Jan. 31, 1967 T. P. HANSON 3,301,289

DEBARKING DRUM CONSTRUCTION

Filed Oct. 12, 1964 3 Sheets-Sheet 1

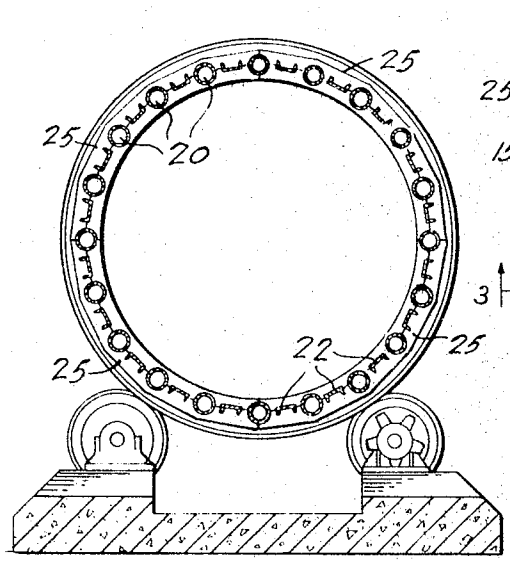


Fig. 2

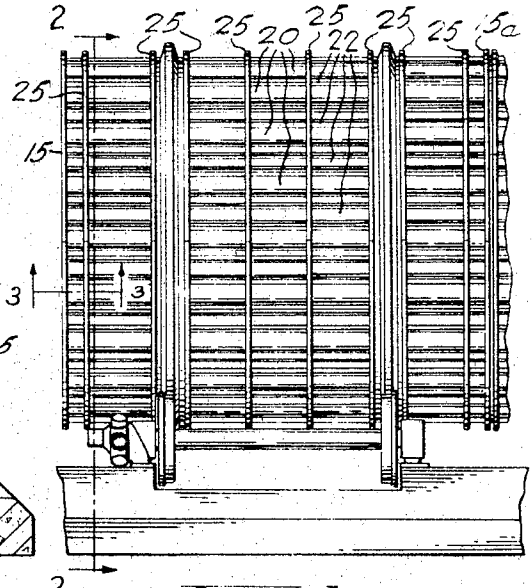


Fig. 1

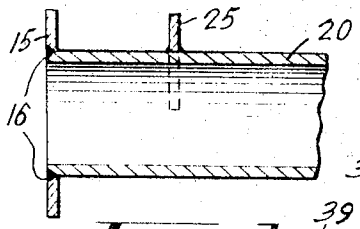


Fig. 3

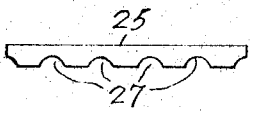


Fig. 4

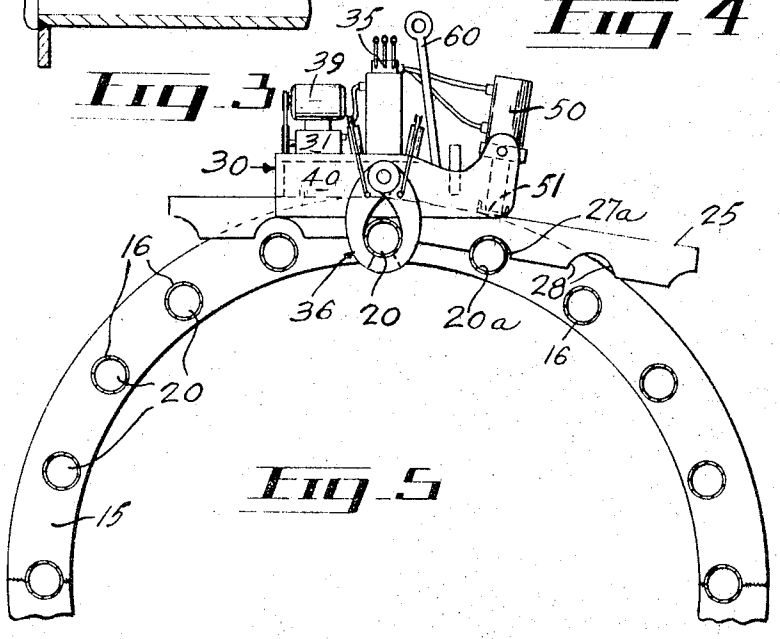


Fig. 5

INVENTOR
Thomas P. HANSON

BY

ATTORNEY

Jan. 31, 1967 T. P. HANSON 3,301,289

DEBARKING DRUM CONSTRUCTION

Filed Oct. 12, 1964 3 Sheets-Sheet 2

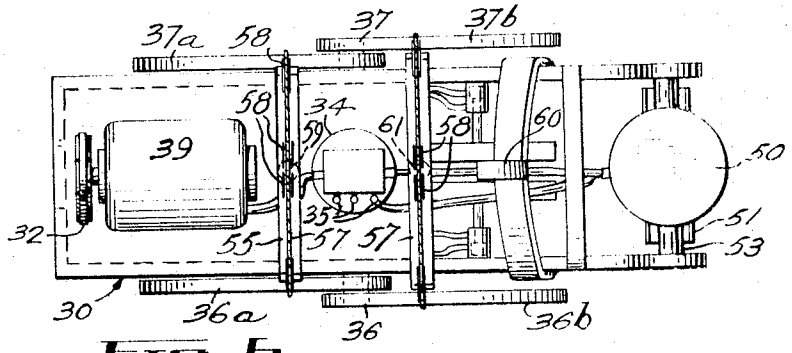


Fig. 6

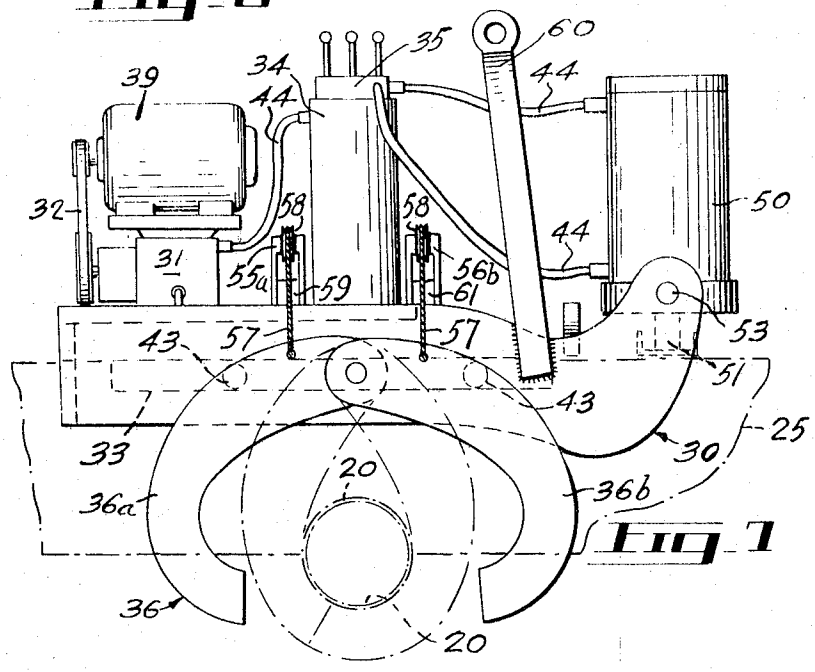


Fig. 7

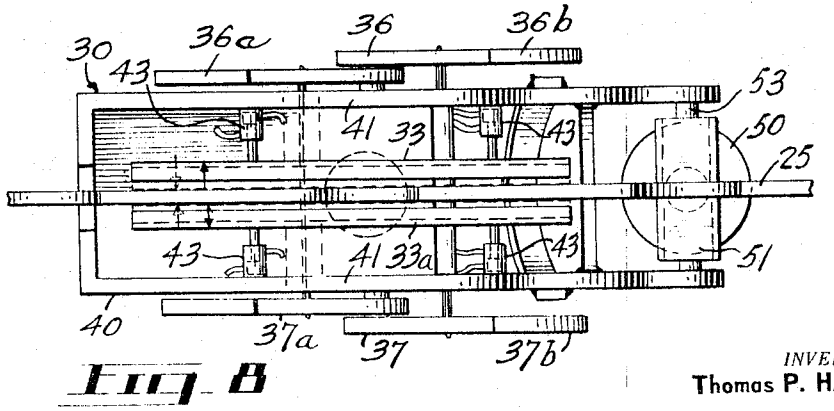


Fig. 8

INVENTOR
Thomas P. HANSON

BY

ATTORNEY

Jan. 31, 1967 T. P. HANSON 3,301,289

DEBARKING DRUM CONSTRUCTION

Filed Oct. 12, 1964 3 Sheets-Sheet 3

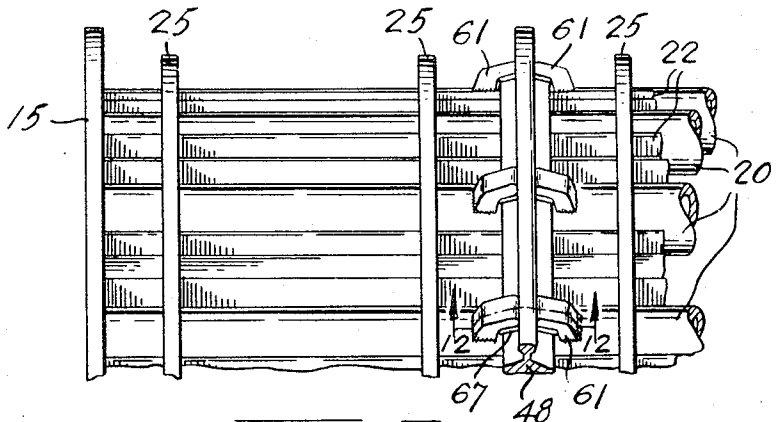


Fig. 9

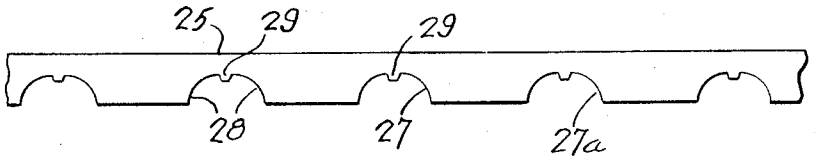


Fig. 10

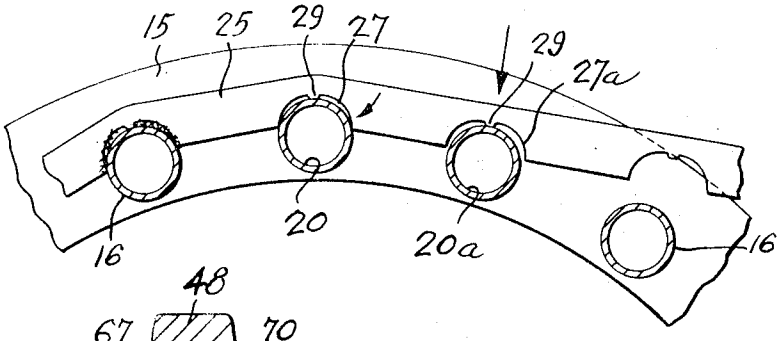


Fig. 11

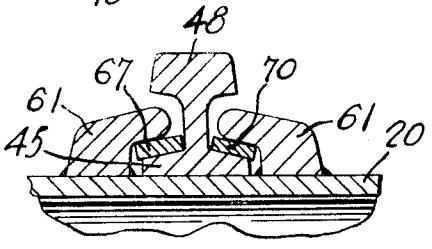


Fig. 12

INVENTOR
Thomas P. HANSON

BY Allan Ansley

ATTORNEY

United States Patent Office 3,301,289 Patented Jan. 31, 1967

3,301,289

DEBARKING DRUM CONSTRUCTION

Thomas P. Hanson, Lennoxville, Quebec, Canada, assignor to Uniweld Inc., Sherbrooke, Quebec, Canada

Filed Oct. 12, 1964, Ser. No. 403,204
4 Claims. (Cl. 144—208)

The present invention relates to improvements in the construction of cylindrical rolling drums, and particularly log debarking drums.

As is well known, barking drums in general consist essentially of a large cylindrical drum mounted for rotation on supporting trunnions, chains or the like. The pulpwood sticks or logs are fed into one end of such a drum and are tumbled against each other and the interior of the drum by rotation of the drum so that their bark is loosened and knocked off as they proceed to the other and discharge end of the drum. The side walls of the drum are perforated or slotted so that the dislodged bark can fall out of the drum and the tumbling or barking operation is usually carried out with water supplied to at least a portion of the drum.

It is also known that in order to obtain the maximum efficiency from practically any type of barking drum it should be run at least half full of wood. Since these drums are relatively large structures, i.e. on the order of from about 8 to about 12 feet in diameter and from about 30 to 45 feet in length, it will be obvious that the strains and shocks applied to a debarking drum in operation are considerable and that the construction of these drums of necessity must be sufficiently rigid and strong to withstand such shocks for long periods of time without structural failure.

The applicant recognizes these and other requirements and has previously developed a barking drum structure having better distribution of material, a stronger, stiffer structure both in torsion and bending, that is available in contemporary designs. This construction is set forth in detail in United States Patent 2,897,858 issued August 4, 1959, Thomas Paul Hanson. Briefly and as shown in United States Patent 2,897,858, by utilizing longitudinal members of circular cross-section, the highest possible moment of inertia and section modulous is assured on every axis for a given size and material thickness, as compared with the U, V and W shapes in common use, which have a high section modulous on one axis only.

Normal practice in drum debarker construction is to attach the longitudinal members to circumferential hoop or ring members, usually consisting of flat plates rolled into circular shape, with the width of the plate in the direction of the drum axis. This type of construction is relatively weak under stresses tending to deform it from the circular. This weakness is overcome in the design of United States Patent 2,897,858 by arranging the circumferential members on edge radially, thus presenting a very high moment of inertia to resist such stresses.

In accordance with the above construction, the longitudinal members are continuous for the length of the drum, and are passed through holes in the radial plates. To increase the bearing area, the longitudinal members are attached to the radial plates by gusset plates or brackets, which also support and reinforce the longitudinal members at a location, which under load is a highly stressed area.

The present invention, as an improvement over the type of drum shown in his previous patent, aims to provide a method, and apparatus capable of carrying out the method, whereby a debarking drum construction similar to that previously described can be assembled and erected in the field. This of course presents a considerable advantage in that the sites where such drums are utilized are often remote making the transportation of large

bulky equipment such as complete drum systems a difficult if not impossible task. It will be appreciated that the present method is equally suited for construction of drums at a more accessible plant site or at a manufacturing plant but it is particularly suited for construction in the field as will be made apparent by the following description.

As in the earlier construction shown in United States Patent 2,897,858, the drum construction of the present invention consists essentially of the combination of a plurality of longitudinal members preferably cylindrical pipes, and a plurality of ring members or radial plates to which the longitudinal members are connected. The main difference in the present invention is that the problem of the lining up and passing the longitudinal pipes through the spaced connecting rings or radial plates has been eliminated so that it is no longer necessary to have machinery or equipment for this purpose.

In accordance with the present method, only the two end radial plates are prepared and perforated, the intervening plates being formed right at the site and progressively connected to the longitudinal members as they are formed. More specifically, the two prepared end plates are set up and aligned in the desired spaced apart relationship and the required number of longitudinal members (preferably lengths of tubing or pipe) are aligned with and connected to the end plates to form the basic cylindrical framework. A plurality of prepared lengths of flat bar having elliptical notches cut out on one edge in spaced relationship coincide with the circumferential locations of the longitudinal members mounted in the end plates are then formed one at a time to fit circumferentially about the drum in an edgewise manner to correspond to the opposed end plates.

This is accomplished by placing each length of prepared flat bar edgewise on the aligned longitudinal members and by means of a portable press, which will be described later, the flat bar is gradually shaped around the drum, forming a radial reinforcing ring with the bar notches fitting snugly about each of the longitudinal members. These reinforcing rings or plates are, as they are formed, welded in place at approximately the same positions and to serve hte same purposes as the radial plates in the construction shown in Patent 2,897,858.

In accordance with the invention, the portable press used to form the flat bars consists essentially of a frame member having internally disposed guide members for holding the flat bar in a stable edgewise position, a hydraulic ram at one end of the frame located so as to press against the bar bending it in successive steps in the desired arcuate form. An abutment is provided at the other end of the frame for keeping the bar from pivotting during forming and a pair of tong-type clamps are also provided for securing the frame to the construction against the forming pressure.

Having thus generally described the nature of the invention, particular reference will be made to the accompanying drawings showing by way of illustration preferred embodiments thereof, and in which:

FIGURE 1 is a fragmentary side elevation of the debarking drum of the invention,

FIGURE 2 is a vertical cross-section taken along line 2—2 of FIGURE 1,

FIGURE 3 is a fragmentary cross-section taken along line 3—3 of FIGURE 2, showing a typical longitudinal member with its attachment to a prepared ring and a formed ring,

FIGURE 4 is a plan view showing a prepared notched flat bar in condition for forming,

FIGURE 5 is a fragmentary end elevation view showing the press in an operable position on a partially completed drum construction,

FIGURE 6 is a top plan view of the press shown in FIGURE 5,

FIGURE 7 is an enlarged side elevation view of the press illustrated in FIGURES 5 and 6,

FIGURE 8 is a bottom plan view of the press,

FIGURE 9 is an enlarged fragmentary view of the drum showing the rail attachments,

FIGURE 10 is a plan view illustrating another embodiment of the flat bar shown in FIGURE 4,

FIGURE 11 is a fragmentary vertical cross-section showing the forming of the drum reinforcing ring from the flat bar, and

FIGURE 12 shows an enlarged cross-sectional along line 12—12 of FIGURE 9.

As shown more clearly in FIGURES 1 to 5, the basic structure of the present barking drum consists of two prepared end radial plates **15** and **15***a* having holes **16** cut by template method for receiving the ends of a plurality of longitudinal cylindrical member or pipe **20**.

The debarking drum pipes **20** are first fitted in the holes **16** provided in the end plates **15**, and welded thereto. Spacer channels **22** are also provided between the tubes **20** and welded to the end plates.

Straight pieces of flat bar **25** of sufficient length to surround a segment of the drum diameter are precut with elliptical notches **27** cut out on one edge thereof are used to be shaped into stiffener rings. These are precut in such a manner that the notches **27** coincide with the pipes **20** when the bars **25** are bent into alignment with and applied to the basic drum framework of pipes **20** and end plates **15**, as will be described.

In order that the forming and assembling operations of the invention, making field assembly of the present drum construction possible, be more clearly understood, the construction and function of a portable hydraulic press designed specifically for this purpose will now be described in detail.

As shown most clearly in FIGURES 5 to 8, the press **30** is built up on a rectangular frame **40** which includes two parallel elongated guide plates **33** and **33***a* which are mounted so as to move inward of the frame under the control of opposed pairs of hydraulic rams **43** which are connected between the frame side plates **41** and the respective guide plates. In operating position, the entire press **30** rests on the flat bar **25** which is to be formed and attached to the basic framework and the guide plates **33**, **33***a* straddle the bar **25** as shown and are moved into contact with the bars holding the press **30** in operative position. It will be appreciated that each bar section **25** is first aligned in its desired location on the basic framework.

To continue with the working elements of the press **30**, a hydraulic cylinder **50** having a piston rod **51** is mounted on one end of the frame **40** for restricted pivotal movement about a shaft **53** extending between the forward end of the frame side plates **41**. The cylinder **50** is operatively connected to and controlled from control stand **34** which is provided with control handles **35** and is mounted substantially centrally of the main frame **40**. The necessary pressurized fluid is provided by a pump **31** driven by a motor **39** through belt **32**. The fluid is conducted from pump **31** to the control stand **34** by conduit **44** and from the stand **34** to cylinder **50** by conduits **44** under the action of suitable valve arrangement (not illustrated) operated by the handles **35**.

A hitching bridle **60** is welded to the frame **40** in such a way that the press **30** when suspended by means of a chain block engaged with the bridle **60** will be in substantially horizontal position. Tong-shaped clamps **36** and **37** are mounted on each side of the frame **40** on the side frame plates **41**. These clamps **36**, **37**, each have pivotally connected arms **36***a* and **36***b*, **37***a* and **37***b* respectively. When the press **30** is mounted on the framework of the drum, the clamps **36**, **37** are lowered in order to

anchor the press to a pipe **20** of the framework as shown in FIGURE 7.

The arms of the clamps **36**, **37** are actuated by means of cables **57** which go over pulleys **58** mounted on transverse frame members **55** and **56**. The clamps **36**, **37** are closed about the selected pipe **20** to anchor the pipe against the forming pressure of the cylinder **50** by releasing the cable **57** under the control of the operating handles **35**. To raise the clamps **36**, **37** into open position the cables **57** are connected centrally of the frame members **56***a*, **56***b* to hydraulic cylinders **59**, **61** which are also supplied from the pump **31**.

OPERATION

In order to assemble a drum in accordance with the invention, end plates **15**, **15***a* are positioned in the desired aligned spaced relationship, the pipes **20** are mounted and fitted in the openings **16** and finally welded. A flat bar **25** is then lowered on the top of the assembled pipes and a centrally located notch **27** is made to coincide with one of the pipes **20** at the desired spacing from the respective end plate and is spot-welded. The press **30** is then lowered by a chain block or the like in order to straddle the flat bar **25** and hydraulic rams **43** are activated to press the guide plates **33**, **33***a* against the edgewise standing flat bar **25**. Simultaneously, the cables **57** are released to drop the clamps **36** and **37** about the pipe **20**.

The press is then in operative position; as shown in FIGURE 5. The cylinder **50** is then activated forcing piston rod **51** against the back edge of bar **25** deforming it about the pipe **20**.

For example, as shown in FIGURE 5, when the piston rod **51** has deformed the bar **25** sufficiently edgewise so that the bar notch **27***a* is in complete association with the pipe **20***a*, the cable **57** is activated to lift the clamp arm **37***a* and **37***b* and **36***a* and **36***b* therefore releasing the press **30**. A crane or chain block (not shown) is hitched to the hitching bridle **60** and the press is raised so that the clamps can engage the next pipe **20***a* as the drum framework is rotated a sufficient amount in order that the press can always be engaged in a horizontal position. The whole procedure is repeated, deforming the flat bar **25** so that the elliptical notch **27***b* comes into contact with a further pipe **20***b* and so on. This procedure is repeated adding flat bars **25** until a complete ring is formed. The flat bars **25** used in the illustrated construction have a length equal to one quarter of the circumference of the drum being formed. The length of the flat bars **25** of course may be varied depending on the size of the drum to be made, which will determine to some extent the length of each segment, or flat length of bar which can be readily handled. The diameter of the drum shown is approximately 12' so that the bars **25** could be readily handled in four segments, each flat bar having a length of approximately 9'. As the flat bars **25** are applied around the drum, each elliptically-shaped notch **27** is deformed, finally taking a substantially semicircular shape thus fitting about the top half of respective pipe **20**.

It will be noted that the deforming pressure from the piston **51** is applied at the point on the bar above each notch **27** so that the bar tends to crimp at its weakest point thereby forcing the sides **28** of the notch **27** inwardly towards the pipe. Since the ellipse formed by the notch **27** is taken along its major axis, it is then forced to become substantially circular in shape because the major axis approaches the minor axis in size. In FIGURES 10 and 11, a preferred form of a bar **25** is shown having small projections **29** at the top of each notch **27** which assures an all-metal contact with the pipe when the bar is deformed providing a better welding area.

In the preferred construction shown, driving rails **48** are assembled to the basic drum framework prior to the

application of the radial stiffening plates. These driving rails are preferably made up of pre-rolled segments which are attached to the pipes **20**, as shown in FIGURE 12 by foot plates **61** welded directly to the pipes **20** and wedges **67** and **70** are utilized between the foot plates **61** and the flange **45** of the rails. The pre-rolled segments of rail **48** are joined by welding and located in the desired locations and a pair of stiffening plates formed and connected to the pipes at each side as shown. The rails **48**, which in this construction are used as a driving means for the drum section, serve as a means whereby the drum framework can be easily rotated for the forming of the radial plates by supporting the drum on temporary trunnion wheels.

Once the rings have been mounted, the channel spacers **22** are then mounted from the inside by cutting small notches in the flanges of the channel spacers **22** or in the web of the ring in order to mate the channels with the rings. The whole framework is finally welded about all interconnecting joints to complete the drum structure.

I claim:

1. An open-ended cylindrical barking drum comprising, a plurality of elongated cylindrical members connected to and supported in spaced apart circumferential alignment between a pair of axially spaced end plates of annular formation and having a greater radial width than thickness with a plurality of annular stiffening plates also of greater radial width than thickness mounted on said elongated members between said end plates in spaced axial relationship therewith, each of said annular stiffening plates having on its inner surface spaced apart notches corresponding in location to said circumferentially spacing of said elongated members and being connected thereto, and annular driving members surrounding said circumferentially spaced elongated members at axially spaced points along the length of said framework.

2. A barking drum construction, comprising in combination a plurality of axially spaced peripheral rings, a plurality of longitudinal members of generally circular cross-section mounted within and extending between said rings in circumferentially spaced apart cylindrical formation to form therewith an open-ended cylindrical framework, each of said peripheral rings being made up of flat metal plate and having a thickness in the axial direction of said drum considerably less than its transaxial width at any point, opposed end ones of said rings being pre-formed and provided with circular openings receiving the end portions of said longitudinal members with the remainder of said rings intervening said end rings being provided with inwardly extending notches corresponding to the circumferential spacing of said longitudinal members and being applied to the exterior thereof in interconnected sgements, and drum guiding members mounted on and surounding said cylindrical framework at spaced apart points between said end peripheral rings.

3. A barking drum construction, as claimed in claim **2** wherein said longitudinal members each comprise a continuous length of heavy gauge metal pipe.

4. A barking drum construction as claimed in claim **2** wherein said notched rings are made up of a plurality of interconnected segments formed from straight prenotched lengths of flat bar bent into arcuate form directly over said cylindrical framework.

References Cited by the Examiner

UNITED STATES PATENTS

1,228,374	4/1917	Ross	144—208
2,300,610	11/1942	Branch	144—208
3,020,943	2/1962	Hjartsater	144—208

WILLIAM W. DYER, JR., *Primary Examiner.*

W. D. BRAY, *Assistant Examiner.*