

Dec. 27, 1955

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2,728,599

APPARATUS FOR RECOVERING JUNK FROM A WELL BORE

Filed Dec. 23, 1952

2 Sheets-Sheet 1

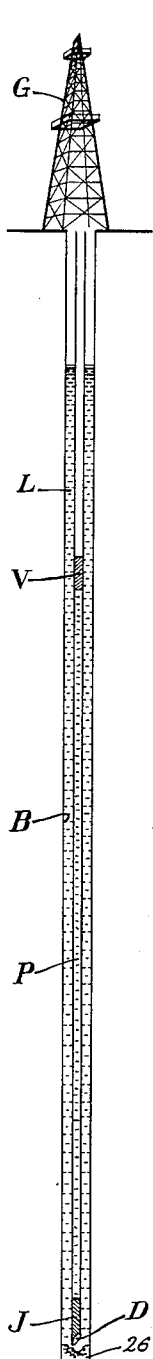


Fig. 1

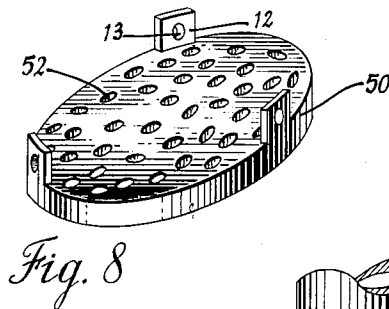


Fig. 8

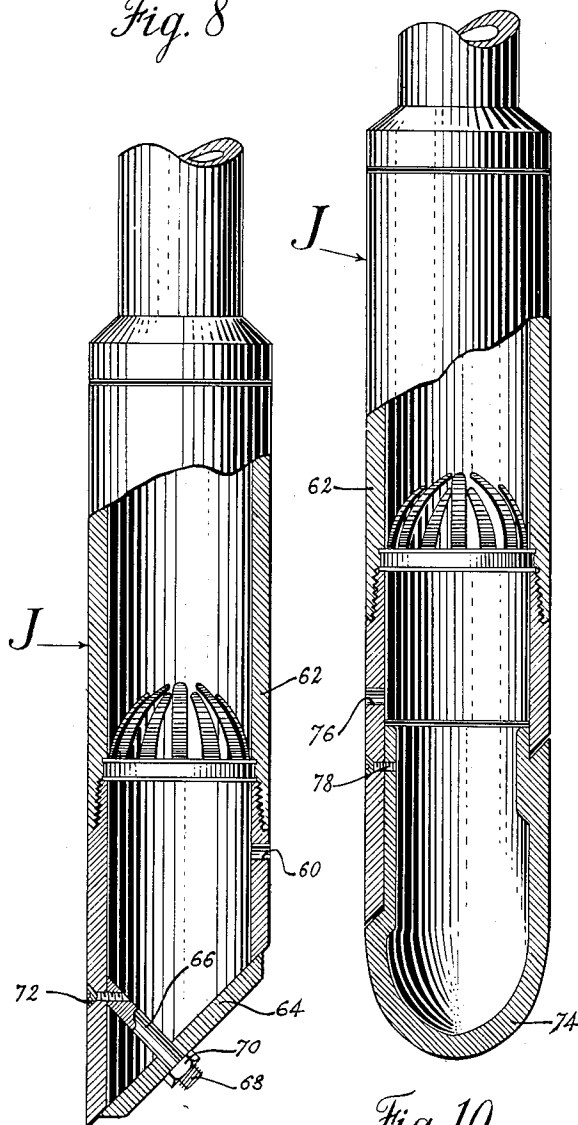


Fig. 9

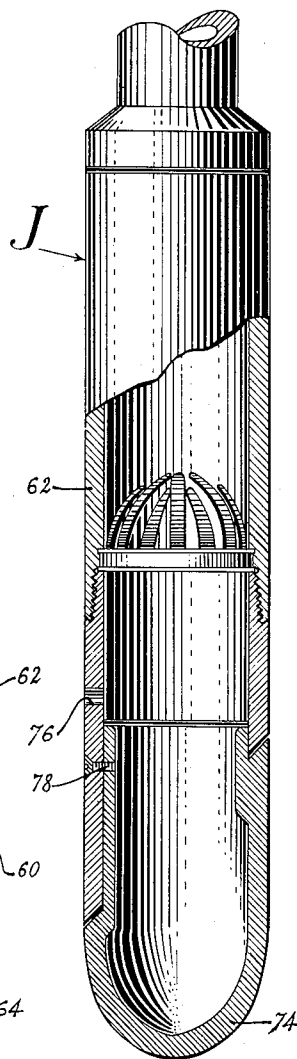


Fig. 10

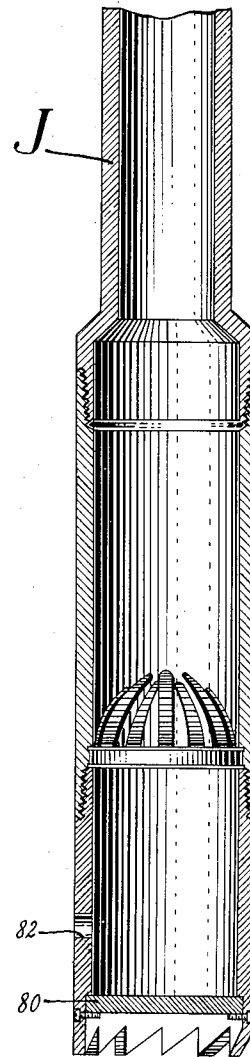


Fig. 11

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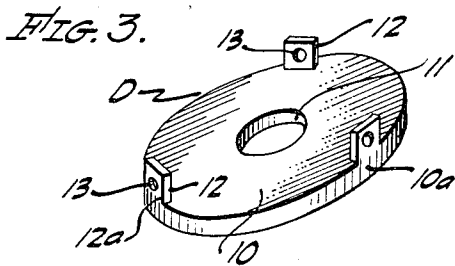


FIG. 5.

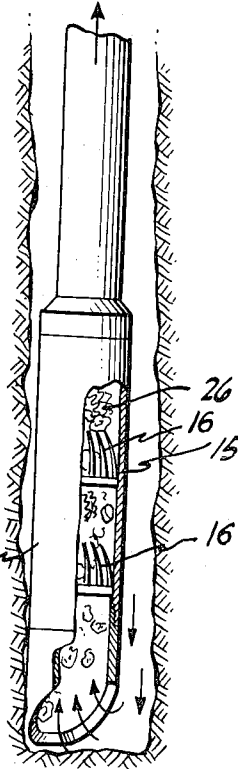


FIG. 4.

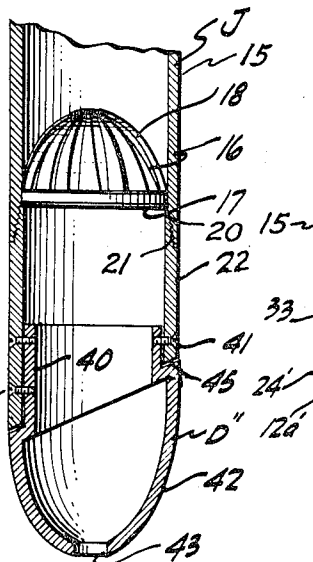
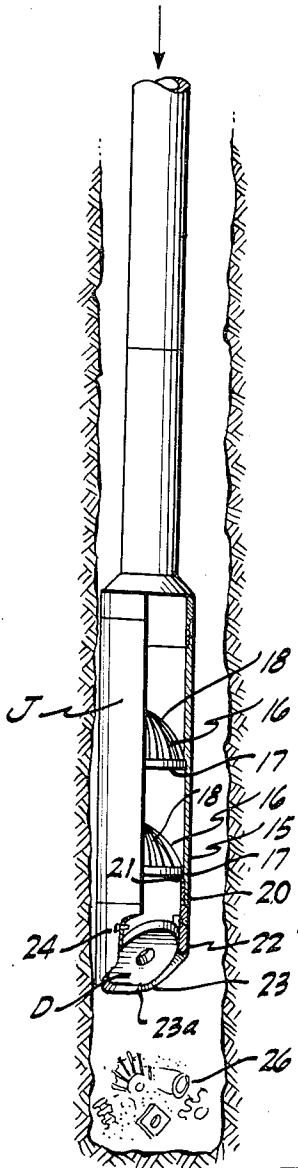
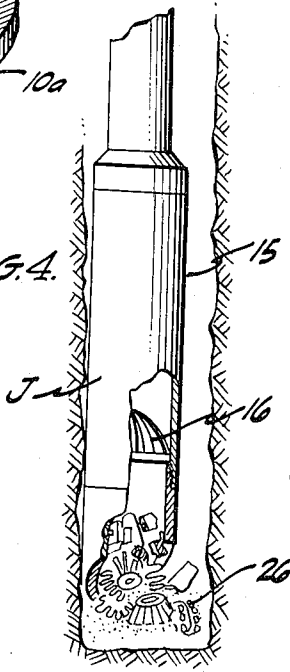


FIG. 6.

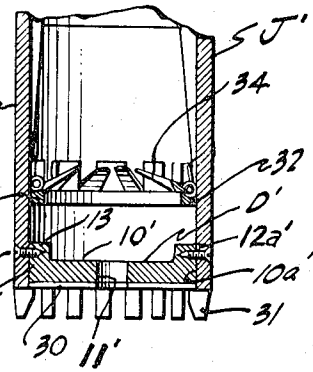


FIG. 2.

FIG. 7.

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APPARATUS FOR RECOVERING JUNK FROM A WELL BORE

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Application December 23, 1952, Serial No. 328,240

16 Claims. (Cl. 294—86)

The present invention relates generally to the field of oil well tools, and more particularly to junk baskets.

This is a continuation-in-part of application Serial No. 151,619 filed by me March 24, 1950, and bearing the same title and now abandoned.

A junk basket is used for the recovery of small objects, usually metal, which have been accidentally lost in a well and the removal of which is necessary in order to permit the continuation of drilling or producing operations within the well. A widely used type of junk basket is of tubular, open-ended configuration and is adapted to be lowered within a well bore at the bottom of a string of pipe. Most well bores are filled with liquid for the major portion of their depth, which liquid provides a pressure head adapted to offset the pressure of the fluids existing in the earth formations through which the well bore is drilled. The pipe string which supports this type of junk basket may incorporate a control valve which is disposed in the pipe string at a point below the level of the liquid standing in the hole. The top of this valve is exposed to the atmosphere by means of the interior of the pipe string, and the valve will be positioned at a point sufficiently far above the junk basket and below the level of the liquid standing in the bore hole to provide a pressure differential of approximately 1500 to 3000 pounds per square inch on its opposite sides. This control valve is controllable from the surface, and during the junk catching operation it will be alternately opened and closed so as to permit liquid outside of the pipe string to enter the lower end of the pipe string through the mouth of the junk basket under the influence of the pressure head of the liquid outside the pipe string. The alternate opening and closing of the control valve creates a series of upward hydraulic surges, which surges lift the junk from the bottom of the bore hole into the junk basket.

A serious problem arises when the junk basket is being lowered through the uncased portion of the well bore. At this time the mud used in drilling the bore hole will have formed a heavy clay-like cake upon the walls of the well bore. As the junk basket is being lowered to the bottom of the well bore it will scrape along the sides thereof so as to accumulate quantities of the mud cake and perhaps of the formation material itself within its confines. This is especially likely to occur when the junk basket is being lowered within a slant-drilled well bore. It will be readily apparent that the accumulation of this heavy material within the junk basket will thoroughly plug it. Such plugging of course, prevents the entry of fluid, and hence junk, through the mouth of the junk basket. Accordingly, when plugging occurs the junk basket must be retrieved to the surface, cleaned, and again lowered into the well bore; all at an appreciable cost in time and labor.

Although it is possible to eliminate the problem of plugging of the junk basket by means of a solid closure member for the mouth thereof, the provision of such a member gives rise to an even more serious problem. Thus, as pointed out above, the major portion of the well

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bore is kept filled with liquid during the junk catching operation. If the mouth of the junk basket was covered with a solid closure member, this liquid could not enter the interior of the pipe string as it is lowered into the well bore. Accordingly, when the junk basket would be positioned adjacent the junk to be recovered and the closure member removed so as to permit the junk to enter the junk basket, the liquid in the bottom portion of the well bore would be free to rush upwardly within the pipe string at a very high velocity until it reached the underside of the control valve. This would permit the occurrence of two serious consequences:

1. The high speed downward movement of the well bore liquid could cause the uncased portion of the well bore to cave in. In such event, not only would the hole require repair, but also the pipe string could easily become stuck in the hole whereby an expensive fishing job would be required to loosen it.

2. The rapid rise of well bore liquid within the interior of the pipe string would be accompanied by a correspondingly rapid drop in the level of the liquid standing in the well. As a result, the head of the well bore liquid could easily be reduced to a point where it could no longer offset the high pressures of the gas or fluid existing in the earth formations adjacent the well bore whereby a disastrous blow-out of the well might occur.

The present invention contemplates the solution of both the aforescribed plugging up problem, and the problem of an undesirable upward hydraulic surge of liquid within the interior of the pipe string by the provision of a closure member for the bottom of the junk basket and the utilization of a liquid passing aperture adjacent the lower end of the pipe string. With this arrangement, the closure member is adapted to prevent the entry of foreign matter within the junk basket as it is being lowered into the well bore, while the aperture permits well bore liquid to pass through the interior of the pipe string to the underside of the control valve as such lowering occurs. Accordingly, when the closure member is removed from the mouth of the junk basket the pressure on the interior and the exterior thereof will be equally balanced, and hence no excessive sudden upward hydraulic surge will occur.

The present invention also contemplates a closure member for the mouth of a junk basket which may be readily ruptured by contact with the junk disposed in the bottom of the well bore as the junk basket is lowered thereinto. To this end, the closure member of the present invention is of a frangible nature having sufficient physical strength to withstand the pressure of the mud cake or other foreign matter which it may encounter as the junk basket is lowered into the bore hole, but not having sufficient physical strength to withstand the sudden jar to which it is subjected upon contact with junk located in the bottom of the well bore.

It is a major object of the present invention to provide an improved apparatus for recovering junk from a well bore.

Another object of the present invention is to provide apparatus of this nature, which reduces to a minimum the likelihood of either a cave in or a blow-out occurring during the junk catching operation.

A further object of the present invention is to provide novel means for preventing the plugging up of a junk catcher by foreign material as it is lowered into a well bore at the lower end of a pipe string, but at the same time permitting well bore liquid to rise within the pipe string.

It is another object of the present invention to provide a closure member for partially closing the mouth of a junk basket, which closure member has physical properties permitting it to be broken upon forceful con-

tact with junk or other hard material disposed at the bottom of a well bore.

An additional object of the present invention is to provide a closure member which is extremely simple in structure, may be fabricated from standard commercially available materials, is easy to install upon any conventional open-mouthed oil tool, and which because of its relatively low cost of production may be retailed at a cost which will encourage its widespread use in the oil industry.

Other objects and advantages will become apparent from the following detailed description of a preferred form and certain modifications of the present invention, when taken in conjunction with the appended drawings wherein:

Figure 1 is a general view showing the mode of operation of junk catching apparatus embodying the present invention;

Figure 2 is an enlarged combination elevational and vertical cross-sectional view of a part of the junk catching apparatus shown in Figure 1;

Figure 3 is a further enlarged perspective view of a frangible closure member used in the junk catching apparatus of Figure 2;

Figure 4 is a combination elevational and vertical cross-sectional view showing the frangible closure member of Figure 3 being broken by contact with junk located at the bottom of the well bore;

Figure 5 is a view similar to Figure 4, but showing the junk being carried upwardly from the bottom of the well bore into the confines of the junk basket member of junk catching apparatus embodying the present invention;

Figure 6 is a vertical cross-sectional view of the lower portion of another form of junk basket equipped with a frangible closure member embodying the present invention;

Figure 7 is a vertical cross-sectional view of the lower portion of yet another form of junk basket equipped with a frangible closure member embodying the present invention;

Figure 8 is an enlarged perspective view showing another form of frangible closure member which may be utilized with the junk catching apparatus disclosed in Figure 2;

Figure 9 is a vertical cross-sectional view of an alternate form of junk catching apparatus embodying the present invention;

Figure 10 is a vertical cross-sectional view of another alternate form of junk catching apparatus embodying the present invention; and,

Figure 11 is a vertical cross-sectional view of yet another alternate form of junk catching apparatus embodying the present invention.

Referring now to the drawings, and particularly Figure 1 thereof, the present invention contemplates the recovery from the bottom portion of a well bore B of junk 26 by means of a junk basket J supported at the lower end of a pipe string P, which pipe string is in turn supported within a derrick G located at the earth's surface. The well bore B is shown partially filled with a liquid L. A control valve V is interposed in the pipe string P at a point spaced below the top level of the liquid L. This control valve is controllable from the earth's surface by suitable means (not shown). The top of the control valve is exposed to the atmosphere by means of the interior of the pipe string P; the junk basket J is of the conventional open-ended type and its mouth is shown closed by a frangible closure member D embodying the present invention.

Referring now to Figures 2 through 5 for the general arrangement of one form of the invention, it will be seen that the closure member D is fabricated from an annular plate 10 of a frangible material, with the plate having a centrally disposed bore 11 formed therein, and the plate having a number of circumferentially spaced

lugs 12 formed on the upper surface thereof. Each of the lugs 12 as may best be seen in Figure 1, has a centrally positioned bore 13 formed therein for reasons which will hereinafter be explained. Although the disc D may be used in partially closing the lower open end of a number of oil tools, its use in junk baskets is specifically illustrated in the present application.

The junk basket J is shown in detail in Figures 2 through 5 inclusive, and Figure 7. The junk basket J includes a barrel 15, with the barrel having a number of vertically spaced junk retainers 16 situated within the confines thereof. Each of the retainers 16 includes an annular ring 17 that has a number of circumferentially spaced upwardly and inwardly extending resilient fingers 18 affixed to the upper portion thereof. The barrel 15 has threads 20 formed on the lower internal surface thereof, with the threads 20 being engaged by threads 21 formed on the upper portion of a shoe 22. The shoe 22, for reasons which will hereinafter be explained, has angularly disposed lower edges 23, with the edges terminating in a horizontal edge portion 23a. The frangible closure member or disc D is angularly disposed in the shoe 22 substantially parallel to the angularly disposed edges 23, and is held in position by screws 24 or similar fastening means that extend through bores formed in the shoe to engage the bores 13.

As the closure member D is angularly disposed in the shoe 22 it will be apparent that the rim 10a of the plate 10 and the circumferential faces 12a of the lugs 12 must be formed at an angle relative to the upper and lower surface of the plate 10 to permit such positioning.

Thus, the frangible closure member D may be easily inserted in the shoe 22 and held in position therein by the screws 24. After the closure member D has been positioned in the shoe 22, the junk basket J is affixed to the lower end of the pipe string P and then lowered into the well bore, as shown in Figure 2. As the junk basket J is lowered into the well bore it may encounter fluid, with the fluid flowing upwardly through the water course or bore 11 in the closure member D and the interior of the pipe string to the underside of the control valve V. The diameter of the bore 11 is sufficiently small however, in comparison with the diameter of the barrel 15 that heavy accumulations such as a large ball of mud cake or formation which may have been scraped off the wall of the hole, floating objects, and the like, will not enter the basket J.

Upon the junk basket J being lowered in the well bore to the position shown in Figure 3 where the frangible closure member D is brought into forcible contact with the junk 26 situated at the bottom of the hole, the closure member is broken into a number of small fragments. The closure member D may be fabricated from a number of frangible or brittle materials, but for ease of manufacture and installation in the shoe 22, a plastic material such as Lucite has been found to give very satisfactory results. After the junk basket J has been bottomed as shown in Figure 3, and the frangible closure member broken by impact with the junk, the mouth of the basket will be free to receive the junk, and to function unimpeded by any stoppage or plugging which might otherwise occur.

The means of lifting the junk upwardly into the basket J and past the retainers may be supplied by a variety of tools and methods which are used to create a downward flow of the well fluid on the outside of the tool and an upward flow through and into the basket. These tools include, among others, such items as sand pumps and hydrostatic bailers, both of which are run into the well on wire lines; hydrostatic types of fishing tools which are run on drill pipe or tubing; and straight coring types of junk baskets which are run on drill pipe or tubing and which cut a core over the junk and through the formation below the basket due to rotation. The preferred manner of lifting the junk 26 into the junk basket J, however, will utilize the control valve V. Thus, once the junk basket has been disposed as shown in Figure 4 with the closure member D

having been broken, the control valve V may be opened. Due to the differential in the pressure head of the well bore liquid L between the interior and exterior of the pipe string P by virtue of the differential in height of this liquid, the liquid in the vicinity of the junk 26 will flow upwardly into the junk basket with considerable velocity whereby the junk 26 will be forced thereinto. After entering the junk basket the junk will be trapped by the junk retainers 16, since it will not have sufficient weight to deform the fingers 18 enough to allow it to fall downwardly back into the well bore. Hence, the junk will be trapped for removal to the surface. It should be especially noted that inasmuch as the well bore liquid L was free to rise within the pipe string P to the underside of the control valve V before this valve was opened, once such opening was effected, the resulting upward hydraulic surge is controllable as to time and quantity. This would not be true if the closure member D was not formed with the aperture 11.

Occasionally the junk 26 to be retrieved from the bottom of the well bore is positioned adjacent to the side walls thereof, and to centrally position the objects or junk 26 therein, the junk basket J when being run on tubing or drill pipe may be slowly rotated while in contact with the junk. If the basket J is run in conjunction with a fishing tool which is lowered into the well bore on a wire line, repeated raising and lowering of the tool against the junk will serve the same purpose. One purpose of the angularly disposed edges 23 is to crowd the junk 26 to the center of the hole as the basket J is either rotated or raised and lowered. Another purpose of the angularly disposed edges 23 is to so direct fluid movement that junk is swept into the basket when the recovery is accomplished by hydraulic means.

An alternate form of junk basket J' is shown in Figure 6 that has a substantially horizontal lower edge 30 from which circumferentially spaced teeth 31 project downwardly. By rotation of the pipe string or tubing on which the junk basket J' is mounted, the teeth 31 mill or cut pieces of junk situated at the bottom of the hole into small portions that may be carried upwardly into the basket by any one of the previously described means. A frangible closure member D' that is similar in construction to the disc D is mounted in the junk basket J', and is held in position by bolts or screws 24' that extend through the side wall of the junk basket J' to engage the bores 13. The closure member D' is horizontally positioned in the junk basket J' and is formed with a rim 10a' and circumferentially spaced lugs 12a' which are normal to the upper and lower faces of the plate 19'. Although the junk retainers 16 have proved to be satisfactory in retaining small objects or junk carried upwardly into the confines of the tool, a junk retainer 32 such as shown in Figure 6 may be used with the junk basket J or J' if desired. The junk retainer 32 includes an annular ring 33 that fits within the confines of the junk snatcher J', with the ring pivotally supporting a number of circumferentially disposed teeth 34 that may pivot upwardly but not downwardly beyond a predetermined point.

As junk 26 is moved upwardly into the junk basket J', by whatever means used, the teeth 34 pivot upwardly and permit the junk to pass therebetween. As the junk falls downwardly after completion of the loading cycle it is caught on the teeth 34 and retained within the confines of the junk basket J'. The junk is retained in the basket J or J' due to the teeth 34 being capable of pivoting downwardly only to a position where they are substantially horizontal.

An alternate hollow frangible closure member D'' is shown in Figure 7 with the member D'' including a neck portion 40 adapted to fit within the lower confines of the junk basket J, and be held in position therein by bolts 41 or other fastening means that engage the side walls of the junk basket and the neck portion 40. The lower portion 42 of the member D'' is preferably curved into

the shape of a hollow paraboloid, and has a bore 43 formed in the lower extremity thereof, that serves as a water course in the same manner as the bore 11 in the frangible disc D. It will be noted that the neck 40 and the lower portion 42 form a body shoulder 45 that may seat against the edges of the shoe. This shape of frangible closure serves well to center the basket during its descent in the well and may be adapted for attachment to any shape or design of junk basket or shoe. The frangible closure member D'' operates in the same manner as the closure member D in preventing mud or other foreign material from obstructing the lower end of the junk basket J or interfering with the operation of the device.

It will be apparent from an examination of the drawing that as in the case of closure member D, the closure members D' and D'' are subjected to an equal pressure on each side thereof during the time the junk basket is being lowered in the hole, due to the liquid in the hole being permitted to flow through the bores formed therein. Were it not for the bores 11, 11' and 43, the exterior surface of these closure members would be subjected to a high pressure differential by the liquid in the well bore, rather than equalized pressure; and as a result, they would have to be fabricated with a considerably heavier wall thickness. Consequently, they would be broken against the junk 26 only with considerable difficulty.

In Figure 8 there is shown another form of frangible closure member 50 which may be used with the type of junk basket J shown in Figures 2 through 5. In this form, the closure member is formed with a plurality of spaced-apart bores 52 of small diameter in place of a single passage 11 of large diameter. These bores 52 serve to admit well liquid into the junk basket, and hence the interior of the pipe string as the junk basket is lowered into the well bore.

Referring now to Figure 9, there is shown an alternate form of junk catching apparatus embodying the present invention. In this form a well bore liquid admitting aperture 60 formed in the side wall 62 of the junk basket J rather than in the closure member 64 itself. With the aperture so formed, likelihood of its being plugged up by well bore detritus as the junk catcher is being lowered into operating position is considerably reduced. It should be noted that in this form of the invention the closure member 64 is secured to the lower end of the junk basket J by means of a frangible bolt element 66. To this end, the lower end of this bolt element may be formed with threads 68 adapted to be engaged by a nut 70, so as to secure the closure member in place; the opposite end of the bolt element being rigidly affixed to the junk catcher by means of a screw 72. Conveniently, both the closure member 64 and the bolt element 66 may be formed of a plastic.

In Figure 10 there is shown another alternate form of junk catching apparatus embodying the present invention. In this form the junk basket J is equipped with a hollow closure member 74 having a downwardly curved paraboloid configuration generally similar to the closure member disclosed in Figure 7. As in the case of the closure member 64 shown in Figure 9, however, the closure member 74 is not formed with a well bore liquid passing aperture. Instead, such an aperture 76 is formed in the side wall 62 of the junk basket J. The closure member 74 should be formed of a frangible material and may conveniently be secured to the lower end of the junk basket by one or more screws 78.

Referring to Figure 11, there is shown a junk basket J' similar to that disclosed in Figure 7, which junk basket is equipped with a frangible closure member 80 like that designated 10' in Figure 7. The closure member 80, however, is not formed with a well bore liquid-passing aperture, as in the case of closure member 10'. Instead such an aperture 82 is shown formed in the side wall 84 of the junk basket J'.

With reference to the embodiments of the invention shown in Figures 9, 10 and 11, it should be noted that their mode of operation is similar to that previously described in connection with Figures 1 through 7.

Although the various devices shown and described hereinbefore are fully capable of achieving the objects and providing the advantages set forth above, it is to be understood that various changes and modifications may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore, the interior of said pipe string being exposed to a pressure less than that existing within said bore in the vicinity of said junk; a junk catcher member carried by the lower end of said pipe string and having a mouth through which said junk may enter; a control valve interposed in said pipe string above said junk catcher member but below the surface of the well bore liquid; a frangible closure member for the mouth of said junk catcher member to prevent the entry of detritus therein as said junk catcher member is being lowered within said well bore; and an aperture formed in one of said members whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk, and said control valve being operable from the surface whereby the differential in the pressure head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto.

2. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore, the interior of said pipe string being exposed to a pressure less than that existing within said bore in the vicinity of said junk; a junk catcher member carried by the lower end of said pipe string and having a mouth through which said junk may enter; a control valve interposed in said pipe string above said junk catcher member but below the surface of the well bore liquid; a frangible closure member for the mouth of said junk catcher member to prevent the entry of detritus therein as said junk catcher member is being lowered within said well bore; and an aperture formed in said closure member whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk, and said control valve being operable from the surface whereby the differential in the pressure head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto.

3. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore, the interior of said pipe string being exposed to a pressure less than that existing within said bore in the vicinity of said junk; a junk basket carried by the lower end of said pipe string and having a mouth through which said junk may enter; a control valve interposed in said pipe string above said junk basket but below the surface of the well bore liquid; a frangible closure member for the mouth of said junk basket to prevent the entry of detritus therein as said junk basket is being lowered within said well bore; and an aperture formed in said junk basket whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk, and said control valve being operable from the surface whereby the differential in the pressure

head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto.

4. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore; a control valve mounted in said pipe string, with the interior of said pipe string above said control valve being exposed to atmospheric pressure; a tubular junk catcher member carried by the lower end of said pipe string, the lower end of said junk catcher member being inclined to the longitudinal axis of said pipe string and the opening defined by said lower end constituting a mouth through which said junk may enter; a generally flat frangible closure member for the mouth of said junk basket member permitting any detritus encountered by said junk basket member as it is lowered within said well bore to slide upwardly along the underside of said closure member, and preventing the entry of said detritus into said junk catcher member; and an aperture formed in said closure member whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk, and said control valve being operable from the surface whereby the differential in the pressure head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto.

5. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore; a control valve mounted in said pipe string, with the interior of said pipe string above said control valve being exposed to atmospheric pressure; a tubular junk catcher member carried by the lower end of said pipe string, the lower end of said junk catcher member being inclined to the longitudinal axis of said pipe string and the opening defined by said lower end constituting a mouth through which said junk may enter; a generally flat frangible closure member for the mouth of said junk basket member permitting any detritus encountered by said junk basket member as it is lowered within said well bore to slide upwardly along the underside of said closure member, and preventing the entry of said detritus into said junk catcher member; and an aperture formed adjacent the lower end of said pipe string whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk, and said control valve being operable from the surface whereby the differential in the pressure head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto.

6. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore; a control valve mounted in said pipe string, with the interior of said pipe string above said control valve being exposed to atmospheric pressure; a tubular fishing tool member carried by the lower end of said pipe string, the lower end of said fishing tool member being inclined to the longitudinal axis of said pipe string and the opening defined by said lower end constituting a mouth through which said junk may enter; a frangible plate closure member for the mouth of said fishing tool, said closure member having two substantially parallel faces and a plurality of spaced lugs extending outwardly from one of said faces at such an angle that said closure member may be disposed over said mouth parallel to the lower end of said tool member with said lugs being positioned substantially parallel to the side walls of said tool member; means to attach said lugs to said tool member so as to hold said closure mem-

ber over said mouth with its faces parallel to the lower end of said tool member thereby permitting any detritus encountered by said tool member as it is lowered within said well bore to slide upwardly along the bottom face of said closure member, and preventing the entry of said detritus into said tool member; and an aperture formed in said closure member whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk, and said control valve being operable from the surface; whereby the differential in the pressure head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto, the inclinity of the lower end of said tool member serving to force said junk toward the center of said mouth as said tool member is moved in the vicinity of said junk.

7. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore, the interior of said pipe string being exposed to a pressure less than that existing within said bore in the vicinity of said junk; a junk catcher member carried by the lower end of said pipe string and having a mouth through which said junk may enter; a control valve interposed in said pipe string above said junk catcher member but below the surface of the well bore liquid; a frangible hollow closure member securable at its upper end to said junk catcher member and extending downwardly therefrom in the shape of a paraboloid, said closure member being adapted to prevent the entry of detritus through said mouth as said junk catcher member is lowered within said well bore; and an aperture formed in one of said members whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk, and said control valve being operable from the surface whereby the differential in the pressure head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto.

8. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore, the interior of said pipe string being exposed to a pressure less than that existing within said bore in the vicinity of said junk; a junk catcher carried by the lower end of said pipe string and having a mouth through which said junk may enter; a control valve interposed in said pipe string above said junk catcher but below the surface of the well bore liquid; a frangible hollow closure member securable at its upper end to said junk basket and extending downwardly therefrom in the shape of a paraboloid, said closure member being adapted to prevent the entry of detritus through said mouth as said junk basket is lowered within said well bore; and an aperture formed in said closure member whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk, and said control valve being operable from the surface, whereby the differential in the pressure head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto.

9. Apparatus for recovering junk from a well bore containing liquid, comprising: a pipe string adapted to be inserted into said well bore, the interior of said pipe string being exposed to a pressure less than that existing within said bore in the vicinity of said junk; a junk catcher carried by the lower end of said pipe string and having a mouth through which said junk may enter; a control valve

interposed in said pipe string above said junk catcher but below the surface of the well bore liquid; a frangible hollow closure member securable at its upper end to said junk basket and extending downwardly therefrom in the shape of a paraboloid, said closure member being adapted to prevent the entry of detritus through said mouth as said junk basket is lowered within said well bore; an aperture formed in said junk basket whereby the well bore liquid may pass through the interior of said pipe string to the underside of said control valve, said closure member being breakable upon forceful contact with said junk and said control valve being operable from the surface whereby the differential in the pressure head of said well bore liquid between the interior and exterior of said pipe string will cause the well bore liquid in the vicinity of said junk to enter said mouth and thereby force said junk thereinto.

10. A device for use in preventing entry of foreign material through the open end of a tubular fishing tool when it is lowered into a bore hole which includes: a frangible closure member supported on the lowermost open end portion of a tubular fishing tool, said member being breakable upon forceful contact with junk situated in the bore hole in which said tool is lowered, and said member having a bore formed therein for equalizing the pressure between the interior and exterior of said tool to prevent a hydraulic surge from a fluid column standing in said bore hole when said member breaks.

11. A device that prevents entry of foreign material through the open end of a tubular fishing tool when it is lowered into a bore hole which includes: a frangible plate that has two substantially parallel faces angularly disposed relative to the side wall of said plate, said plate having a bore formed therein; a plurality of spaced lugs extending outwardly from one of the faces of said plate, the longitudinal axis of each of said lugs being substantially parallel to said side wall of said plate; and means to engage said lugs and hold said plate in an angular position in the lower open end of a tubular fishing tool that has a portion of its lower edge angularly disposed and substantially parallel to said plate so as to facilitate the direction of flow when a hydraulic junk retrieving surge is made, said plate serving to prevent the entry of foreign material into said tool as it is lowered into said bore hole, and said bore permitting the equalization of pressure between the interior and exterior of said tool to prevent a hydraulic surge from a fluid column standing in said bore hole when said plate is broken.

12. Junk catching apparatus including: a tubular junk basket member having a mouth formed at its lower end; a frangible closure member for said mouth adapted to prevent the entry of detritus thereinto as said junk basket member is lowered into a well bore, said closure member being breakable upon forceful contact with junk located in the bottom of said well bore; and an aperture formed in one of said members for equalizing the pressure on both sides of said closure member.

13. Junk catching apparatus including: a tubular junk basket member having a mouth formed at its lower end; a frangible closure member for said mouth adapted to prevent the entry of detritus thereinto as said junk basket member is lowered into a well bore, said closure member being breakable upon forceful contact with junk located in the bottom of said well bore; and an aperture formed in said closure member for equalizing the pressure on both sides of said closure member.

14. Junk catching apparatus including: a tubular junk basket member having a mouth formed at its lower end; a frangible closure member for said mouth adapted to prevent the entry of detritus thereinto as said junk basket member is lowered into a well bore, said closure member being breakable upon forceful contact with junk located in the bottom of said well bore; and an aperture formed in said junk basket member for equalizing the pressure on both sides of said closure member.

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15. A device for use in maintaining the lower mouth of a hydraulic junk basket free and clear of caked mud as it is lowered into a well bore and automatically opening said mouth to permit upward entry of junk there-through upon contact with said junk, which includes: a frangible closure member adapted to removably engage and completely close said mouth, a portion of which member extends therebelow, with the configuration of the exterior surface of said portion being so angularly designed as to cause deflection of detritus encountered as said junk basket is lowered in said bore to slide upwardly out of contact therewith, the thickness of said member being sufficient to withstand the pressure exerted thereon by said detritus yet sufficiently frangible to break upon contact with said junk to open said mouth.

16. A device for use in maintaining the lower mouth of a hydraulic junk basket free and clear of caked mud as it is lowered into a well bore and automatically opening said mouth to permit upward entry of junk there-through upon contact with said junk, which includes: a frangible closure member adapted to removably engage

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and completely close said mouth, a portion of which member extends therebelow, with the configuration of the exterior surface of said portion being so angularly designed as to cause deflection of detritus encountered as said junk basket is lowered in said bore to slide upwardly out of contact therewith, the thickness of said member being sufficient to withstand the pressure exerted thereon by said detritus yet sufficiently frangible to break upon contact with said junk to open said mouth; and screw means that engage said member and junk basket to removably support said closure member in said mouth-engaging position.

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