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FOR	Apparatus for Removable Insertion into an Excavated Trench to Protect Worker Against Collapse of Trench Wall

U.S. Patent and Trademark Office
Customer Service Window Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria, VA 22314
U.S.A.

Dear Sir:

Responsive to the Office Action dated October 26, 2022 and further to filing of a
Request for Continued Examination (2nd request):

Explanation of Amendments in the Claims:

1-22. (cancelled)

23. (currently amended) A method for excavating and preventing collapse of a trench in ground material to receive a worker therein comprising:

providing an upstanding tubular wall having a cylindrical exterior surface from an open top of the tubular wall to an open bottom thereof, wherein the upstanding tubular wall has an interior between the open top and the open bottom and configured to receive the worker therein;

~~resting~~ arranging the upstanding tubular wall on in contact with a surface of the ground material;

~~with~~ after arranging the upstanding tubular wall resting on in contact with the surface of the ground material, removing ground material underneath the tubular wall through [[an]] the interior thereof the tubular wall until the open bottom of the tubular wall is located at a prescribed depth below the surface of the ground material to define a floor of the trench, whereby to (i) excavate the trench is excavated to conform to an exterior cross-section across a height of a portion of the upstanding tubular wall below the surface of the ground material and whereby (ii) lower the tubular wall is lowered into the ground material by gravity when the ground material is removed from underneath the upstanding tubular wall;

after removing ground material underneath the tubular wall to excavate the trench and lower the tubular wall into the ground material, leaving the tubular wall in the trench in the ground material to reinforce the trench until work to be performed by the worker in the trench has been completed and leaving the interior of the tubular wall free of filler material to define, within said interior, a working space for the worker to perform the work, wherein the working space is adjacent the floor of the trench on which the open bottom of the tubular wall is resting; and

after ~~the work performed by the worker~~ in the trench ~~[[is]]~~ has been completed by the worker, removing the tubular wall from the ground material.

24. (cancelled)

25. (currently amended) The method of claim ~~[[24]]~~ 30 wherein stacking said another tubular wall onto the tubular wall in the ground material comprises stacking the arcuate wall sections ~~are stacked~~ one at a time onto the tubular wall in the ground material and interconnecting the arcuate wall sections to form said another tubular wall on top of and coaxial with the tubular wall in the ground material.

26. (currently amended) The method of claim ~~[[24]]~~ 30 wherein the arcuate wall sections are substantially identical to each other.

27. (currently amended) The method of claim ~~[[24]]~~ 30 wherein each arcuate wall section spans 180 degrees around an upstanding axis thereof.

28. (currently amended) The method of claim ~~[[24]]~~ 23 wherein removing ground material through ~~[[an]]~~ the interior of the tubular wall to excavate the trench and lower the tubular wall into the ground material is performed using hydro excavation.

29. (new) The method of claim 23 wherein, when the prescribed depth of the floor of the trench exceeds a height of the tubular wall between the open top and the open bottom thereof, the method further includes:

before a depth of the trench relative to the surface of the ground material exceeds the height of the tubular wall, stacking, onto the tubular wall in the ground material in coaxial alignment therewith, another tubular wall having:

a cylindrical exterior surface between an open top of said another tubular wall and an open bottom thereof and having a matching exterior cross-section to the tubular wall in the ground material across a full height of said another tubular wall; and

an interior between the open top of said another tubular wall and the open bottom thereof and configured to receive the worker therein.

30. (new) The method of claim 29 wherein said another tubular wall is formed from a plurality of interconnectable self-standing arcuate wall sections.

31. (new) The method of claim 23 wherein, when the tubular wall encompasses an axis, the tubular wall comprises tubular sheathing encompassing the axis and a frame internal to the tubular sheathing and attached to an interior surface thereof, wherein the frame includes annular members encompassing the axis and arranged at axially spaced positions of the tubular sheathing and axially-extending cross members of the frame interconnecting the annular members.

REMARKS:

The above-referenced Office Action states that claims 23-28 are rejected under 35 U.S.C. 102 and 103 based at least on Thompson, Jr. in view of Byrne, Jr.

In response, independent claim 23 has been amended to clarify that the claimed invention is patentably distinguished from the cited prior art by the following features:

a) ***providing an upstanding tubular wall having a cylindrical exterior surface from an open top of the tubular wall to an open bottom thereof, wherein the upstanding tubular wall has an interior between the open top and the open bottom and configured to receive the worker therein;***

b) ***arranging the upstanding tubular wall in contact with a surface of the ground material; and***

c) ***after arranging the upstanding tubular wall in contact with the surface of the ground material, removing ground material underneath the tubular wall through the interior thereof until the open bottom of the tubular wall is located at a prescribed depth below the surface of the ground material to define a floor of the trench, whereby the trench is excavated to conform to an exterior cross-section across a height of a portion of the upstanding tubular wall below the surface of the ground material and whereby the tubular wall is lowered into the ground material by gravity when the ground material is removed from underneath the upstanding tubular wall;***

d) ***after removing ground material underneath the tubular wall to excavate the trench and lower the tubular wall into the ground material, leaving the tubular wall in the trench in the ground material to reinforce the trench until work to be performed by the worker in the trench has been completed and leaving the interior of the***

tubular wall free of filler material to define, within said interior, a working space for the worker to perform the work, wherein the working space is adjacent the floor of the trench on which the open bottom of the tubular wall is resting; and

e) after work performed by the worker in the trench reinforced by the upstanding tubular wall has been completed, removing the tubular wall from the ground material.

The amendments are believed to be supported by the application as filed. Furthermore, and with particular respect to feature c) above, the person of ordinary skill in the art would understand that if the tubular wall is lowered when the ground material is excavated from the bottom of the tubular wall, this lowering occurs due to gravity. Moreover, and with respect to feature d) above, the person of ordinary skill in the art would understand that if the tubular wall is to act as a reinforcing wall for the trench, in which work is to be performed, the interior of the tubular wall remains free of filler material after installation of the tubular wall in the trench and before removal of the tubular wall from the ground material, so that a bottom of the trench is accessible.

It is submitted that neither Thompson Jr. nor Byrne Jr., alone or in combination, disclose the combination of features a) through e) above.

Regarding **feature a)** above, **Thompson Jr.** teaches a caisson pipe having a diameter of between 12 and 24 inches (col. 2 lines 44-46). This is not large enough to provide an interior suited for receiving a person, that is a worker, therein.

Still referring to **feature a)** above, **Byrne Jr.** teaches caisson construction in which there is a shoe member at the bottom of the caisson sections and having an enlarged diameter so that caisson sections on top thereof will be slightly spaced away from the

surrounding earth (lines 27-31, Figs. 1 and 2). Therefore, an outer or exterior surface of a caisson constructed according to the teaching of Byrne Jr. is not cylindrical.

Regarding the combination of **features b) and c)** above, which relate to lowering of the tubular wall into the ground, the Office Action admits on page 3 that **Thompson Jr.** is relied upon as showing a caisson removal method, while Byrne Jr. is relied upon as showing caisson installation steps. Thus, Thompson Jr. does not positively teach steps analogous to features b) and c) of the claimed invention.

Still referring to **features b) and c)** above, **Byrne Jr.** teaches at lines 27-31 that caisson sections above the shoe member at the bottom will be slightly spaced away from the surrounding earth, such that the space is filled with water to facilitate their downward movement (lines 31-37). Thus, the trench formed by sinking the arrangement of Byrne Jr. does not conform to an exterior cross-section across a height of a sunken portion of the caisson of Byrne Jr., that is across a height of the portion of the caisson below the surface of the ground material.

Regarding **feature d)** above, even though **Thompson Jr.** may not positively teach installation or use of a caisson, and further, despite teaching that the caisson is not suited to receive a worker therein (based on diameter provided at col. 2 lines 44-46), Thompson Jr. discloses in relation to caissons that are removed according to the teachings thereof a caisson driven into the ground in Figs. 1-3, such that an open bottom of the caisson is located below a surface of ground material (in a body of water) and such that a lower portion of the caisson, which defines the bottom driven into the ground, is accordingly filled with ground material (by virtue of being driven into the ground). Thus, during use, and prior to removal according to the teachings of Thompson Jr., (i) the bottom of the caisson is not resting on a floor of a trench (there is no trench) and (ii) the interior between the open top and bottom is not free of filler material.

Still referring to **feature d)** above, **Byrne Jr.** teaches that after sinking the caisson to the desired depth, it is filled with concrete which solidifies to make a permanent

support or foundation (lines 11-13). Therefore, the interior of the caisson arrangement of Byrne Jr. is not free of filler material.

Regarding **feature e)** above, **Thompson Jr.** does not teach that a worker performs work inside the caisson, as the caisson is not large enough for a person or worker to be inside the same (col. 2 lines 44-46).

Still referring to **feature e)** above, the Office Action admits that **Byrne Jr.** does not teach removal of the caisson, and for this Thompson Jr. is relied upon. However, **Thompson Jr.** teaches at col. 2 lines 42-51 that the lower end 16 of the caisson (to be removed) was driven into the ground. Therefore, the person of ordinary skill in the art would not apply the teachings in Thompson Jr. to even attempt to remove the caisson arrangement of Byrne Jr. in which the caisson is not driven but rather lowered by gravity when earth from inside the shoe member is removed (lines 65-71).

Moreover, **Byrne Jr.** teaches that after sinking the caisson to the desired depth, it is filled with concrete which solidifies to make a permanent support or foundation (lines 11-13). Since the caisson is filled with concrete, the person of skill in the art would understand that the caisson is permanent and would not attempt removal from the ground.

Based on the foregoing, it is believed that the claimed invention of claim 23 is patentably distinguished from the cited prior art, such that the current rejection based on same is overcome.

AMENDMENTS BEYOND INDEPENDENT CLAIM 23

Additionally, the following amendments have been made:

- Claim 24 is cancelled in favor of new claims 29 and 30 and amended claim 25;
- Dependencies of Claims 26-28 have been amended to follow new claim 30;
- Claims 26 and 28 have been amended for clarity;

-New Claim 31 is presented to a structure of the tubular wall, which is believed to further patentably distinguish the claimed invention of claim 23 over the cited prior art.

IN CLOSING

Favorable reconsideration of the application is respectfully requested.

Respectfully submitted
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