt from said pawl will extend said bolt to impact a radially extending lug on a union.

2. The apparatus as recited in claim **1**, wherein rearward movement of said bolt will disengage said bolt from said pawl.

3. The apparatus as recited in claim **2** wherein said frame is repositionable on said union to impact said lug on said union from the opposite direction.

4. The apparatus as recited in claim **3**, wherein said frame has a pocket for receiving said union.

5. The apparatus recited in claim **3** wherein said compression spring is comprised of at least two coiled compression springs positioned in said internal spring bore of said bolt.

6. The apparatus as recited in claim **5** wherein at least one of said coiled compression springs is a die spring.

7. The apparatus as recited in claim **3**, wherein said lever is pivoted manually.

8. The apparatus as recited in claim **3**, wherein said lever is pivoted by extension of a piston rod from a hydraulic cylinder.

9. An apparatus for rotating a union comprising:

a) a union having a radially extending lug;

b) a frame having a forward end, a rearward end, and a pair of spaced apart side plates;

c) a longitudinally extending bolt slidably mounted within said frame, said bolt having a forward end and a rearward end, and an internal spring bore at said rearward end of said bolt;

d) a compression spring positioned within said internal spring bore of said bolt, wherein said compression spring will compress upon movement of said bolt toward said rearward end of said frame;

e) a releasable bolt restraint engaged with said bolt, said bolt restraint restraining said bolt from forward movement when said bolt is moved toward said rearward end of said frame; and

f) wherein disengagement of said bolt from said bolt restraint will extend said compression spring to move said bolt toward said forward end of said frame to impact said lug on said union with said forward end of said bolt.

10. The apparatus as recited in claim **9** wherein said frame is repositionable on said union to impact said lug on said union from the opposite direction.

11. The apparatus recited in claim **10** wherein said compression spring is comprised of at least two coiled compression springs positioned within said internal spring bore of said bolt.

12. The apparatus as recited in claim **11** wherein at least one of said coiled compression springs is a die spring.

13. The apparatus as recited in claim **10** wherein said releasable bolt restraint includes a pawl pivotally mounted on said frame wherein said pawl is engaged with ratchet teeth on said bolt.

14. The apparatus recited in claim **13** wherein said bolt is moved toward said rearward end of said frame by a lever pivotally mounted to said frame.

15. The apparatus as recited in claim **14** wherein said lever is moved by a hydraulic cylinder and piston assembly mounted on said frame.

16. The apparatus recited in claim **10** wherein said bolt has a plurality of rack gear teeth and wherein said bolt is moved toward said rearward end of said frame by rotation of a pinion gear having a plurality of pinion gear teeth engaged with said rack gear teeth on said bolt.

17. The apparatus recited in claim **16** wherein said releasable bolt restraint includes a pinion gear having a gap in said a plurality of pinion gear teeth.

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