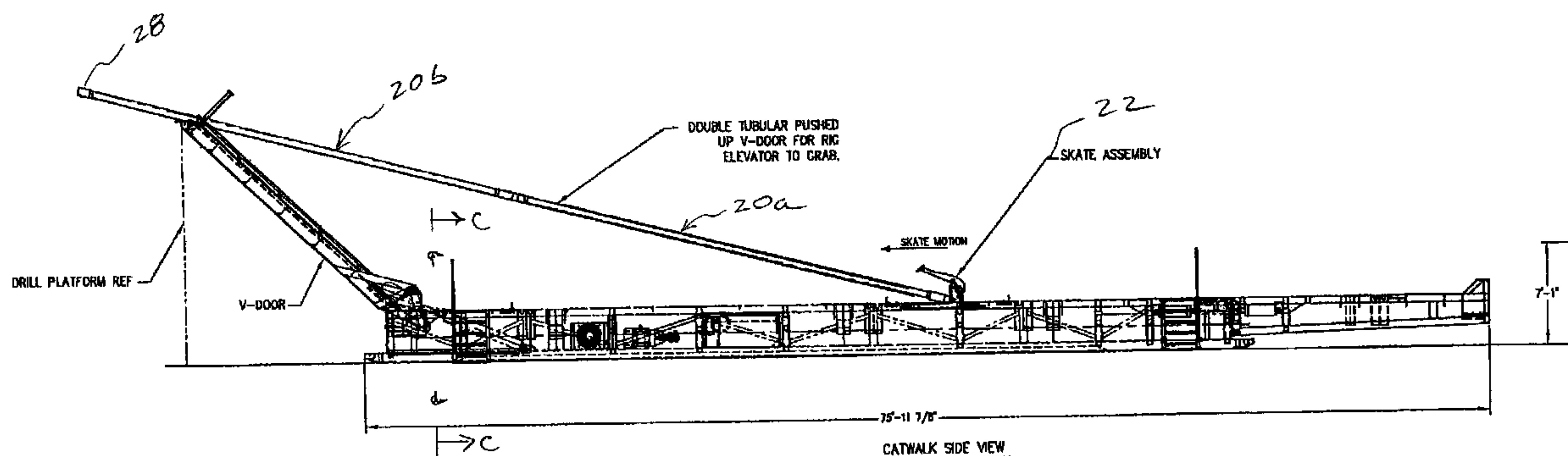




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(54) Titre : DISPOSITIF ET METHODE DE CONSTITUTION DE PODIUMS  
(54) Title: APPARATUS AND METHOD FOR FORMING STANDS



(57) **Abrégé/Abstract:**

A catwalk apparatus for forming stands from individual tubulars comprises a frame having a top surface adapted to receive tubulars. The apparatus also includes a skate mechanism capable of pushing and pulling the tubulars once loaded on the apparatus. The apparatus is adapted to receive at least two tubulars in a coaxial arrangement. The apparatus includes a rotating means for oppositely rotating the tubulars along their longitudinal axes. The skate mechanism is used to advance the tubulars together during rotation so as to allow cooperatively threaded ends of the tubulars to engage thereby forming a stand. The skate mechanism is also used to urge the stand towards the drill rig for subsequent hoisting and orienting vertically. A method and system for forming tubulars is also provided.

**APPARATUS AND METHOD FOR FORMING STANDS**1  
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14**ABSTRACT**

A catwalk apparatus for forming stands from individual tubulars comprises a frame having a top surface adapted to receive tubulars. The apparatus also includes a skate mechanism capable of pushing and pulling the tubulars once loaded on the apparatus. The apparatus is adapted to receive at least two tubulars in a coaxial arrangement. The apparatus includes a rotating means for oppositely rotating the tubulars along their longitudinal axes. The skate mechanism is used to advance the tubulars together during rotation so as to allow cooperatively threaded ends of the tubulars to engage thereby forming a stand. The skate mechanism is also used to urge the stand towards the drill rig for subsequent hoisting and orienting vertically. A method and system for forming tubulars is also provided.

## APPARATUS AND METHOD FOR FORMING STANDS

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### FIELD OF THE INVENTION

**[0001]** The present invention relates to pipe handling apparatuses and, more specifically, to apparatuses and methods for drilling operations wherein stands are formed from tubulars.

### DESCRIPTION OF THE PRIOR ART

**[0002]** Various ground drilling operations are known such as exploring and/or extracting oil from subterranean deposits. The drilling operation is conducted on a drill rig comprising a raised drilling platform located above the drilling location. A derrick is provided on the platform to raise, support and rotate a drill string. A drill string includes a drill bit for boring into the ground. As the drilling operation continues, tubular members, commonly referred to as “tubulars” are connected in an end to end manner to form a drill string. Tubulars are commonly about 30 feet in length and have opposing female and male ends. The ends are threaded in a complementary manner so that opposing male and female ends can be joined together.

**[0003]** The addition of a tubular to an existing drill string is a relatively time consuming and dangerous procedure. Tubulars are provided on a rack from which they are individually rolled onto a horizontal support, such as a catwalk. Both the rack and catwalk are generally located adjacent to the drilling platform with the catwalk being generally positioned perpendicular to the platform. Once on the catwalk, one end of the tubular is attached to a hoist connected either directly or indirectly to the derrick and raised to a vertical position on the drilling platform. The lower end of the tubular is then oriented over the existing drill string and connected to the terminal, surface end of thereof. Following connection of the tubular to the drill string and “torquing” to establish a tight connection, the drilling operation is continued. As indicated above, tubulars are generally about 30 feet (10m) in length. As such, the frequency of adding tubulars to the drill string is high and, therefore, the efficiency of the drilling operation is hampered. In addition, the above described manipulation of the tubulars often requires manual handling and, therefore, increases the risks to the drill rig personnel.

**[0004]** Various apparatuses and methods have been proposed for handling tubulars such as those provided in the following US patents: 4,547,110; 4,486,137; 6,220,807; 6,705,414;

1 6,854,520; 6,969,223; 6,976,540; and 6,997,265. The entire disclosures of which are  
2 incorporated herein by reference.

3 **[0005]** In order to increase the efficiency of the drilling operation, various methods have  
4 been proposed to pre-connect at least two tubulars, to form a "stand", prior to connection to the  
5 drill string. Such a process is often referred to as "standbuilding". As will be appreciated, such  
6 pre-connection step involving two tubulars will reduce by half the number of connections  
7 required to be made to the drill string and, therefore, allows the drilling process to continue with  
8 fewer interruptions. An example of such a standbuilding procedure is provided in related US  
9 patents 6,976,540 and 6,997,265. In these references, a tubular is rolled from a rack onto a ramp  
10 positioned adjacent the drilling platform. One end of the tubular is raised by a hoist to a vertical  
11 orientation above the drilling platform. The tubular is then inserted into an opening in the  
12 drilling platform adjacent to the existing drill string. A further tubular is then vertically hoisted  
13 and aligned above the first tubular. The opposing ends of the two tubulars are then connected  
14 together to form a vertical, dual tubular stand. The stand is then raised and secured to the drill  
15 string. During formation of the stand, the drilling operation is continued without interruption.

16 **[0006]** Another example of a standbuilding operation is provided in US patent 6,705,414. In  
17 this reference, a stand is formed on a horizontal catwalk associated with a drilling platform.  
18 According to the disclosed method, two pairs of tubulars are positioned end to end on the  
19 catwalk. A "bucking machine" is then used to join the two tubulars. The bucking machine  
20 includes jaws that grasp and axially rotate the tubulars in opposite directions so as to engage the  
21 threads on the respective ends and to torque the connection to the desired value. Two stands are  
22 formed in this manner, which are then loaded onto a "trolley". The trolley, carrying the two  
23 stands, is hoisted onto the drill rig platform and oriented vertically. The stands are then removed  
24 from the trolley and either connected to the drill string or stored in the vertical position for later  
25 connection to the drill string.

26 **[0007]** Thus, there exists a need for a simple and efficient means for forming stands.

## 27 SUMMARY OF THE INVENTION

28 **[0008]** In one aspect, the present invention provides a method of forming a stand from  
29 tubulars comprising:

30 - providing a supply of tubulars;

- 1           - providing an elongate stand forming apparatus comprising a front end, rear end  
2 and mid section;
- 3           - loading a first tubular on the stand forming apparatus, wherein the first tubular is  
4 positioned generally parallel therewith;
- 5           - pulling the first tubular towards the rear end of the apparatus;
- 6           - loading a second tubular on the stand forming apparatus, wherein the second  
7 tubular is positioned generally parallel therewith and wherein the second tubular is  
8 positioned in general coaxial alignment with the first tubular;
- 9           - rotating the first and second tubulars about their longitudinal axes and in  
10 opposite directions; and,
- 11           - advancing the first tubular against the second tubular during the rotation  
12 whereby cooperating threads on each opposing end of the first and second tubulars are  
13 engaged to form a stand.

14 **[0009]** In another aspect, the present invention provides an apparatus for forming a stand  
15 from tubulars comprising:

- 16           - a generally horizontal, elongate catwalk having a frame with a top surface  
17 adapted to receive at least two of the tubulars aligned in a coaxial manner, the frame  
18 having a front end, a rear end, and a mid section;
- 19           - a pulling means adapted to grip and pull a first of the tubulars towards the rear  
20 end of the catwalk;
- 21           - a pushing means adapted to advance the first tubular to the front end of the  
22 frame; and,
- 23           - a rotating means for rotating the tubulars about their longitudinal axes.

#### 24 BRIEF DESCRIPTION OF THE DRAWINGS

25 **[0010]** These and other features of the invention will become more apparent in the following  
26 detailed description in which reference is made to the appended drawings wherein:

27 **[0011]** Figure 1 is a side elevation of a stand forming apparatus according to an aspect of the  
28 invention with a first tubular loaded thereon.

29 **[0012]** Figure 1a is a front elevation along the line A-A of Figure 1.

30 **[0013]** Figure 2 is a plan view of the apparatus of Figure 1.

1 **[0014]** Figure 3 is a side elevation of the apparatus of Figure 1 with a second tubular loaded  
2 thereon.

3 **[0015]** Figure 3a is a front elevation along the line B-B of Figure 3.

4 **[0016]** Figure 4 is a side elevation of the apparatus of Figure 1 wherein the formed stand is  
5 elevated towards a drilling rig.

6 **[0017]** Figure 4a is a front elevation along the line C-C of Figure 4.

7 **[0018]** Figure 5 is a side elevation of the apparatus of Figure 1 shown in a folded state  
8 without tubulars.

### 9 DETAILED DESCRIPTION OF THE INVENTION

10 **[0019]** As described further below in more detail, the present invention provides an  
11 improved apparatus for forming stands from individual tubulars. In general, the invention  
12 comprises a catwalk onto which are loaded two tubulars. The tubulars are positioned generally  
13 coaxially on the catwalk in an end-abutting arrangement. The catwalk is provided with lifting  
14 devices comprising, in one aspect, actuating arms having rollers that contact and raise the  
15 tubulars above the level of the catwalk. The rollers are driven by one or more motors and are  
16 arranged so that the tubulars are axially spun in opposite directions with respect to each other.  
17 During the spinning operation, the tubulars are advanced against each other whereby the  
18 complementary threads on each end engage to form a connection, thereby forming a dual tubular  
19 stand. As will be understood, the tubulars are arranged so that the male and female ends are in  
20 abutting arrangement so as to permit engagement. The arms are then lowered whereby the now  
21 formed stand is allowed to rest on the catwalk, preferably in a trough or groove provided thereon.  
22 The stand is then pushed towards the drilling rig. A ramp provided either on the catwalk or on  
23 the rig causes one end of the stand to be raised during the pushing process up to a point where a  
24 hoist on the drill rig can engage and pull the stand to the desired vertical position over the  
25 drilling platform. The stand can then be stored or immediately connected to an existing drill  
26 string. The apparatus of the invention is transportable and certain sections can be folded to  
27 facilitate such transport.

28 **[0020]** Thus, the invention provides a simple and efficient means of forming a stand. The  
29 invention can also be operated to load individual tubulars as well directly onto a rig in situations  
30 where a stand is not needed. In another aspect, the apparatus of the invention can operate in the

1 opposite manner wherein stands are received from the rig and then separated or dismantled into  
2 individual tubulars.

3 **[0021]** Figure 1 illustrates an embodiment of the apparatus of the invention. The catwalk  
4 apparatus 10 comprises a frame having a front end section 12, a rear end section 16 and a mid  
5 section 14. The structure of the frame is commonly known and may comprise struts and support  
6 members and the like. As will be understood by persons skilled in the art, various structures for  
7 the frame are possible. In one embodiment, the apparatus 10 is adapted to rest on the ground;  
8 however, in other embodiments, the apparatus may include tracks, wheels or other such devices  
9 upon which the frame rests. The front end 12 of the apparatus 10 is inclined upwards and is  
10 preferably adjustable so as to reach to the level of the drilling platform. In general, the front end  
11 12 can be inclined to a point where a tubular or stand resting thereon can be grasped by a hoist or  
12 similar device provided on the drill rig. In another embodiment, the catwalk apparatus 10 does  
13 not include a front end portion 12 as shown in the accompanying drawings. Such a situation may  
14 occur where the drilling rig itself includes a suitable ramp that functions in the same manner as  
15 the front end 12.

16 **[0022]** The catwalk 10 includes a top surface 17 which receives and manipulates tubulars as  
17 will be described further below. In a preferred embodiment, the top surface 17 includes a groove  
18 or "V" or "U" shaped surface for locating the tubular in a desired location thereon. An example  
19 of such a groove is illustrated as element 19 in Figure 4a. Various other means for retaining  
20 tubulars on the top surface 17 will be known to persons skilled in the art. It will be understood  
21 that such retaining means serve to prevent tubulars from rolling or other such unwanted  
22 movements.

23 **[0023]** In operation, the catwalk apparatus 10 is first positioned adjacent a drilling rig (not  
24 shown) such that the catwalk extends generally perpendicularly from the rig and such that the  
25 front end section 12 is adjacent the rig. As indicated above, the front end section 12 is inclined  
26 upwards so as to be roughly at the level of drilling platform (not shown) of the rig. As  
27 mentioned above, in another aspect, the catwalk apparatus 10 does not include a front end  
28 section 12 and such functionality is instead provided by a ramp provided on the drill rig.

29 **[0024]** Figure 2 illustrates a plan view of the catwalk apparatus wherein the front end section  
30 12 is not shown for convenience. Moreover, various other elements of the catwalk 10 such as

1 decking etc. are not illustrated but will be apparent to persons skilled in the art. As shown in  
2 Figure 2, a supply rack 18 containing a supply of tubulars 20 is positioned adjacent to the  
3 catwalk apparatus 10. The tubulars 20 are preferably provided in a generally parallel  
4 arrangement on the rack 18. As discussed above, the tubulars, as commonly known in the art,  
5 have male and female ends each provided with complementary threads. Thus, in a preferred  
6 embodiment, the tubulars 20 on the rack 18 are arranged so that all of the respective male and  
7 female ends are positioned in the same orientation. More preferably, in order to facilitate the  
8 present method, the tubulars are oriented such that all female ends are pointed towards the  
9 catwalk front end 12 (i.e. pointed towards the drilling rig). The purpose of such preferred  
10 arrangement will be apparent from the following description.

11 **[0025]** As shown in Figure 2, the supply rack 18 is positioned close to the catwalk 10 so as to  
12 facilitate transfer of tubulars 20 from the rack 18 to the catwalk 10. In one embodiment, the  
13 catwalk 10 and rack 18 are arranged so as to allow a tubular to roll from the rack onto the top  
14 surface 17 of the catwalk 10. As will be understood, in such arrangement, the catwalk top  
15 surface 17 would be slightly lower than the rack 18 so as to allow such rolling. In one  
16 embodiment, the catwalk apparatus 10 would be vertically adjustable whereby the catwalk could  
17 be lowered to allow a tubular to roll thereon from the rack. The catwalk can then be raised to a  
18 height above the rack so that, during a stand dismantling operation (discussed further below), the  
19 tubulars can roll from the catwalk onto the rack. It will be understood that in other  
20 embodiments, any difference in height may also be overcome by using a forcing means to urge  
21 tubulars between the catwalk and the rack. In such case, a difference in height would not pose a  
22 problem for the tubular transfer step. In yet another embodiment, tubulars can be transferred  
23 between the rack 18 and the catwalk apparatus 10 by means of a crane or any other similar  
24 device. Various other tubular transfer mechanisms will be known to persons skilled in the art.

25 **[0026]** The catwalk apparatus 10 of the invention also preferably includes a skate 22 that is  
26 arranged to generally traverse the length of the catwalk from the rear end section 16 to the front  
27 end section 12. The skate 22 includes a clamp to grasp one end, preferably the male end, of a  
28 tubular after being loaded on the catwalk top surface 17 and to pull same towards the rear end  
29 section 16 of the catwalk apparatus. The skate 22 also includes a bearing surface for pushing the  
30 tubular along the length of the catwalk towards the front end section 12. The skate 22 can be



1 provided on a track or groove on the catwalk. One example of an arrangement for the skate is  
2 taught in US patent 6,969,223 wherein a “pusher” member is described for advancing tubulars  
3 longitudinally along a catwalk. As will be apparent to persons skilled in the art, the skate 22 can  
4 be advanced in either direction by a mechanical means (such as using a cable attached to a  
5 motor), a hydraulic means (such as by using a cylinder and piston combination) or any other  
6 means. Further, as described above, the skate is provided with a clamp for attaching to an end of  
7 one tubular. Such clamps are commonly known in the art and any suitable clamp mechanism  
8 can be used for the skate. For example, one such clamp is shown in US patent 6,976,540, which  
9 teaches a “gripping device” for grasping an end of a tubular. It will be understood that the skate  
10 22 may, in one embodiment, include a threaded portion (not shown) with threads that are  
11 complementary to those provided on the end of the tubular. In this way, instead of clamping or  
12 grasping a tubular, the threaded portion of the skate 22 may be rotated to engage the end of the  
13 tubular. Rotation in an opposite direction would then disengage the skate. Various other  
14 gripping means for the skate will be apparent to those skilled in the art.

15 **[0027]** In operation, as shown in Figures 1 and 2, a first tubular 20a is rolled or otherwise  
16 placed onto the top surface 17 of the catwalk apparatus 10. As shown, in the preferred  
17 arrangement, the female end 24 of the tubular 20a is directed towards the front end of the  
18 catwalk apparatus 10. The skate 22 is then advanced towards the tubular and grips the male end  
19 26 thereof. The skate 22, in a “pull” mode, is then retracted to the rear end portion 16 of the  
20 catwalk apparatus 10. In this way, the first tubular 20a is pulled towards the rear end portion 16.  
21 This position is illustrated in Figure 1 which also shows the skate 22 gripping the tubular 20a.  
22 Once the skate 22 has reached its terminal point on the catwalk apparatus 10, the gripping  
23 mechanism is released. This position is shown in Figure 3. As will be understood by the  
24 discussion herein, the terminal position of the skate 22 on the rear end 16 of the apparatus 10 is  
25 the position that pulls the first tubular 20a a sufficient distance so as to allow another tubular 20  
26 to be loaded onto the top surface 17.

27 **[0028]** Figure 3 illustrates the next step in the process wherein a second tubular 20b is  
28 provided on the top surface 17 of the catwalk apparatus 10. As with the first tubular 20a, the  
29 second tubular 20b is oriented with its female end 28 directed towards the front end section 12 of  
30 the catwalk apparatus 10. The male end 30 of the second tubular 20b is positioned adjacent and

1 in opposition to the female end 24 of the first tubular 20a. Further, as can be seen in Figure 3,  
2 both tubulars 20a and 20b are positioned on the top surface 17 of the catwalk 10 and aligned so  
3 as to be coaxial with each other. As will be understood, the groove 19 (as shown in Figure 4a)  
4 serves to maintain the desired alignment of the tubulars 20a and 20b. Once the two tubulars 20a  
5 and 20b are provided on the top surface 17, a plurality of lifting devices 32 (a - d), provided on  
6 the catwalk apparatus 10, are actuated. The lifting devices 32 preferably, and in one aspect,  
7 comprise actuating arms 33 at the ends of which are provided driven rollers 34. Such lifting  
8 devices are illustrated in Figures 1a, and 3a. As can be seen, according to one embodiment, each  
9 arm is provided with a pair of opposed rollers. As shown in Figure 1a, the rollers are arranged so  
10 as to form a pinch point 31 there-between, which is adapted to receive a portion of a tubular as  
11 explained further below.

12 **[0029]** In the embodiment shown in Figures 1 and 3, the catwalk apparatus 10 is provided  
13 with four lifting devices, 32a to 32d, such that each of the first and second tubulars, 20a and 20b,  
14 are engaged by two lifting devices. Thus, as shown, lifting devices 32a and 32b engage the  
15 second tubular 20b while lifting devices 32c and 32d engage the first tubular 20a. In operation,  
16 the roller-bearing ends of actuating arms 33 are raised by any known means, such as  
17 hydraulically, mechanically etc. In such manner, the rollers 34 are raised up to receive the  
18 tubular within the pinch 31 there-between. The arms 33 are raised further so that the tubular is  
19 raised above the top surface 17 of the catwalk apparatus 10. For example, Figure 3a illustrates  
20 the second tubular 20b contained between two rollers 34 and raised above the top surface 17.

21 **[0030]** It will be understood that the top surface 17 of the catwalk is provided with openings  
22 through which the rollers 34 and/or arms 33 may be extended. The rollers 34 are driven either  
23 directly or indirectly by motors and the like so as to rotate the tubular engaged therein about its  
24 longitudinal axis. In one embodiment, the rollers 34 are reversibly driven as will be further  
25 explained below. It will be understood that the arms 33 and rollers 34 are designed with  
26 sufficient strength to support the tubular. It will also be understood from the present description  
27 that the rollers 34 are made of a material that includes a sufficient coefficient of friction to cause  
28 rotation of the tubular. Such materials and other specifications will be apparent to persons  
29 skilled in the art. In addition, although two pairs of lifting devices are described for the purpose  
30 of lifting the entire lengths of each of the tubulars, it will be appreciated that any number of

1 devices may also be provided for achieving the same purpose. For example, it would also be  
2 possible to include only one lifting device per tubular in which case, the rollers may be elongated  
3 to support the length of the tubulars.

4 **[0031]** Once the two tubulars 20a and 20b are raised above the top surface 17, the rollers are  
5 activated as mentioned above. However, it should be noted that the rollers engaging the first  
6 tubular 20a (i.e. the rollers provided on lifting devices 32c and 32d) are rotated in a direction  
7 opposite to the rollers engaging tubular 20b (i.e. the rollers provided on lifting devices 32a and  
8 32b). In this way, the two tubulars are rotated in opposite directions. Once axial rotation of the  
9 tubulars 20a and 20b is begun, the skate 22, now in “push” mode (as shown in Figure 3) is used  
10 to advance the first tubular 20a towards the front end 12 of the apparatus 10. Thus, the female  
11 end 24 of the first tubular 20a is advanced towards the male end 30 of the second tubular 20b.  
12 Due to the opposite rotation of each tubular, and the complementary threading between the male  
13 and female ends (as discussed above), the first and second tubulars are allowed to engage one  
14 another thereby forming a stand. In this process, it will be understood that the rotation directions  
15 of each of the rollers associated with the two tubulars are selected so as to allow the respective  
16 male end to be threaded onto the respective female end and vice versa.

17 **[0032]** Once the stand, comprising the joined tubulars 20a and 20b, is formed, the lifting  
18 devices 32 are lowered so as to allow the stand to rest on the top surface 17 of the catwalk  
19 apparatus 10. The skate 22 continues in the “push” mode and is advanced towards the front end  
20 section 12 of the apparatus 10. In this way, the skate 22 bears against the male end 26 of the first  
21 tubular 20a and, therefore, urges the stand in a direction towards the front end section 12 and  
22 towards the drilling rig (not shown).

23 **[0033]** As illustrated in Figure 4, due to the inclination of the front end section 12, the  
24 section of the stand proximal to the front end section is gradually elevated as the skate 22 is  
25 advanced. Such elevation continues until the female end 28 of the second tubular 20b reaches a  
26 height wherein a hoist mechanism (not shown) provided on the drilling rig is able to reach and  
27 grip the end of the stand. The hoist mechanism then raises the stand to its vertical orientation on  
28 the drilling platform and the stand is then either connected to the existing drill string or is stored  
29 in the vertical position for future connection. It will be understood that the stand may require

1 torquing on the drilling rig to provide a sufficiently tight connection between the tubulars 20a  
2 and 20b. Such torquing can be effected by known devices commonly provided on the rig.

3 **[0034]** As will be known to persons skilled in the art, the terminal, surface exposed end of a  
4 drill string is normally the female end. As such, the lower end of the now vertical stand should  
5 comprise the male end in order to mate with the existing drill string. As will be understood from  
6 the above description, by positioning the tubulars on the rack with the female ends directed  
7 towards the front end section 12 of the catwalk apparatus 10, the formation of the stand takes  
8 place in such a manner that the formed stand, when oriented vertically, is in the desired position  
9 with the male end pointed downwards. It will also be understood that the opposite orientation of  
10 the tubulars and stands will be required should the exposed drill string end be male.

11 **[0035]** As will be understood by persons skilled in the art, the above described process can  
12 also be operated in reverse order to dismantle stands. That is, the hoist on the drilling rig can  
13 first extract a stand from a drill string and lower it on to the front end section 12 of the catwalk  
14 apparatus. The skate 22 is then advanced and activated to grip the free end (usually the male  
15 end) of the stand. The skate is then retracted towards the rear end section 16 of the catwalk  
16 apparatus 10 until the stand is rests on top surface 17 in a generally horizontal orientation and  
17 wherein each tubular segment of the stand is positioned above the respective pairs of lifting  
18 devices 32. The lifting devices 32 are then activated as above to raise the stand above the top  
19 surface 17. The rollers are then actuated to rotate in opposite directions as before, but in this  
20 case, such rolling is used to disconnect (i.e. unscrew) the tubulars. Once separated, one of the  
21 tubulars is then loaded onto the rack 18 by either rolling or by means of a device such as a crane  
22 etc. The remaining tubular is then pushed by the skate 22 to a position on the top surface 17 that  
23 enables the tubular to be moved to the rack as well.

24 **[0036]** Another feature of the present invention is the capability to automate the  
25 standbuilding operation. That is, as described above, very little manual manipulation of the  
26 tubulars or stands is needed. Thus, the entire process can be coordinated by an operator  
27 positioned away from the catwalk. In this way, the present invention provides a stand make-up  
28 and break-up system which comprises a safer alternative than processes known in the art. It will  
29 be understood that the apparatus discussed above will include suitable and commonly known  
30 electrical connections and/or processors etc. to enable such automation. For example, the system

1 of the invention would include a control system to enable one or more operators to control  
2 various mechanisms on the catwalk 10, the rack 18 and/or the drill rig (i.e. the hoist). In such  
3 case, the rack may be provided with an automated feeder to feed single tubulars to the catwalk  
4 top surface 17. The skate 22 and lifting devices 32 may in turn be controlled remotely by means  
5 of commonly known control circuitry. Similarly, the hoist described above may also be  
6 controlled remotely by the same operator so as to cause vertical lifting of the stand onto the rig.  
7 In one embodiment, the system may be controlled by a computer based control system, which  
8 can coordinate all of the above functions.

9 **[0037]** Figure 5 illustrates a further feature of the invention. As shown, the front end 12 and  
10 rear end 16 sections of the catwalk apparatus 10 can be folded over the mid section 14. In this  
11 way, the apparatus 10 can be reduced in size to facilitate transportation between sites.

12 **[0038]** The above description has focussed on “making up” a dual tubular stand. However, it  
13 will be appreciated that the present apparatus also provides a safe and efficient means of loading  
14 even single tubulars onto a drilling platform. In such a process, a tubular is loaded onto the top  
15 surface 17 of the catwalk apparatus 10 as described above and the skate 22 is used to push the  
16 tubular towards the rig. As described above, the combination of the pushing action by the skate  
17 22 and the inclination of the front end section 12, causes the front end of the tubular to be raised  
18 towards the drilling platform. A hoist mechanism (as described above) on the drill rig can then  
19 be used to raise the tubular to a vertical orientation and positioned on the drilling platform. As  
20 discussed above, the automation of the process enables an operator or a control system to  
21 remotely control this operation.

22 **[0039]** It will be understood that the above description has focussed on the formation of  
23 stands including two tubulars (i.e. a dual make-up stand). However, the apparatus described  
24 above may also be adapted to form stands with any number of tubulars. Persons skilled in the art  
25 will recognize that a functional limit in the length of stands lies in the height of the derrick  
26 provided on the drill rig.

27 **[0040]** In the above description, the skate 22 has been described as performing two  
28 functions, namely the “pulling” and “pushing” of tubulars. However, it will be understood that  
29 such dual role of the skate is a preferred embodiment. In other embodiments of the invention,  
30 each of these functions can be performed with two separate skate-like devices. Thus, one device

1 may comprise a gripping mechanism to pull tubulars while a second device may comprise a  
2 bearing surface for pushing tubulars.

3  
4 **[0041]** Although the invention has been described with reference to certain specific  
5 embodiments, various modifications thereof will be apparent to those skilled in the art without  
6 departing from the spirit and scope of the invention as outlined herein. The disclosures of all  
7 prior art recited herein are incorporated herein by reference in their entirety.

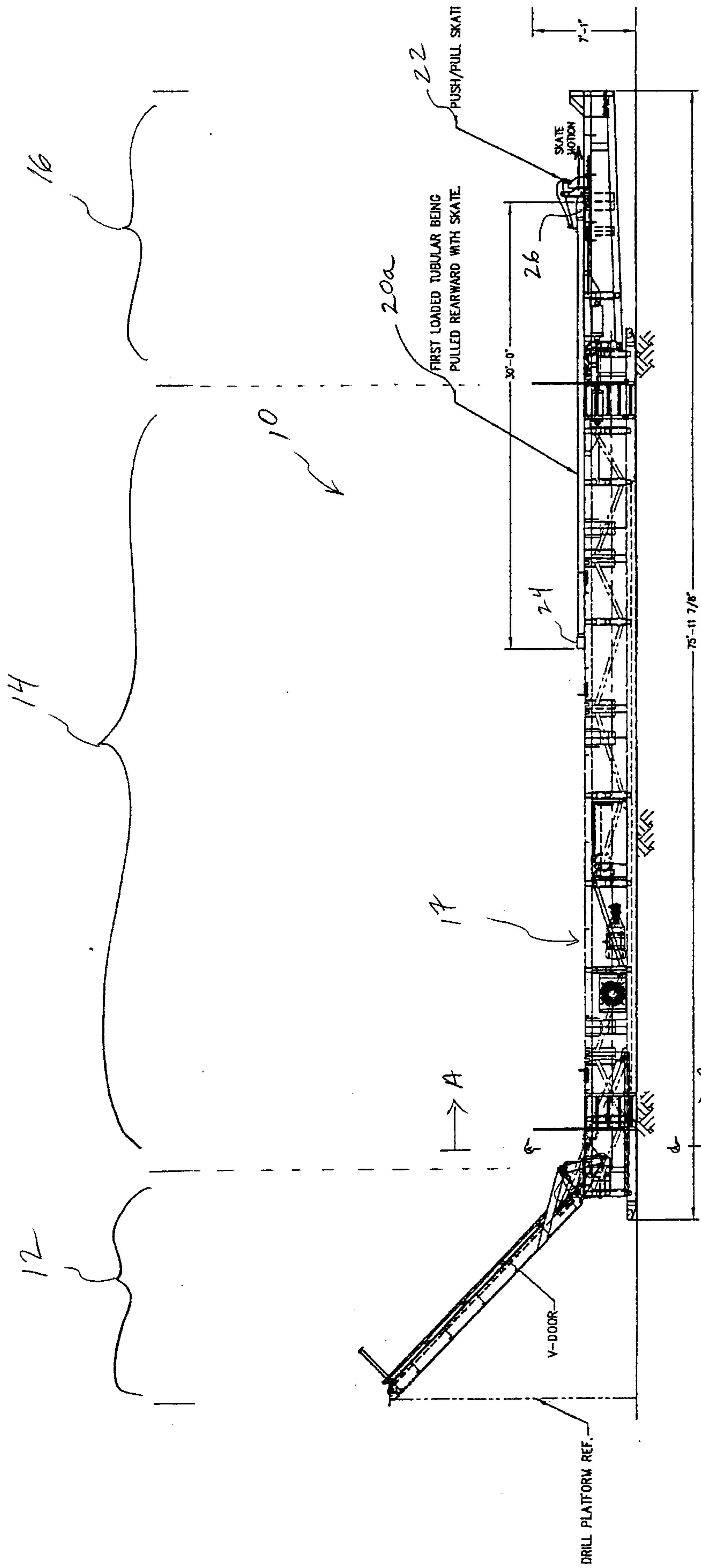
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**We Claim:**

1. A method of forming a stand from tubulars comprising:
  - providing a supply of tubulars;
  - providing an elongate stand forming apparatus comprising a front end, rear end and mid section;
  - loading a first tubular on the stand forming apparatus, wherein said first tubular is positioned generally parallel therewith;
  - pulling the first tubular towards the rear end of the apparatus;
  - loading a second tubular on the stand forming apparatus, wherein said second tubular is positioned generally parallel therewith and wherein the second tubular is positioned in general coaxial alignment with said first tubular;
  - rotating said first and second tubulars about their longitudinal axes and in opposite directions;
  - advancing the first tubular against the second tubular during said rotation whereby cooperating threads on each opposing end of the first and second tubulars are engaged to form a stand.
  
2. The method of claim 1 further comprising advancing the stand towards the front end of the apparatus.
  
3. The method of claim 3 further comprising engaging the stand by a hoist and lifting said stand into vertical alignment.
  
4. An apparatus for forming a stand from tubulars comprising:
  - a generally horizontal, elongate catwalk having a frame with a top surface adapted to receive at least two of said tubulars aligned in a coaxial manner, said frame having a front end, a rear end, and a mid section;
  - a pulling means adapted to grip and pull a first of said tubulars towards the rear end of the catwalk;
  - a pushing means adapted to advance said first tubular to the front end of the frame;

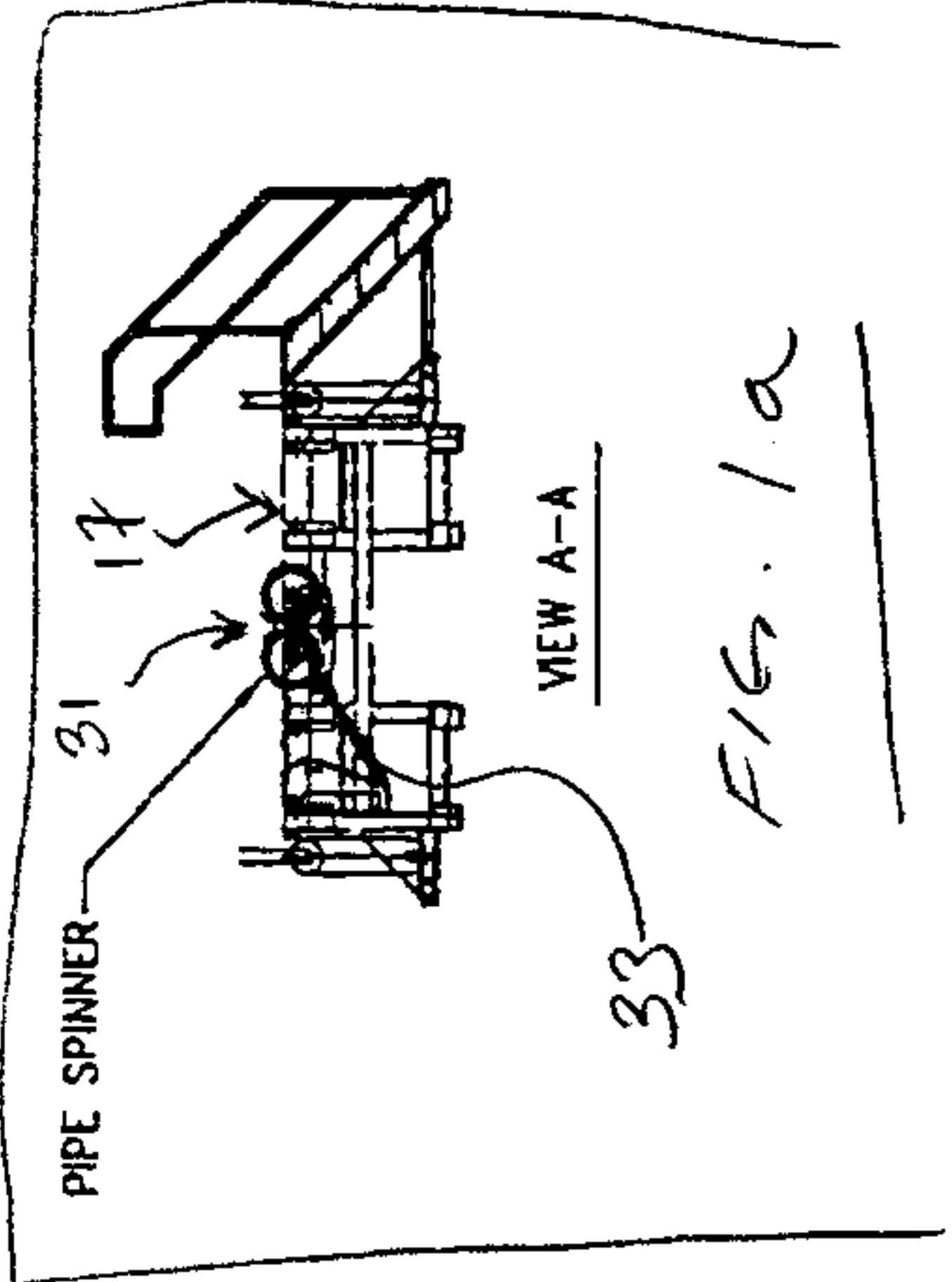
- a rotating means for rotating said tubulars about their longitudinal axes.
- 5. The apparatus of claim 4 wherein said pulling means is adapted to grip and pull a first tubular loaded on the catwalk.
- 6. The apparatus of claim 5 wherein said pushing means is adapted to bear against the first tubular and to advance said first tubular towards the front end of the catwalk.
- 7. The apparatus of claim 6 wherein said rotating means comprises motor driven rollers.
- 6. The apparatus of claim 7 wherein said rollers are connected to arms.
- 9. The apparatus of claim 8 wherein said arms are actuatable and are capable of being raised and lowered with respect to the catwalk frame.
- 10. The apparatus of claim 9 wherein said rollers are adapted to rotate said at least two tubulars in opposite directions.
- 11. The apparatus of claim 9 wherein said catwalk front end is inclined upwards.
- 12. The apparatus of claim 11 wherein said catwalk top surface includes a groove to receive said tubulars.
- 13. The apparatus of claim 12 wherein said catwalk front and rear ends are foldable over said mid section.





CATWALK SIDE VIEW

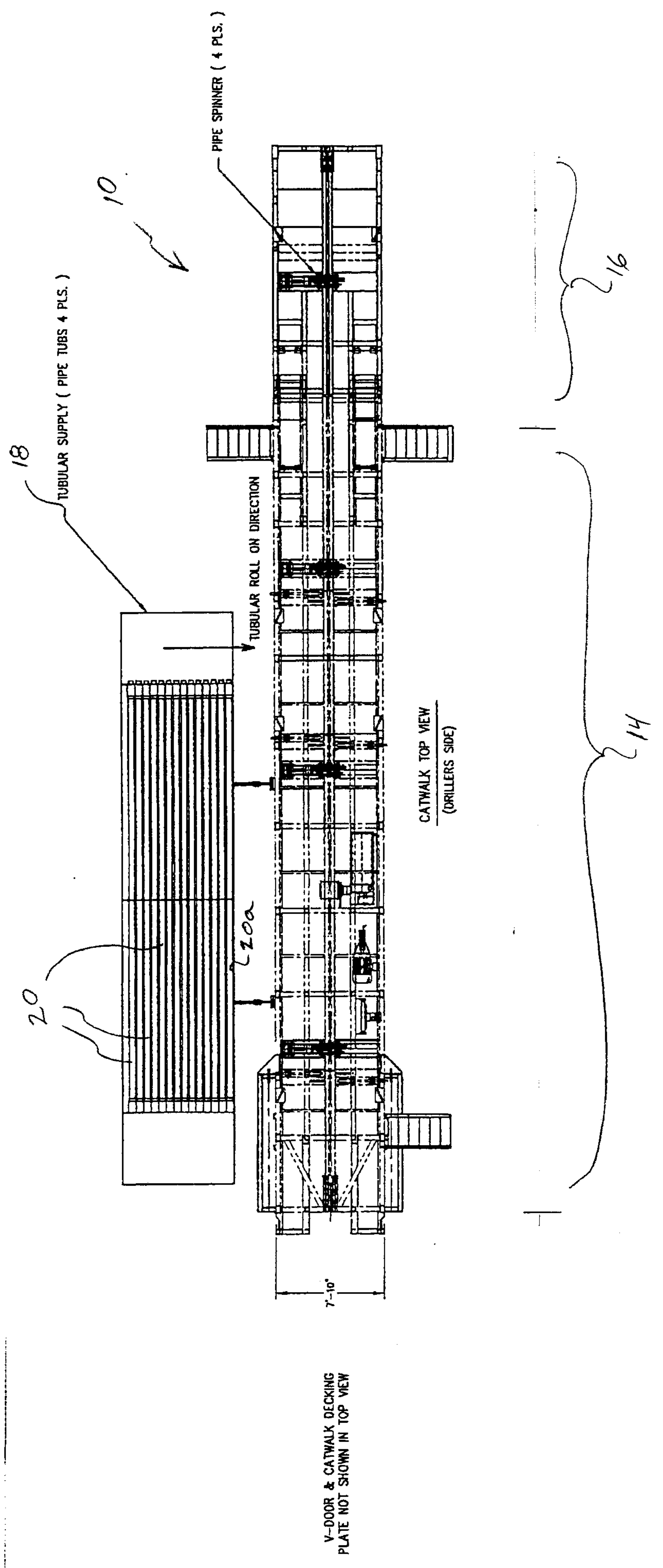
FIG. 1



VIEW A-A

FIG. 1a

FIG. 2



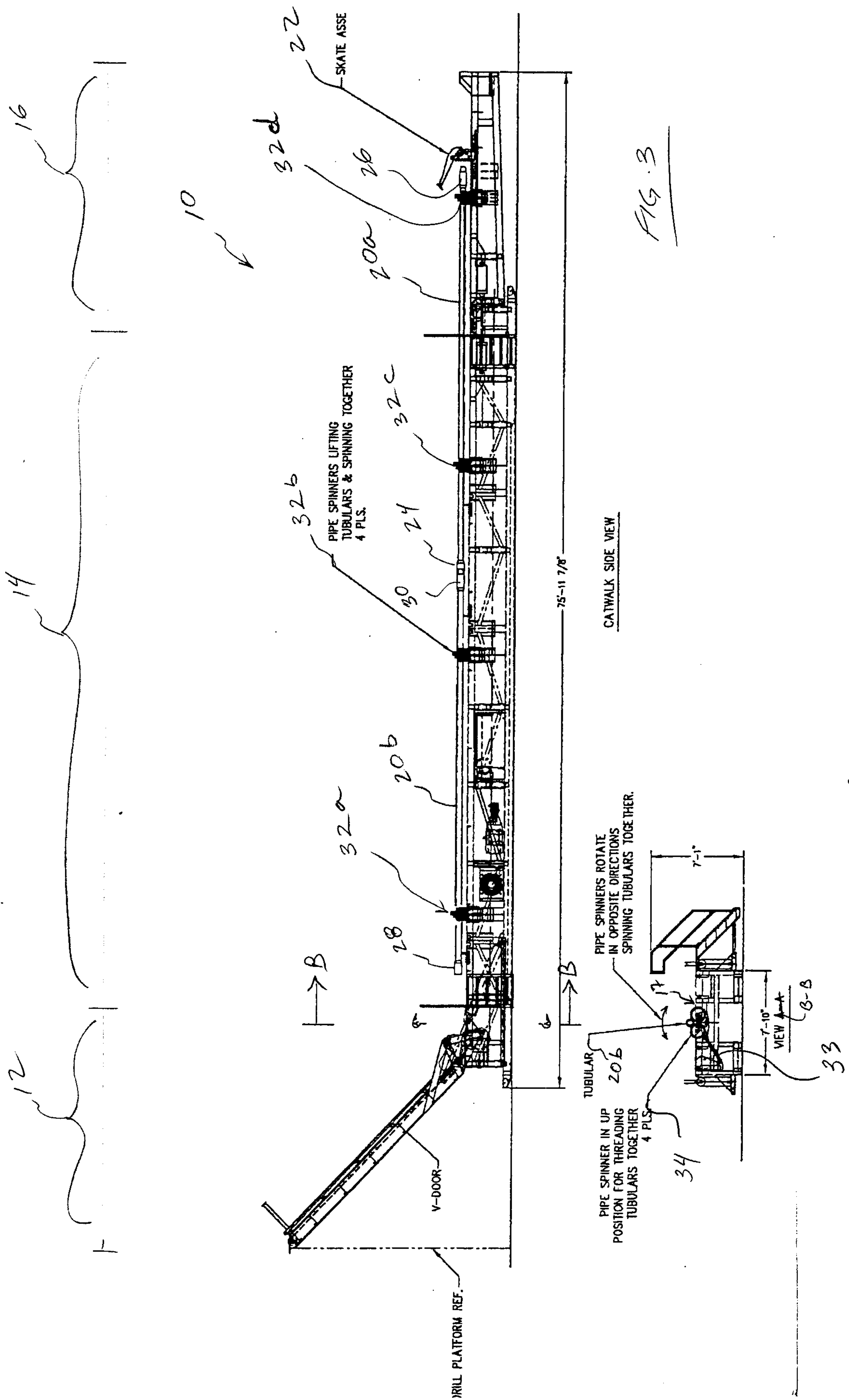


FIG. 3a

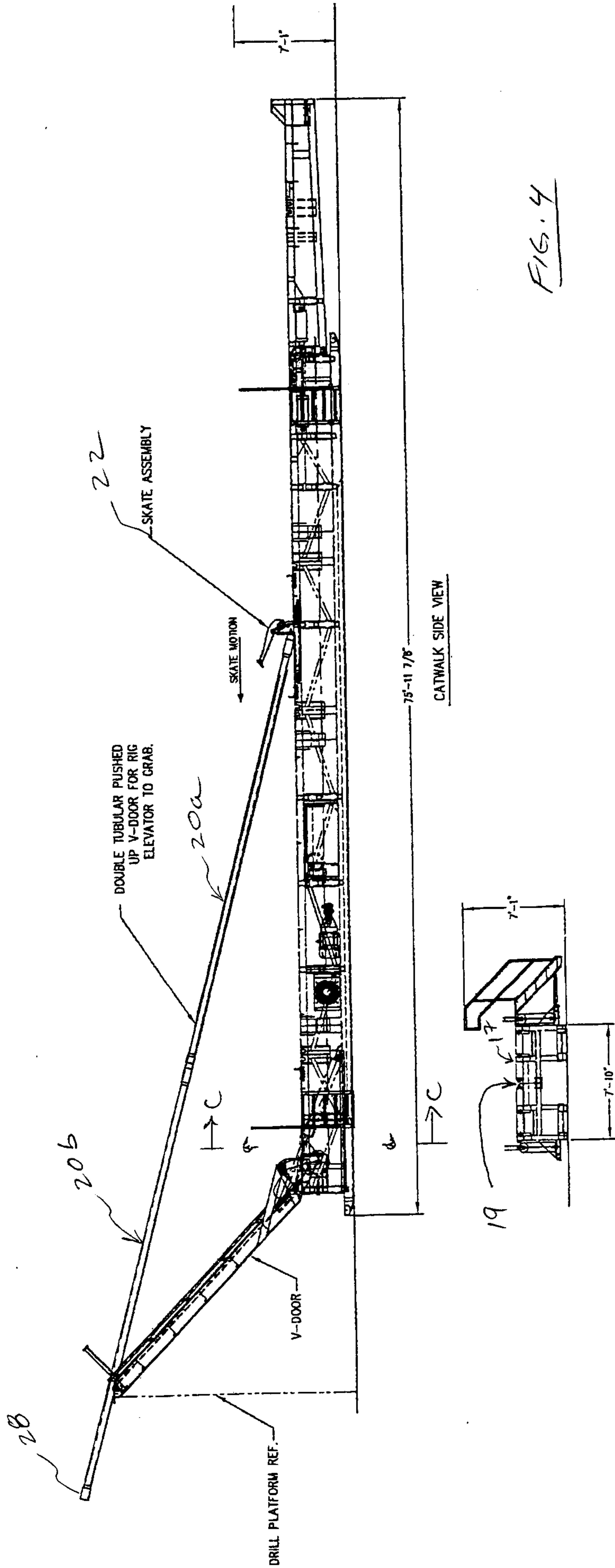


FIG. 4

FIG. 4a

