PATENTS EXAMINATION BOARD

Subject: The Drafting of Patent Specifications - Paper ~~2~~ 1

Date: July 2023

Time: 09h00 -13h00 (although candidates requiring extra time are entitled to an additional two hours)

Examiners: L Cilliers
V Williams

Moderator: J D Whittaker

Question 1

Your client hands you the following description and drawings for his new device that helps maintain the integrity of a drain pipe system made of cast iron when subjected to abnormal internal pressures.

In a typical building drain piping system, sections of cast iron drain or DWV (drain, waste and vent) pipe and their fittings are assembled by butting the ends of the pipe sections together and bridging the joints with water-tight rubber or rubber/metal couplings. These abutting pipes and fittings are secured together and sealed with metal band screw clamps tightened to about 60 in-lb of torque to compress the tubular sleeves. This is commonly called a "no-hub" cast iron system. Building drain or DWV piping is considered a low-pressure application typically operating at about 5 psi or less when in service. Such piping systems are not usually subject to the rigorous engineering of a pressurized pipe system. However, under "high" pressures, e.g., above 15-20 psi, such as might occur within the piping system when drains become blocked in a multi-story building or under system pressure testing, these joints and fittings have a tendency to move and sometimes separate, with resulting leakage and property damage. The thrust forces involved in causing the separation can vary from a few hundred pounds to several thousand pounds, depending on the size of the pipe and the number of floors behind the drain back-up. Such joint failures tend to occur at or near the point where the drain piping changes direction from vertical to horizontal, particularly as commonly occurs at the base of a multi-story vertical "stack" of pipe, such as at the building ground floor. There is no standard solution to this, and not every building contractor takes the pains to address it. A common method of dealing with the potential problem is to fabricate some kind of "splint" system on-site to reinforce major vertical-to-horizontal transitions in the

piping, using bulky and often expensive combinations of threaded rod, fasteners, scrap or fabricated metal or heavy pipe "riser clamps" which are large, usually heavy-gage metal clamps and which are commonly used to support the weight of vertical pipe runs by resting on the decks of consecutive building floors. Photos of a typical clamp used to secure pipes before and after a bend to a wall, floor or ceiling are shown below marked Prior Art. There is thus a need for a way to restrain movement in the joints adjacent to a bend in the drain/DVW piping, and to reduce the solution down to a simple, standardized, easily transported and installed device, which can be capable of working with a range of pipe sizes, pipe types, and pipe pressures.

An embodiment of the new pipe restraint is show in the drawings wherein:

FIG. 16 is a perspective view of the restraint device of the invention in operation;
FIG. 17 is a perspective view of the restraint device of FIG. 16 without the pipes and sealing sleeves;
FIG. 18 is an enlarged perspective view of a portion of FIG. 16 showing the connection between an inner strap and pipe connectors of the restraint device;
FIG. 19 is a lower perspective view of the restraint device illustrated in FIG. 16;
FIG. 20 is a cross-sectional view of the restraint device illustrated in FIG. 19;
FIG. 14 is a perspective view of an inner strap of the restraint device, with an adjustable length or adjustable force connection on each end of the strap; and
FIG. 15 is a perspective view of an outer strap of the restraint device with an adjustable length or adjustable force connection on each end of the strap.

*FIG. 16 of the drawings illustrates a restraint device according to the invention for restraining a curved section of pipe **16** in abutment with an upstream section of pipe **18a** and a downstream section of pipe **18b**. These sections of pipe **16**, **18a** and **18b** are arranged so that fluid can flow through the pipe sections in the direction of the arrow **13**.*

*With reference also to FIG. 17 of the drawings, the restraint device includes an elongate inner strap **12i**, an elongate outer strap **12o**, and two pipe connectors **14a** and **14b**. The pipe connector **14a** is fastened to a first end of the inner strap **12i** and a first end of the outer strap **12o**, and the pipe connector **14b** is fastened to a second end of the inner strap **12i** and a second end of the outer strap **12o**. As best shown in FIGS. 16 and 20, a first end **17a** of the curved section of pipe **16** is connected to the upstream section of pipe **18a** with a tubular sealing sleeve **20a**, and a second end **17b** of the curved section of pipe **16** is connected to the downstream section of pipe **18b** with a tubular sealing sleeve **20b**.*

*The sealing sleeves **20a** and **20b** serve to seal the joints between the curved section of pipe **16** and the sections of pipe **18a** and **18b** (see FIGS. 18 to 20). These sealing sleeves **20a** and **20b** typically are made of rubber, or of metal with an inner liner made of an elastomeric or other sealing material. A series of clamps **22** compress the sealing sleeve **20a** on either side of the joint between the curved section of pipe **16** and the upstream section of pipe **18a** to form a seal on either side of this joint. Similarly, a series of clamps **22** compress the sealing sleeve **20b** on either side of the joint between the curved section of pipe **16** and the downstream section of pipe **18b** to form a seal on either side of this*

*joint. The clamps **22** may be hose clamps or ring clamps, and may, in addition to serving a sealing function, also serve to strengthen the joint.*

*In the illustrated embodiment, the pipe connectors **14a** and **14b** of the restraint device are fastened directly to the pipe sections **18a** and **18b**, respectively. However, these connectors **14a** and **14b** may be fastened around portions of the sleeves **20a** and **20b** extending over the pipe sections **18a** and **18b** to assist in the formation of seals adjacent the respective pipe joints. In this way, the straps **12i** and **12o** are fastened to the sections of pipe **18a** and **18b** via the pipe connectors **14a** and **14b**.*

*Advantageously, to accommodate larger forces in the straps **12i** and **12o**, each pipe connector **14a** and **14b** comprise a split ring connector (sometimes called a pipe clamp or riser clamp) having two parts **38L** and **38R** (Left & Right, respectively), each of which has a curved portion **40** and two distal end flanges **42L** and **42R** extending generally radially outward. A bolt and nut arrangement **44** extends through holes in each pair of adjacent end flanges **42L** and **42R** to clamp the respective pipe connector **14a** and **14b** to the respective sections of pipe **18a** and **18b**.*

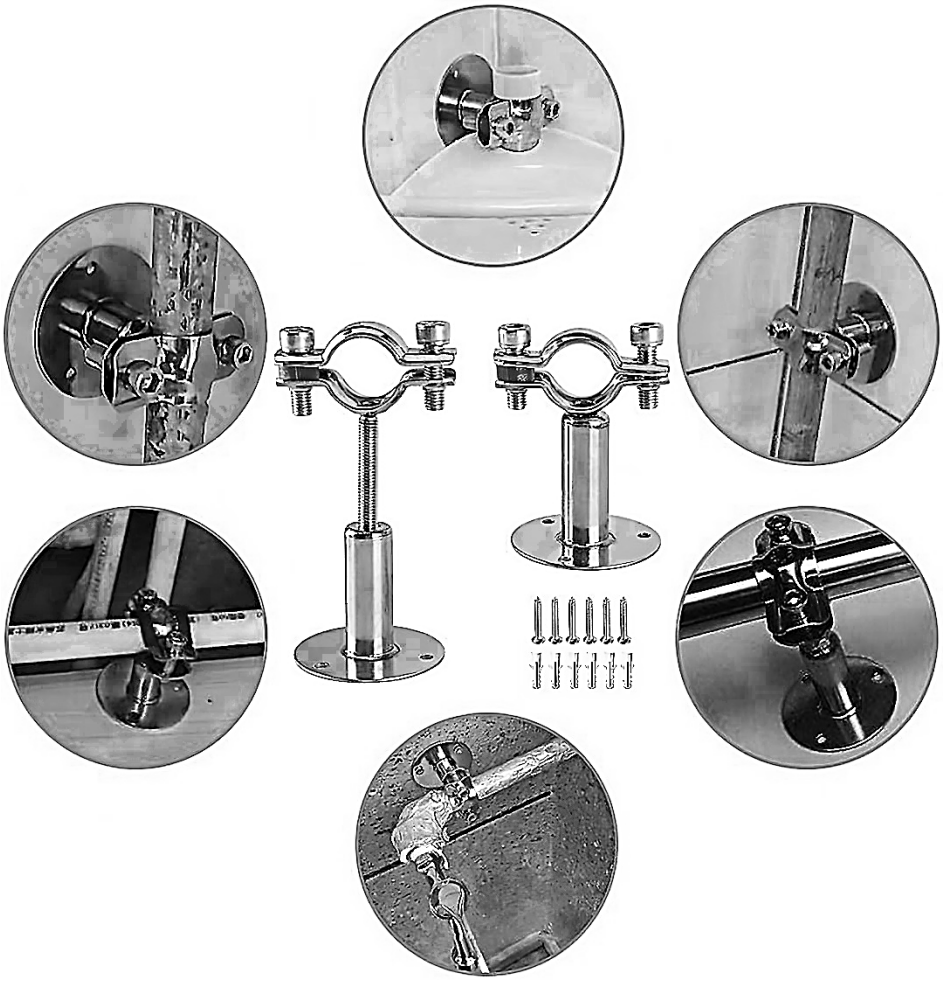
*FIG. 14 shows each end of the inner strap **12i** folded back on itself to accommodate, and anchor, an end portion of a T bolt **30**. The folded back portion of the inner strap **12i** may be fastened to the strap by bolts or rivets **34**. The T bolt **30** carries an external thread on a portion **32** thereof, as shown, which is engageable with a nut **36**. In use, the portion **32** of each T bolt is passed through an opening in one of the pipe connectors **14a** and **14b** and is retained in the relevant connector by means of the nut **36**, thereby fastening the strap to the connector. FIG. 15 illustrates similar components on the outer strap **12o**.*

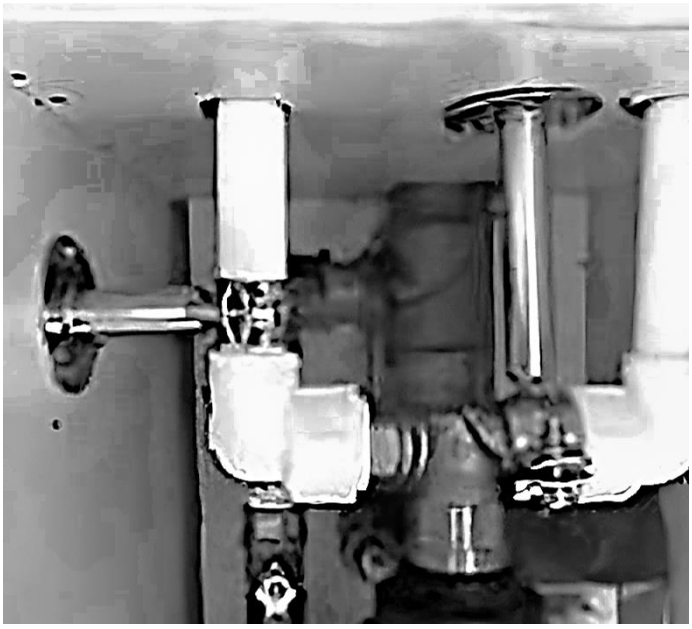
*In operation, if the pressure within the sections of pipe **16**, **18a** and **18b** increases to pressures above 15-20 psi, for example due to a blocked drain, these pressures, in the absence of the restraint device, typically cause displacement of the sections of pipe **18a** and **18b** relative to the curved section of pipe **16**. Such displacement usually results in the opening of either or both of the joints between the respective pipe sections, and consequent leaking at these joints. The purpose of the restraint device of the invention is to avoid, or at least limit, such displacement so as to prevent leaks at the joints between the various pipe sections. In this regard, with the connectors **14a** and **14b** of the restraint device fastened to the sections of pipe **18a** and **18b**, the straps **12i** and **12o** can receive tensile loads which resist displacement of the pipe sections relative to one another, and consequently any significant opening of the joints between these pipe sections.*

*It is to be appreciated that the ends of pipe sections **16**, **18a** and **18b** are of the same general size and shape, and typically abut against each other. The pipes are preferably made of cast iron, but could be made of other materials, including, but not limited to, plastic or steel.*

The candidate is required to identify the inventive feature(s) of the invention, and to draft up to three claims to protect the above invention.

Prior Art





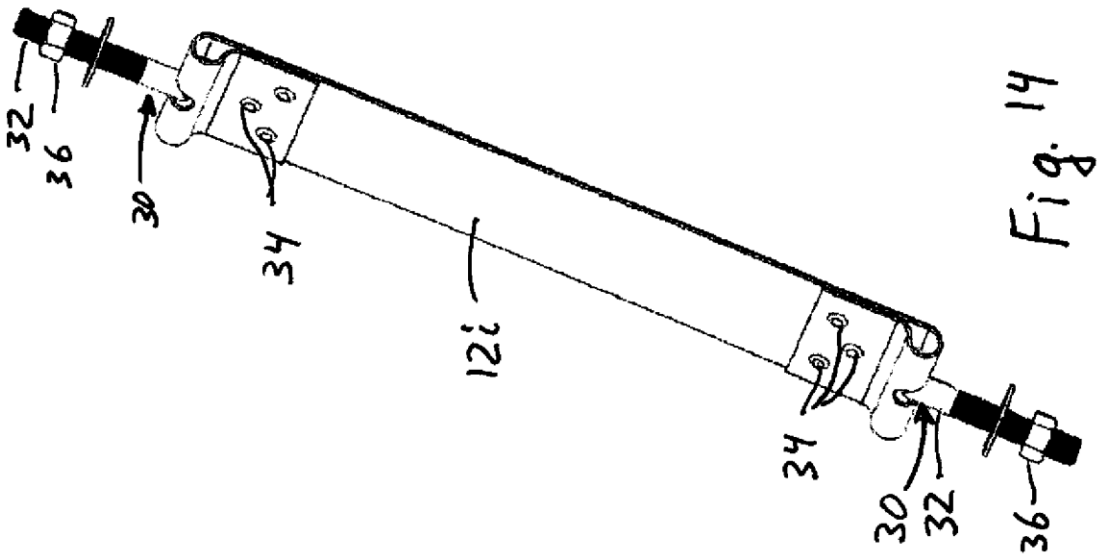


Fig. 14

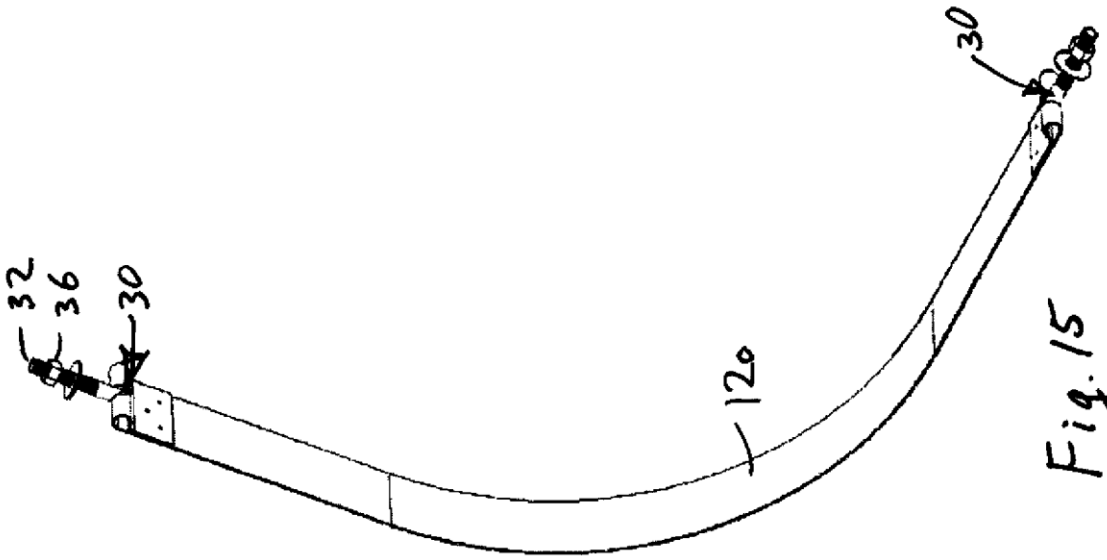


Fig. 15

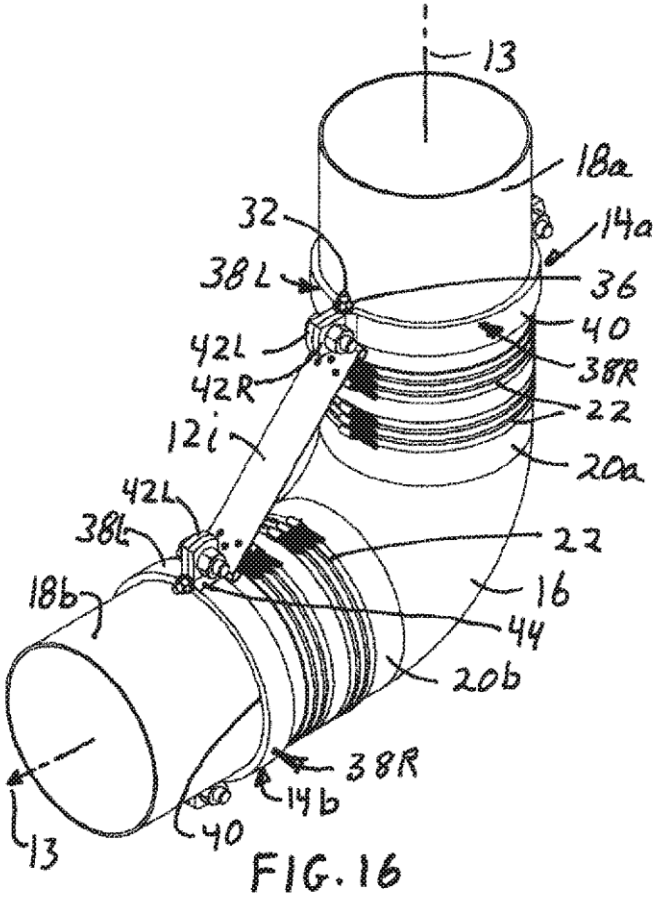

13
18a
32
14a
38L
36
40
42L
38R
42R
22
12i
20a
42L
38L
22
18b
16
44
20b
38R
14b
13
40

FIG. 16

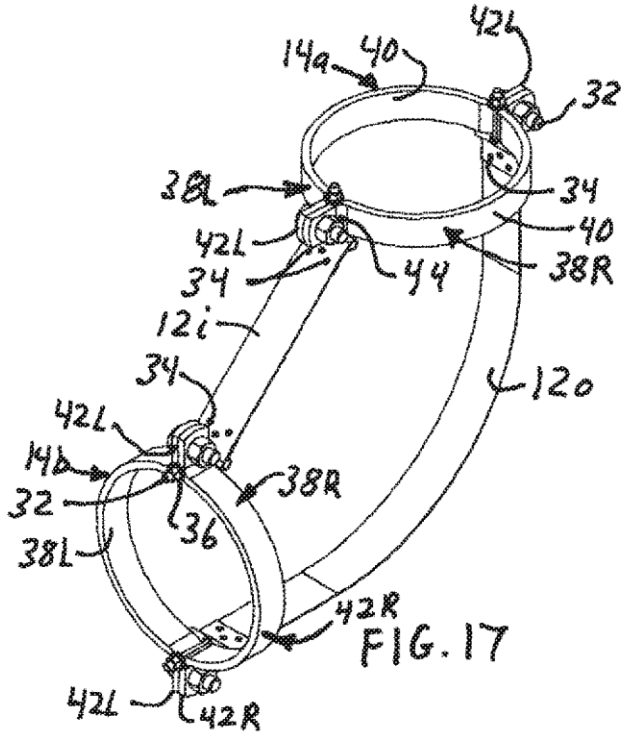

42L
14a
40
32
38L
34
42L
40
34
44
38R
12i
34
12o
42L
14b
38R
32
36
38L
42R
42L
42R

FIG. 17

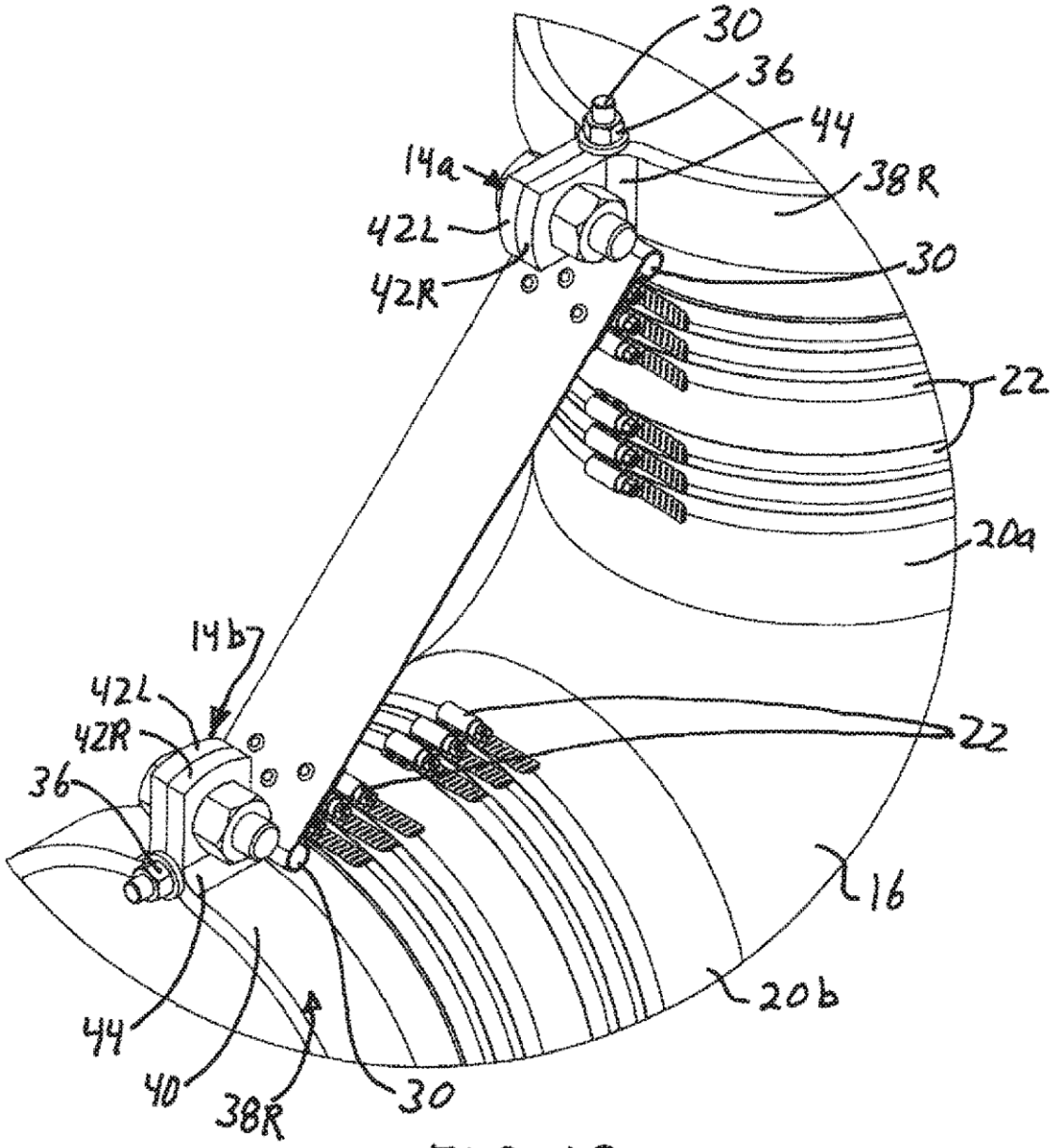

30
36
44
14a
38R
42L
42R
30
22
20a
14b
42L
42R
36
22
16
20b
44
40
38R
30

FIG. 18

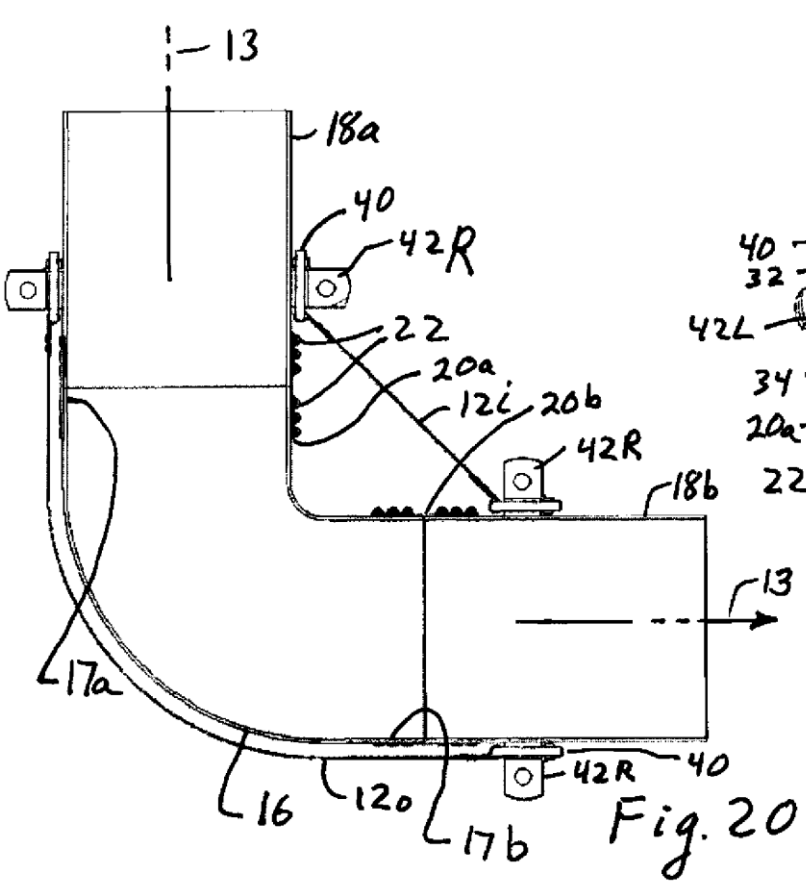

13
18a
40
42R
22
20a
12i
20b
42R
18b
13
17a
16
12o
17b
42R
40

Fig. 20

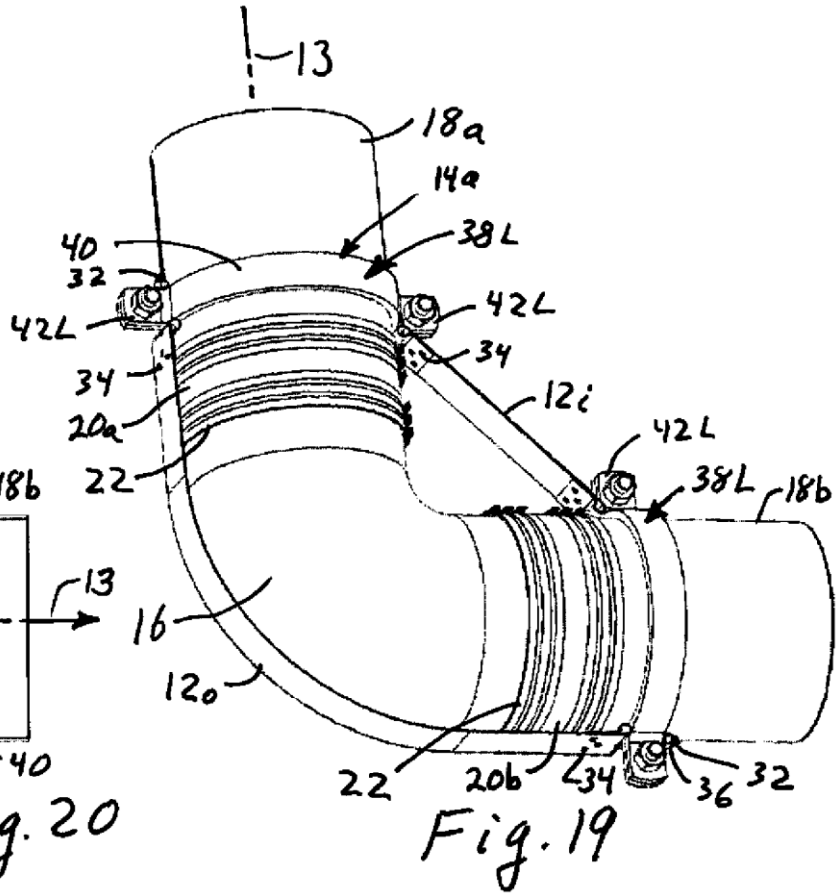

13
18a
14a
40
32
38L
42L
42L
34
34
12i
20a
22
42L
38L
18b
16
12o
22
20b
34
36
32

Fig. 19

Question 2

Your client hands you a drawing of his new welding helmet 10 which comprises a head brace 12 which is mountable on a head 14 of a user. In addition, the welding helmet 10 includes a facemask 16 which is connected to the head brace 12 and which has an aperture (not visible) therethrough through which a user can see. The head brace 12 is adjustable so as to permit the aperture in the facemask 16 to be positioned in a user's line of sight. The facemask 16 is pivotally connected to the head brace 12 via a pair of pivot pins 18 (one of which is shown in the drawing) for pivotal displacement between a lowered position (shown in the drawing) and a raised position which is not shown. The welding helmet 10 further includes an optical filter 20 which is hingedly connected via a hinge 22 to the facemask 16 for rotational displacement between an eye protecting position (shown in solid lines in the drawing) and an open position (shown in broken lines in the drawing). In its eye protecting position, the filter 20 covers the aperture in the facemask 16 thereby permitting a user to view a welding operation without injury to the user's eyes.

The welding helmet 10 also includes a solenoid 28 mounted to an inner surface of the facemask 16, and an elongate connecting element 30 connected at its one end to the solenoid 28 and at its other and to the filter 20. The connecting element 30 extends through a hole 32 in the facemask 16, as shown. It should be appreciated that the solenoid 28 may be mounted to the outer surface of the facemask 16. A power source (not shown), typically in the form of a battery, is provided in order to energize the solenoid 28.

The solenoid 28 is connected to a mouthpiece 34 which incorporates a switch which could, for example, be a normally open switch comprising two spaced apart contacts which are closed by compressing the mouthpiece 34. The switch could then be closed by a user biting on the mouthpiece 34 thereby activating the solenoid 28 which in turn would move the filter 20 between the eye protecting and the open positions shown in solid and dotted lines respectively. The mouthpiece 34 may also include a pressure sensor for sensing a change in the pressure in a user's mouth to allow sucking or blowing by the user to activate the solenoid 28.

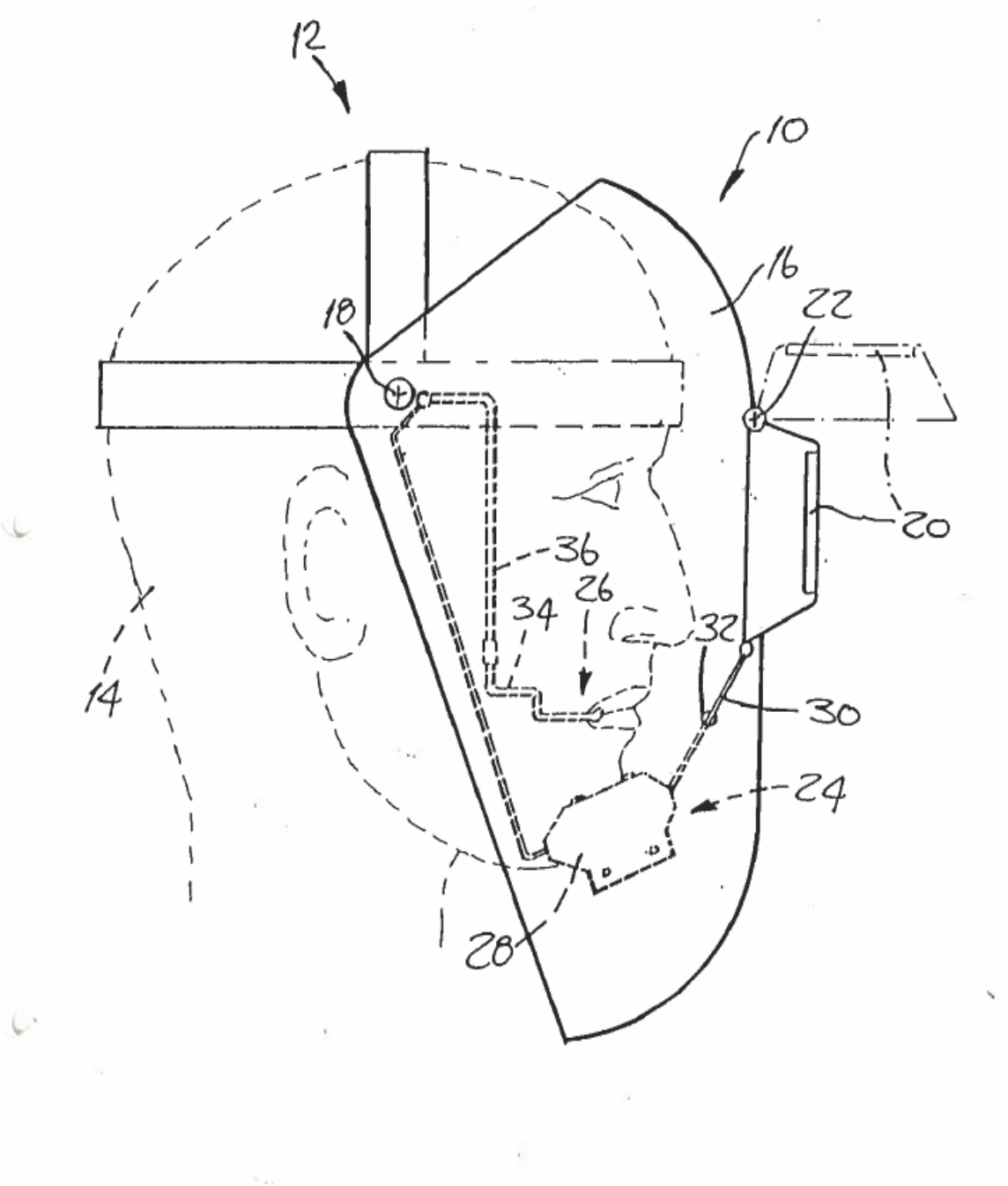
In order to facilitate hygienic use of the welding helmet 10, the mouthpiece 34 is removably connected to a support arm 36. Hence, the mouthpiece 34 can be discarded when dirty or can be removed and cleaned. Further, when the welding helmet 10 is to be used by more than one person, each person may be provided with his own mouthpiece 34 or set of mouthpieces thereby obviating the need to

share mouthpieces. The mouthpiece 34 can also be color-coded to facilitate identification of a user's personal mouthpiece.

In use, the welding helmet 10 is worn in a conventional manner with the head brace 12 being adjusted such that the aperture in the facemask 16 is in the user's line of sight when the facemask 16 is in its lowered position. The user positions the mouthpiece 34 in his or her mouth and then bites, sucks or blows on the mouthpiece 34, as the case may be, to energize the solenoid 28 and thereby open or close the filter 20. The filter 20 will remain in its position until the user once again bites, sucks or blows on the mouthpiece 34 thereby energizing the solenoid 28 to move the filter 20.

Your client tells you that the filter 20 on a conventional welding helmet has to be moved between the open and eye protecting positions by hand. A major advantage of your client's new welding helmet 10 over conventional welding helmets is that it is not necessary to displace the filter 20 by hand, and this leaves both of the user's hands free to perform the welding operation. It is also to be appreciated that, as the user would normally be wearing bulky welding gloves, moving the filter 20 by hand is not an easy operation to perform.

The candidate is required to identify the inventive feature(s) of the invention, and to draft up to three claims to protect the above invention.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