United States Patent [19]

Hermann

[11] **3,733,163**

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[54] WEAR SURFACE FOR CONCRETE PIPE MACHINE LONG BOTTOMS

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[52] **U.S. Cl.** **425/262**

[51] **Int. Cl.** **B28b 21/26**

[58] **Field of Search** ..... 25/36, 35, 30 R; 144/288 A, 1, 48, 44, 355; 425/262

[56] **References Cited**

UNITED STATES PATENTS

868,866	10/1907	Keil	25/36
911,245	2/1909	Keil et al.	25/36
1,328,699	1/1920	Vogt	25/36
3,276,091	10/1966	Pausch	25/36

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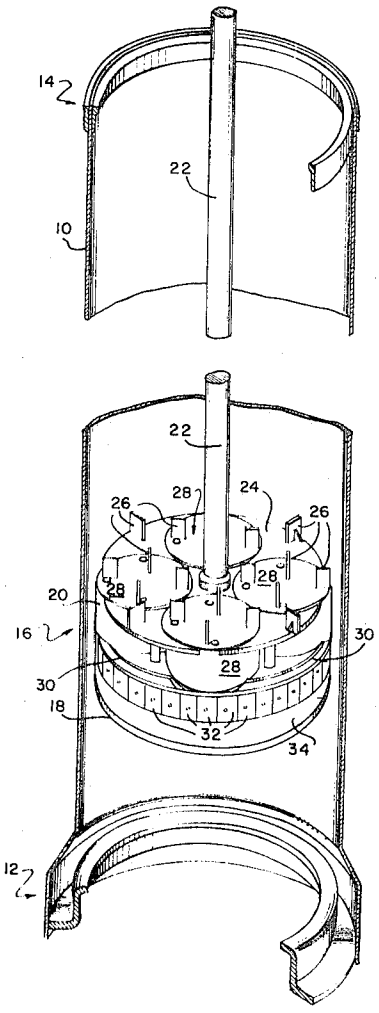
Assistant Examiner—Ben D. Tobor
Attorney—William A. Strauch et al.

[57] **ABSTRACT**

An improved wear surface for long bottoms employed in concrete pipe making machines utilizing the packerhead method of pipe formation wherein the base, or long bottom, of the packerhead includes a plurality of wear segments about the upper circumferential outer surface thereof, each easily removable for replacement after wear. Each segment may be 3.1416 inches wide so that if the diameter of the long bottom is a whole number, measured in inches, an easily determinable number of segments may be used to completely skirt the long bottom for wear purposes. Since the circumference of a circle equals π times the diameter, and π equals 3.1416, each 1 inch increase in diameter of the long bottom calls for one additional segment. Each segment is secured to the long bottom by a single bolt, countersunk through the segment wear surface. Preferably, the segments are made of cast Nihard steel, or some other hard, long wearing material.

9 Claims, 7 Drawing Figures



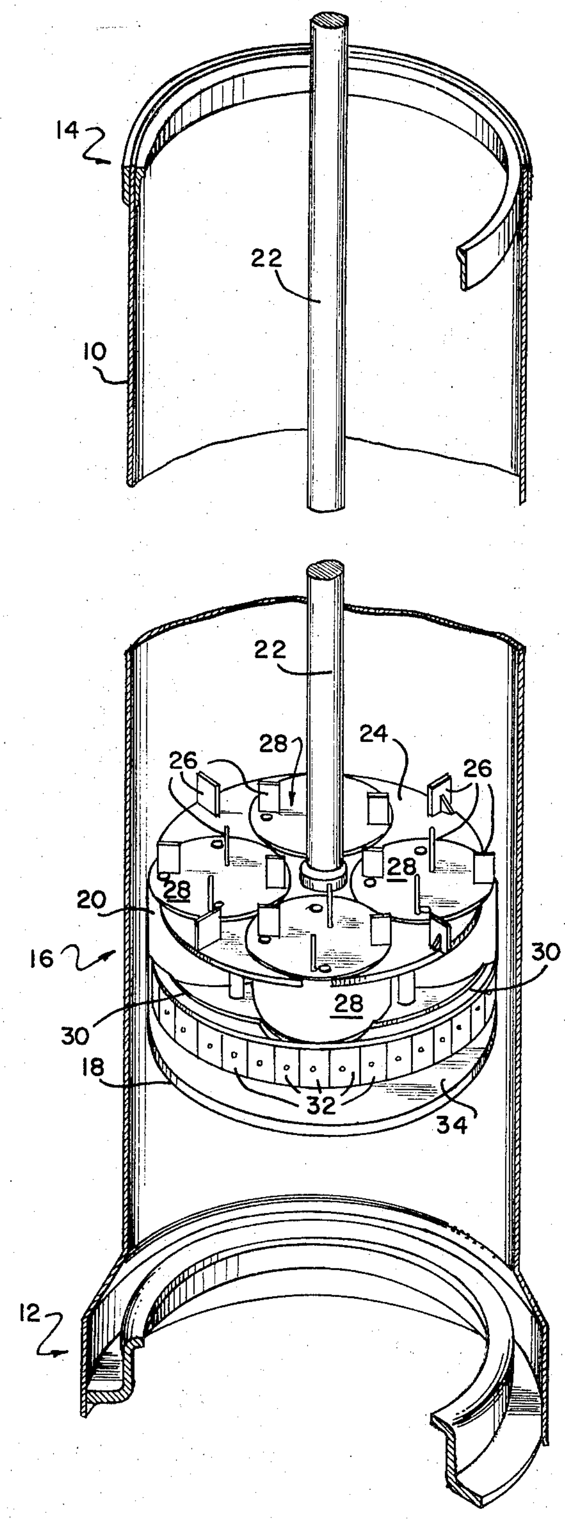


FIG. I

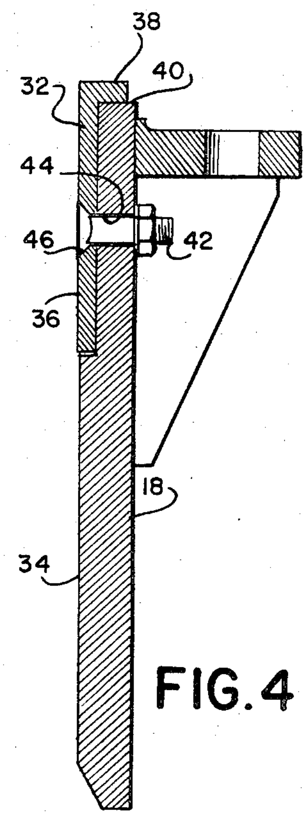


FIG. 4

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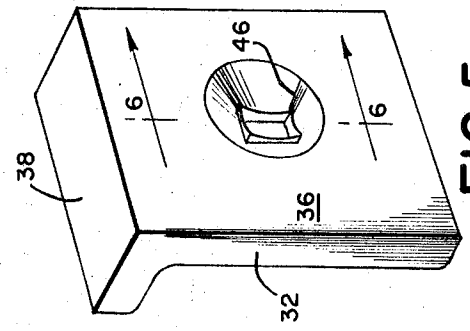


FIG.5

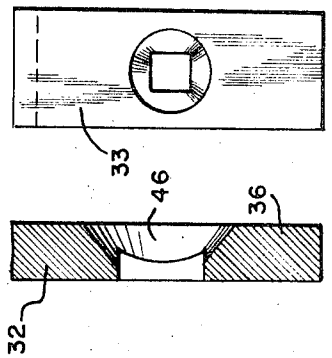


FIG.6 FIG.7

FIG.2

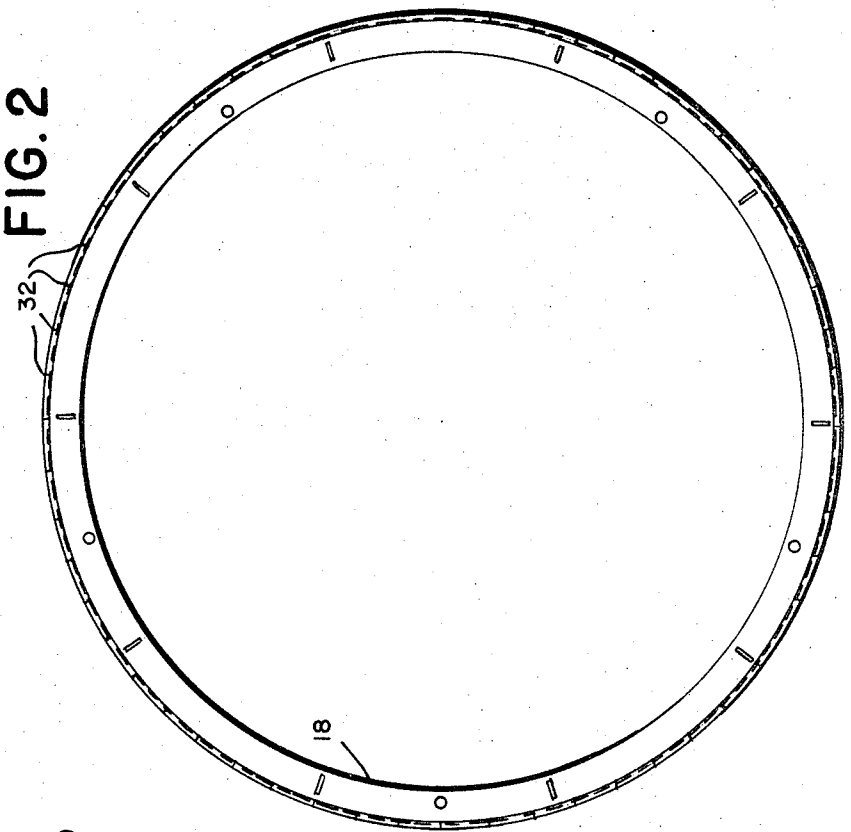
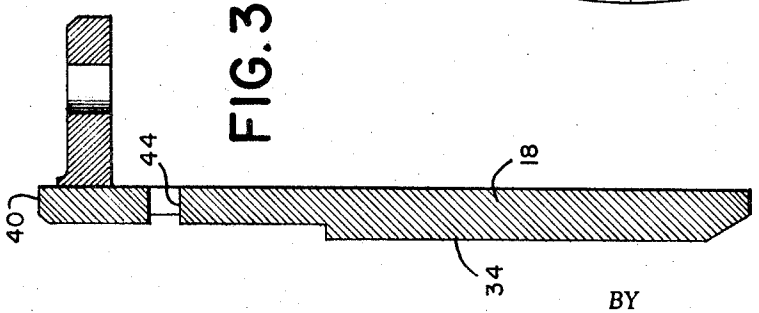


FIG.3



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WEAR SURFACE FOR CONCRETE PIPE MACHINE LONG BOTTOMS

BACKGROUND OF THE INVENTION

The packerhead method of concrete pipe formation has been known for some time and is widely accepted as the least expensive and most efficient method of concrete pipe formation. Generally, the machine for forming pipe by this method includes an outer, vertically disposed, bell-end down jacket, for forming the outer surface of a pipe section, and an interior, vertically reciprocable rotary packerhead, concentrically disposed with respect to the jacket, for forming the interior surface of the pipe section. The completed pipe section consists of a female, or bell end, which is formed first, the cylindrical body of the pipe, and a male end, formed at the upper, terminal end of the pipe body.

The steps of pipe section formation are as follows. The jacket is vertically situated, bell or female end down. The rotary packerhead is lowered concentrically within, and to the bottom of the jacket. The packerhead comprises a rotating cylindrically shaped base member known as a long bottom in the art, having an outer diameter equal to the inside diameter of the completed pipe section, a rotary pipe forming assembly, from which the long bottom depends and includes a plurality of radially spaced trowels, or rollers for forming and shaping the interior surface of the pipe section, with a circular plate having a plurality of vertically disposed concrete slingers thereon for initial forming of the pipe, and a packer-shaft which supports and rotates the long bottom and rotary pipe forming assembly. Next, concrete is introduced and the packershaft rotated to form the bell end of the pipe. The jacket may be vibrated at this time to eliminate any bell end voids. Once formed, the packerhead is raised and rotated while concrete is introduced into the jacket to form the cylindrical body of the pipe. When formation is complete, an additional pass or additional passes of the packerhead vertically interiorally of the jacket may be made to smooth and finish the pipe interior surface. During pipe formation and after, the jacket may be vibrated to settle the concrete and eliminate any voids in the pipe wall. Thereafter, the packerhead is removed and the jacket with the completed pipe is moved for curing, whereupon a new jacket is provided and the process repeated.

One of the major expense items in the art has been the long bottom, which is usually a single casting of hard, long wearing metal such as Nihard steel. However, even this steel wears after a while and must be replaced with a new, expensive longbottom. The closest solution that the prior art discloses is found in U.S. Pat. Nos. 1,328,699, issued to Joseph Vogt, and 3,276,091, issued to Charles B. Pousch. The former discloses a between roller shoe 8 (FIG. 5) and the latter discloses a similar shoe 65 (FIG. 6). But these shoes do little to conserve wear on the surface of longbottoms 1, and 18, respectively.

In contradistinction, the present invention provides a plurality of hard metal wear segments secured directly to the long bottom wear surface, each being much cheaper than the long bottom casting itself, and replaceable upon excessive wear, whereby the life of the long bottom is considerably extended.

SUMMARY OF THE INVENTION

An improved wear surface for the long bottoms of rotary packerheads used in the formation of concrete pipe, comprising a plurality of radially disposed wear segments secured to the long bottom wearing surface. The wear segments may be arranged one adjacent the other, about the upper periphery of the long bottom, to form a complete wear ring. Each segment may be 3.1416 units of measurement wide, with respect to the unit of measurement of the long bottom diameter, so that for each unit increase in long bottom diameter, one additional segment may be added to the long bottom, the circumference of a circle being π times the diameter, π equaling 3.1416. Each wear segment may include an upper lip, which rests on the periphery of the long bottom, and each segment is attached to the long bottom by a nut and bolt assembly, countersunk with respect to the segment wear surface.

BRIEF DESCRIPTION OF THE DRAWINGS

A further and more complete understanding of the nature, objects and advantages of the instant invention may be had by reference to the following drawings wherein:

FIG. 1 is a cutaway perspective view of a packerhead pipe forming machine utilizing the instant invention;

FIG. 2 is a top plan view of a packerhead long bottom having wear segments evenly distributed thereabout;

FIG. 3 is a vertical, sectional view of the long bottom without a wear segment installed; FIG. 4 is a similar view with a wear segment in place;

FIG. 5 is a perspective view of one wear segment;

FIG. 6 is a sectional view, taken along lines 6—6 of FIG. 5; and

FIG. 7 is an elevational view of another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings by reference character, FIG. 1 illustrates in cutaway form a packerhead concrete pipe former including jacket **10**, having bell end **12** and spigot end **14**, a packerhead **16** including long bottom **18** and rotary pipe forming assembly **20**, and a packershaft **22**, for raising, lowering, and rotating packerhead **16**. Long bottom **18** depends from pipe former **20** which comprises a circular plate **24**, having concrete slingers **26** thereon, radially spaced rollers **28**, having additional concrete slingers **26** thereon, and between roller shoes **30** which assist in the smoothing of the interior wall of the pipe as it is formed, in conjunction with rollers **28**. In the embodiment shown, a rollerhead pipe former is shown, but any one of the wide variety of packerhead concrete pipe formers might be used instead, mounted on long bottom **18**.

The instant invention is an improved wear surface for prolonging the life of long bottom **18** and comprises a plurality of wear segments **32**, arranged one adjacent the other about the upper circumferential periphery of long bottom **18**, in the preferred embodiment. Segments **32** are located as they are since it is the upper portion of long bottom **18** that receives the most stress as it first contacts the fresh pipe surface formed by pipe forming assembly **20**. The trailing skirt section **34** of long bottom **18** is arranged coplanar with the wear surfaces **36** of segment **32** (FIG. 4) and presents a smooth,

unbroken circular band for finishing the interior surface of the formed pipe. Lip **38** is not mandatory if there is a trailing coplanar skirt **34** on long bottom **18**, but, is necessary only if long bottom **18** does not include a skirt **34**.

Each wear segment includes a lip **38** formed along the upper edge thereof, which is directed inwardly towards packer-shaft **22**, and rests on the upper periphery **40** of long bottom **18**. Lip **38** thus stabilizes the segment **32** in a vertical plane. Thus, only a single nut and bolt assembly **42** is required to secure each segment **32** to long bottom **18**. Bores **44** are formed through long bottom **18** for the shaft of the bolts, and a countersink **46** is provided centrally of wear segment **32** to receive the bolt head. In this way, the nut and bolt assembly **42** will not mar the interior surface of the pipe section being formed.

As mentioned previously, each wear segment may be formed with a width equal to π, or 3.1416 with respect to the unit of measurement used in the diameter of long bottom **18**. For example, FIG. **2** shows a long bottom **18** having an external diameter of **54** inches. Thus, **54** wear segments **32** are provided, each having a width of 3.1416 inches. The factor of π is used since, conveniently, the circumference of a circle equals π multiplied by the diameter. Thus, a convenient supply of segments **32**, each having the same measurements, may be kept on hand as replacements as initially installed ones wear out. Additionally, there is no need to have different sized segments for long bottoms of varying diameter. If the long bottom external diameter is 40 inches, then 40 wear segments will be used; if it is 60 inches, 60 wear segments **32** are needed; and so forth.

To form a true, perfect circle, the outer face of segment **32** ought to be curved to fit a true arc conforming to the circumference of the long bottom being used, but since exactness to this degree is not an absolute necessity in forming concrete pipe, and since the larger the diameter of long bottom **18**, the more wear segments **32** will be needed, each contributing a smaller part of the entire circle being formed, it is practical to form wear surface **36** planarly instead of arcuately. For example, in the embodiment illustrated in FIG. **2** wherein 54 wear segments **32** are used, the circumference formed by 54 individual, almost flat wear surfaces **36** almost forms a true circle.

For smaller diameter pipe, such as pipe having a diameter of from about 8 to 21 inches, wear segments such as **33** (FIG. 7) may be used. Each is similar to wear segment **32**, but having a width of $\frac{1}{2}\pi$, or 1.5708 with respect to the unit of measurement being used. In this way, the circumference formed by a plurality of segments **33** will also be nearly a true circle, even though the pipe diameter is rather small. In this case, two wear segments **33** are required for each single unit of measurement increase in pipe diameter, the circumference of a circle being π times the diameter, or in this case, 2 times π times one-half the diameter. Thus, for 8-inch diameter pipe, 16 segments **33** would be used; for 21-inch diameter pipe, 42 segments **33** would be needed, and so forth.

Preferably, each wear segment **32** is cast of a hard, long wearing material such as Nihard steel, but obviously a wide variety of materials may be used having such characteristics.

I claim:

1. In a concrete pipe forming machine utilizing the packerhead method of pipe construction, and including a vertically reciprocable rotary packerhead assembly for forming and troweling the interior surface of the pipe being formed, said packerhead including a pipe forming rotary assembly mounted upon a following, rotary long bottom for smoothing and finishing the interior cylindrical surface of the formed pipe, an improved wear surface for the long bottom comprising:

a. a plurality of segments, evenly radially distributed about the outer circumferential cylindrical surface of the long bottom, and arranged to space the long bottom from the interior surface of the pipe being formed; and

b. means for securing each segment to the long bottom; the relationship of the diameter of the long bottom, number of segments, and width of each segment being represented by the formula: $\pi D = NW$; where D equals the diameter of the long bottom, N, the number of segments, and W, the width of each segment.

2. The invention as recited in claim **1** wherein said wear segments are distributed one adjacent the other about the long bottom, thereby forming a complete wearing ring about the long bottom outer circumferential cylindrical surface.

3. The invention as recited in claim **1** wherein the ratio of unit of measurement of the diameter of the long bottom to the width of each wear segment is $1:\pi$.

4. The invention as recited in claim **3** wherein the unit of measurement is expressed in inches, each wear segment being 3.1416 inches wide.

5. The invention as recited in claim **1** wherein said segments are distributed about the upper edge of the long bottom.

6. The invention as recited in claim **5** wherein each wear segment includes a lip formed along the upper portion thereof to rest on the long bottom upper edge.

7. The invention as recited in claim **1** wherein said each of said means for securing each segment to the long bottom comprises:

a. means defining a bore through the long bottom;

b. means defining a mating countersink through the wear surface of the wear segment; and

c. nut and bolt means extending through the bore and countersink to secure the wear segment to the long bottom.

8. The invention as recited in claim **1** wherein the ratio of unit of measurement of the diameter of the long bottom to the width of each wear segment is $1:\frac{1}{2}\pi$.

9. The invention as recited in claim **8** wherein the unit of measurement is expressed in inches, each wear segment being 1.5708 inches wide.

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