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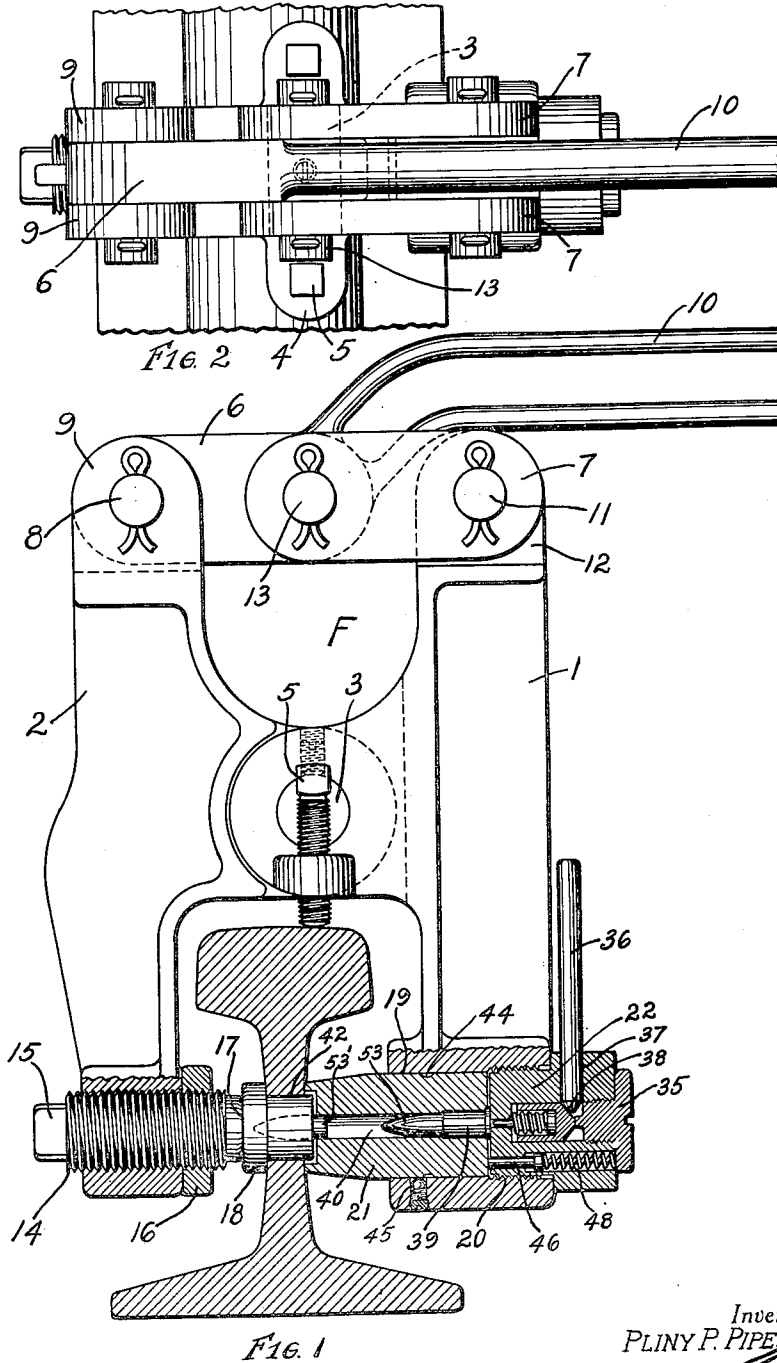
P. P. PIPES

2,045,333

APPARATUS FOR BONDING RAILS

Filed June 27, 1934

2 Sheets-Sheet 1



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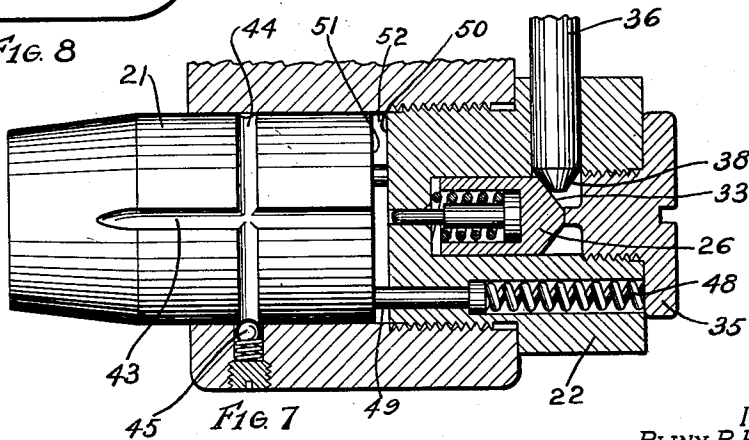
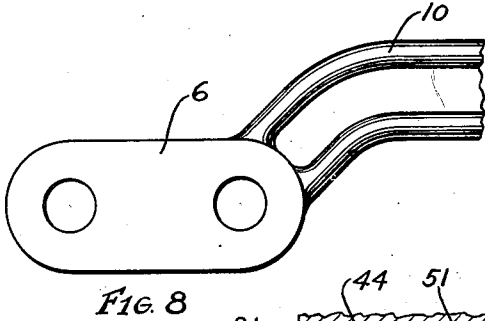
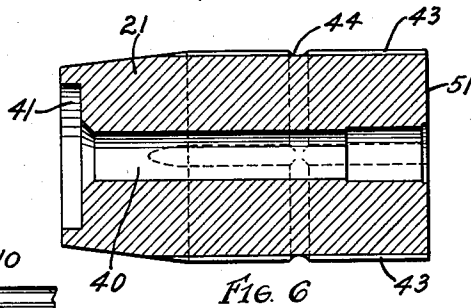
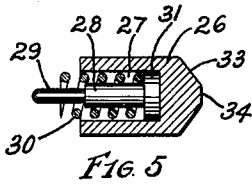
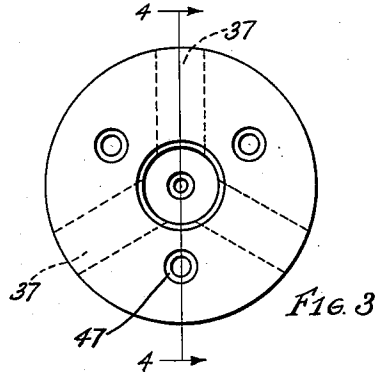
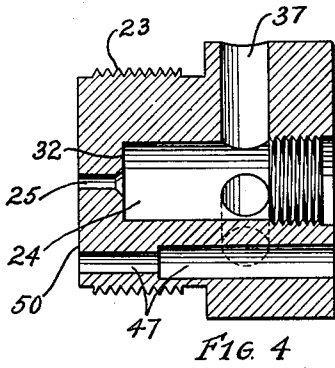
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APPARATUS FOR BONDING RAILS

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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,045,333

## APPARATUS FOR BONDING RAILS

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Application June 27, 1934, Serial No. 732,701

16 Claims. (Cl. 1—47)

My invention relates to apparatus and means for applying rail bonds to rails and particularly to that type of bond in which the terminal is expanded within an opening or orifice through some portion of the rail.

One object of my invention is to provide a means for installing what may be termed a pin-expanded bond by forcing a pin into a solid bond terminal thus expanding the terminal into intimate contact with the surface of the rail.

Another object is to provide means for forcing the pin into the solid terminal through the medium of a force created by the expansion of gases as in the case of gun powder, dynamite, etc.

Further objects will be revealed by the disclosure in the specification and drawings.

In applying bonds of the expanded type, such expansion has been brought about by applying a force to the opposite faces of the bond terminal thus tending to shorten the bond thereby increasing the diameter and forcing the terminal into contact with the surface of the rail.

Other types of bonds, known as the pin-driven or pin-expanded type, have depended upon the forcing of a pin into an orifice extending through the terminal of the bond and which was of smaller diameter than the pin, but this has not been entirely satisfactory because if the pin was not forced into the terminal in axial alignment with the orifice, then the full expansion of the terminal was not secured.

In the latter case the pin has usually been forced into the terminal by means of hammer blows applied to the end of the pin, but in my improved method I force a steel pin into a solid terminal through the medium of forces set up by the explosion of gun powder or other explosive.

I have also provided a unique tool or apparatus for applying the bond as pointed out above, and this tool provides quick application and removal, and also provides a high degree of safety against premature firing of the explosive.

In the drawings:—

Fig. 1 is a side view in partial section of my invention shown in position on a rail for application of the bond terminal.

Fig. 2 is a top view of Fig. 1.

Fig. 3 is an end view of the breech block shown in Fig. 1.

Fig. 4 is a section of Fig. 3 taken on the lines 4—4.

Fig. 5 is a view in partial section of the priming mechanism.

Fig. 6 is an enlarged sectional view of the barrel shown in Fig. 1.

Fig. 7 is a view in partial section of the firing portion of my invention and differs from the corresponding parts shown in Fig. 1 in that the barrel is in safety position while in Fig. 1 the corresponding parts are in position for firing.

In the preferred embodiment of my invention I provide a frame F provided with legs 1 and 2 held in pivotal relation by the transverse hinge pin 3.

The member 1 is provided with side projecting lugs 4 in which are threadedly mounted adjusting screws 5 by means of which the position of the tool with respect to the bond terminal may be changed to meet varying conditions. The screws 5 are a convenience in positioning the tool upon the rail as they act as a support for the tool until it is clamped in position.

The upper ends of the members 1 and 2 are provided with toggle levers 6 and 7 of which there are two of the latter. The lever 6 is pivotally secured to the member 2 by means of the hinge pin 8 and is positioned between the spaced lugs 9. The lever 6 is provided with integrally formed operating handle 10.

The toggle levers 7 are pivotally secured to the member 1 by means of the hinge pin 11 and are positioned on opposite sides of the projecting lug 12.

The toggle levers 6 and 7 are pivotally secured together by means of the hinge pin 13. By means of the toggle arrangement just described it is possible to very quickly move the lower end of the members 1 and 2 in order to apply or remove the tool from its position on the rail. It is further possible to secure by proper adjustment of the parts a very powerful grip of the tool upon the terminal and rail and the proper adjustment is easily secured by means of the adjusting screw 14 which is threadably mounted at the lower end of the member 2 and is provided with a projection 15 by means of which the screw is rotated and provided with a lock nut 16. The end face 17 of the screw 14 is adapted to engage the head 18 of the bond terminal.

The lower end of the member 1 has a passage therethru of two portions, the portion 19 being smooth bored and the portion 20 threaded.

The lower end of the member 1 constitutes a holder for the slidable barrel 21 and the threaded breech block 22.

The breech block is provided with threads 23 for securing it in the threaded passage 20 and is also provided with a recess 24 in which is positioned the priming mechanism. From the recess

24 an opening 25 extends in which is positioned a portion of the priming pin.

The priming mechanism consists of a cup-shaped member 26 having a bore 27 in which is mounted the priming pin 28. The pin has a projecting portion 29 which extends into and through the passage 25 in the breech block. The pin is normally held in its retracted position by means of the spring 30 which is positioned between the head 31 of the pin and the face 32 of the breech block.

The closed end of the member 26 has its exterior formed as the frustum of a cone with the sloping surface 33 and the flat end surface 34. The face 34 is adapted to bear against the end face of the screw 35 which limits the longitudinal movement of the member 26 under tension of the spring 30. The face 33 of the member 26 is arranged to be engaged by the operating pin 36 which is slidably positioned in the opening 37 and has a face 38 corresponding to the face 33 of the member 26.

When the upper end of the pin 36 is struck as by means of a hammer and is forced downwardly the faces 33 and 38 co-act to force the members 26 and 28 forward thus forcing the portion 29 of the priming pin against the priming cup of the loaded cartridge 39.

The barrel 21 has a thru-passage 40 slightly enlarged at one end to receive the cartridge 39. The terminal end of the barrel 21 has a counter-bore 41 which permits the shank 42 of the bond terminal to project therein.

The barrel 21 has one or more longitudinal grooves 43 which permit the escape of air as the barrel is moved manually inwardly or outwardly with respect to the breech 22 as the fit between the member 21 and the walls of the passage 19 is very close.

The member 21 is also provided with an annular groove 44 which is engaged by a spring-held ball detent 45 when the member 21 has been moved to the position shown in Fig. 7 before the tool is applied to the rail. When the tool is in position on the rail the member 21 takes the position shown in Fig. 1 in which the adjacent faces of the members 21 and 22 are in contact or very close. The detent 45 prevents the member 21 from accidentally shifting its position before the tool is applied to the rail.

The breech block 22 is provided with a plurality of safety pins 46, one of which is shown in Fig. 7 and is mounted in the two-chambered thru-passage 47 and is strongly held in the advanced position by means of the spring 48. In the advanced position the end 49 of the safety pin projects beyond the inner face 50 of the breech such that when the barrel 21 is held by the detent 45 the inner face 51 of the barrel will just about contact with the end of each safety pin.

The space 52 between the faces 50 and 51 is greater than the projection of the priming pin beyond the face 50 of the breech thus it will be understood that should the priming pin be accidentally forced to its advanced position it will not contact with the priming cup of the cartridge 39.

The combined tension of the springs 48 is sufficient to make it very difficult to manually move the barrel 21 beyond the locking position shown in Fig. 7, but when the tool is positioned upon a rail and the toggles are operated to force the lower ends of the members 1 and 2 toward each other, the pressure of the springs 48 is very easily overcome and the member 21 is forced to the position

shown in Fig. 1. It is now possible by forcing the pin 36 inwardly to explode the cartridge 39.

The cartridge 39 may be said to be an ordinary cartridge having a solid hardened steel projectile 53 and the cup is preferably filled with a smokeless powder or other high explosive. I prefer to use smokeless powder as it does not affect the bore 40 of the barrel 21.

When the cartridge has been exploded the projectile 53 is driven forward with great force and speed and it is found that the cartridge will be forced into the solid bond terminal and expand the same in contact with the rail.

I prefer to make the length of the projectile 53 such that when it has reached its final position in the bond terminal it will take the position 53' in which one end of the projectile extends outside the bond terminal and for a predetermined distance into the bore 40 of the barrel 21. This arrangement I find eliminates to a very large degree the noise from the exploding cartridge.

The end face of the member 17 acts as a stop for the projectile should it for some reason have a tendency to move entirely through the terminal, but I find that this is a very remote possibility for the reason that smokeless powder in the present state of the art runs very uniform as to its explosive power and by uniformly gauging the amount of powder in each cartridge and shaping the projectile to harmonize with same that the penetration of the projectile into the bond terminal is very uniform.

If desired the projectile 53 may be separate from the cartridge 39 in which case the cartridge may be said to be a blank cartridge. I find that under such arrangement the projectile 53 if detached from the shell will penetrate the terminal equally as well as when formed as a part of the shell.

The tool having been properly placed and the cartridge exploded, the tool is then removed and the barrel 21 removed by hand from its holder. The exploded shell will be found mounted in the barrel 21 and is very easily removed and replaced with an unfired cartridge and then the barrel replaced in position.

The tool is very light compared with screw or hydraulic compressors now in use and the penetration which results in the expansion of the terminal is exceedingly uniform and is not dependent upon the workmen.

It will be obvious that after the toggle devices 6 and 7 have been operated to their extended position that further pressure may be applied to the rail and bond head by operating the screw 14; also the barrel 21 may be moved in the bore 19 by means of the screw 14 against the pressure of the springs 48. If of proper length the screw 14 may be used exclusively for applying the device to the rail.

There are other uses to which my invention may be put than that of applying bonds, as for instance expanding rivets in metal plates.

I prefer to have the projectile enter the shank 42 rather than have it enter the head 18.

There will be many modifications which will suggest themselves both as to the method of bonding being disclosed and the tool therefor, therefore, I wish to be limited only by my claims.

I claim:—

1. A bonding device for holding and expanding a bond terminal in a rail comprising a frame having two spaced members hinged together between their ends, toggle levers pivoted to the members at one end thereof by means of which the free ends of the members may be moved either

towards or away from each other, means to manually operate the toggle levers, means mounted on the free end of one member to engage with the bond terminal and adjustable towards and away from the free end of the other member, the said free end of the other member having a bore, an apertured barrel slidably mounted in said bore, means to releasably hold said barrel in a predetermined position in said bore and permit the barrel to move to another predetermined position in said bore when the device is mounted on a rail and the toggle levers move the free ends towards each other, the aperture of said barrel arranged to receive and hold a projectile and charge of explosive, and means to fire the explosive charge to drive the projectile into said bond terminal.

2. A bonding device for holding and expanding a bond terminal in a rail comprising a frame having two spaced members hinged together between their ends, means acting upon one end of each member to move the free ends of the members either towards or away from each other, means to manually operate the said means, means mounted on the free end of one member to engage with the bond terminal and adjustable towards and away from the free end of the other member, the said free end of the other member having a bore, an apertured barrel slidably mounted in said bore, means to releasably hold said barrel in a predetermined position in said bore and permit the barrel to move to another predetermined position in said bore when the device is mounted on a rail and the first said means moves the free ends towards each other, the said aperture adapted to receive and hold a projectile and charge of explosive, and means to fire the explosive charge to drive the projectile into said bond terminal.

3. In combination a yoke-shaped body having oppositely disposed spaced and free ends, an adjusting member in one free end and a bore extending into the other free end, the adjusting member and the bore having a common axis, a barrel slidably mounted in the bore of said body, means to releasably hold the barrel in a predetermined position relative to the yoke, a bore extending through the barrel to receive a cartridge, and a firing mechanism mounted in the bore of said yoke to explode said cartridge.

4. In combination a yoke-shaped body having oppositely disposed spaced and free ends, a longitudinally adjustable member in one free end and a bore extending into the other free end, the adjustable member and the bore having a common axis, a barrel slidably mounted in the bore of said body, means to releasably hold the barrel in a predetermined position relative to the yoke, a bore extending through the barrel to receive and hold a cartridge, firing mechanism mounted in the bore of said yoke to explode the cartridge, and spring means yieldingly resisting movement of the barrel towards the firing mechanism.

5. In combination a yoke-shaped member having two arms pivoted together intermediate their ends, one arm having an aperture with an apertured barrel slidably mounted therein to receive a projectile, a pressure member adjustably mounted in the other arm in axial alignment with the barrel and movable towards and away from the barrel, and means pivotally connected to both arms for moving the pressure member and barrel towards and away from each other.

6. In a device of the class described, in combination, a frame having two spaced members

hinged together between their ends, means acting upon one end of each member to move the free ends of the members either towards or away from each other, means to manually operate the said means, the free end of one member having a bore, an apertured barrel slidably mounted in said bore to move either towards or away from the free end of the other member, means to releasably hold said barrel in a predetermined position in said bore and permit the barrel to move to another predetermined position in said bore, the barrel aperture arranged to receive a projectile and an explosive charge, and means to fire the explosive charge and drive the projectile towards the said free end of the other member.

7. In combination, a support member, an aperture in the support member, a barrel provided with a bore and slidably mounted in the aperture and projecting from said member, spring held means to engage and to resist movement of the barrel in one direction, manually operated means associated with the support member to effect pressure by the barrel against said spring held means when the device is mounted for operation to overcome the resistance of the spring held means, and firing means mounted on said support member to detonate an explosive charge positioned in the said bore after the said spring held resistance has been overcome.

8. In combination, a support having an aperture, a barrel having a bore slidably positioned in said aperture and having two predetermined positions, namely, a safety position and a firing position, means to releasably hold the barrel in the safety position, means to yieldingly resist movement of the barrel to the firing position, means to fire an explosive charge carried in said bore, means to yieldingly hold said firing means normally in a retracted position, and means to advance the firing means to explode the charge when the barrel is in the firing position.

9. In combination, a support having an aperture, a barrel having a bore slidably mounted in said aperture and having two predetermined positions, namely, a safety position and a firing position, means to releasably hold the barrel in the safety position, a breech block attached to the support in alignment with the barrel, the breech block having resilient means to engage with and to yieldingly resist the movement of the barrel from the safety position to the firing position, a firing mechanism yieldingly held in retracted position, and means to move the firing mechanism to its advanced position to detonate an explosive charge in the barrel bore after the barrel has been moved to the safety position.

10. A breech block comprising a body having means to removably secure it in position, an aperture in said body, a reduced passage from one end of the aperture through the body, means to close the other end of the aperture, a cup-shaped member slidably mounted in the aperture with its open end opposite the reduced passage and with the solid end conically shaped, a firing pin slidably mounted in the cup-shaped member and having a reduced stem portion extending into the reduced passage, a spring positioned within the cup-shaped member and acting upon the firing pin and cup to yieldingly move the cup member and pin in a direction away from the reduced passage and limited by the said closing means, and a transverse passage from without opening into the aperture at a point opposite the conical end surface of the cup member through which an operating pin is slidably movable.

ble to engage the said conical surface to advance the cup member and pin and project the reduced portion of the pin to and beyond the reduced passage to engage a detonator.

11. A breech block comprising a body having means to removably secure it in position, an aperture in said body, a reduced passage from one end of the aperture through the body, means to close the other end of the aperture, a cup-shaped member slidably mounted in the aperture with its open end opposite the reduced passage and with the other end conically shaped, a firing pin slidably mounted in the receptacle of the cup-shaped member and having a reduced stem portion extending into the reduced passage, a spring positioned within the cup-shaped member and acting upon the firing pin and cup to yieldingly move the cup member and pin in a direction away from the reduced passage and limited by the said closing means, a transverse passage opening into the aperture at a point opposite the conical end surface of the cup member through which an operating pin is slidably movable to engage the said conical surface to advance the cup member and pin and project the reduced portion of the pin through and beyond the reduced passage to engage a detonator, and spring advanced pins projecting from the same end of the breech body as the firing pin projects.

12. A barrel for an explosive type of expander comprising a body arranged to be slidably mounted in an apertured holder, a detent mounted in the holder, means on the outer surface of the body to coact with the detent to yieldingly hold the body in a predetermined position in the holder, and a bore extending entirely through the body to receive an expander and an explosive charge to drive the expander through the bore, the end face of the body opposite from that charge having a counterbore surrounding the bore opening.

13. A bonding device to span a rail, press the bond terminal in position and expand the terminal, comprising in combination, a body member having an aperture, a bored barrel slidably mounted in the aperture, the bore arranged to receive an expander and an explosive charge, firing mechanism to detonate the charge and drive the expander along the bore and into the bond terminal, a second body member pivotally associated with the first body member to cooperate therewith to hold the device in position on the rail, means to operate the body members, and means preventing the detonation of the charge until the device is in operative position on the rail.

14. A bonding device for applying bonds to rails

comprising an elongated body member having an aperture at one end transversely disposed to the longitudinal axis of the member, a barrel slidably mounted in the aperture, a bore through the barrel to receive a projectile and an explosive charge to drive the projectile, means associated with the body member and cooperating with the same to secure the barrel in operative position relative to the rail and bond, means to yieldingly resist movement of the barrel in one direction, and manually operable firing means for exploding said charge after the resistance of said yielding means has been overcome and the barrel and charge therein moved within range of the firing means.

15. In a device of the class described, in combination, a frame comprising a pair of oppositely disposed parallel members pivoted together intermediate their ends, one end of one member having an aperture, means slidably mounted in the aperture and having an opening therethrough for holding an expander and an explosive charge to drive the expander through the opening, non-slidable means mounted in the aperture, slidable means mounted in the non-slidable means to detonate the charge, and means cooperating with the ends of the members remote from the aperture to move the other ends of the members towards or away from each other and move the slidably mounted means in the aperture towards the non-slidable mounted means.

16. In combination, an apertured holder, a bored barrel slidably mounted in the aperture and arranged to hold an explosive charge in the bore of said barrel, a breech block closing one end of the aperture, yieldable means projecting from the breech block to engage with and yieldingly resist movement of the barrel towards the breech block as the barrel is moved in the direction of the breech from a predetermined position spaced from the breech, a firing mechanism slidably mounted in the breech block and projecting into the aperture when in its advanced position, means to normally hold the mechanism retracted, the firing mechanism being of such length as to be projected into the aperture a distance short of reaching the barrel when the barrel is in said predetermined position, and slidable means projecting from the breech and having one end positioned within the breech and engageable with the firing mechanism to advance the mechanism into engagement with and detonate an explosive charge in the barrel after the barrel has been moved from said predetermined position to one adjacent the breech.

PLINY P. PIPES.

## DISCLAIMER

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Hereby enters this disclaimer to claims 7 and 14 of said patent.  
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