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W. BRINTON.

PIN FOR DREDGES OR DREDGING CHAINS.

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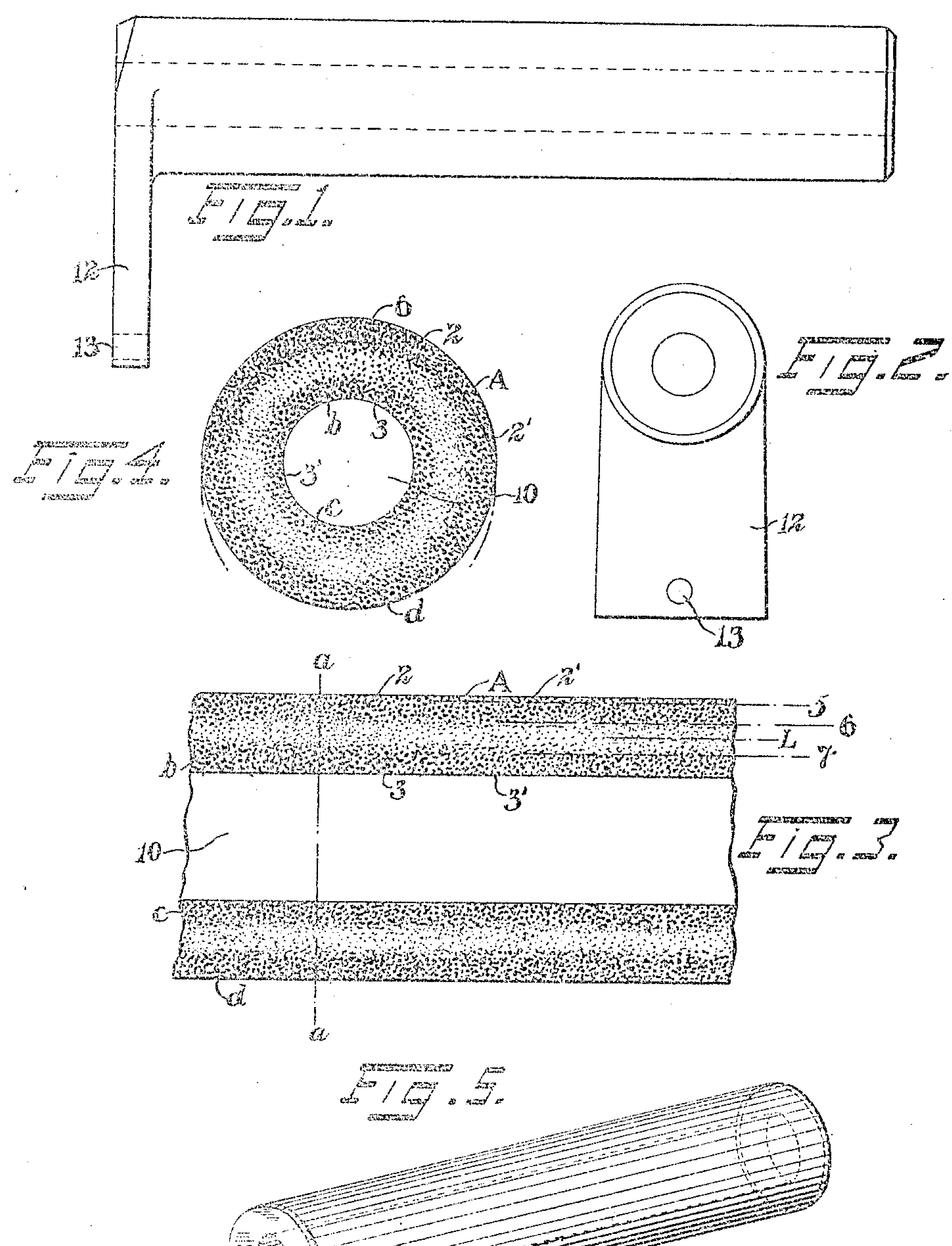

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PIN FOR DREDGES OR DREDGING-CHAINS.

No. 882,138. Specification of Letters Patent. Patented March 17, 1908.

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To all whom it may concern:

Be it known that I, WALTER BRINTON, a citizen of the United States, residing in High Bridge, in the county of Hunterdon and State of New Jersey, have invented certain new and useful Improvements in Pins for Dredges or Dredging-Chains, of which the following is a specification.

This invention consists in the provision of an improved pin for use in dredging machinery, especially in connection with the buckets or chains thereof, an object of the invention being to so construct the pin that it may be made of unmachineable metal.

A further object of the invention is the provision of a cast, manganese-steel tubular dredge-bucket or chain pin.

A further object of the invention is the provision of a tubular, unmachineable metal dredge-chain pin so constructed that notwithstanding a large part thereof may in use be worn away it will still be sufficiently strong to resist breakage, so that the life of the pin will be materially prolonged.

In the drawings accompanying and forming part of this specification, Figure 1 is a side view of this improved pin; Fig. 2 is an end view thereof, looking from right to left; Fig. 3 is a diagrammatic view on an enlarged scale, illustrating the construction of the pin; Fig. 4 is a cross-sectional view taken in line *a—a*, Fig. 3; and Fig. 5 is a view of another form of this pin.

Similar characters of reference indicate corresponding parts throughout the different figures of the drawings.

It is believed that dredge-bucket or chain pins made of manganese steel will be a material improvement over other forms of steel pins, owing to the fact that this material is very hard, so hard in fact that the only practicable mode of machining it is by grinding, so that it is usually considered as unmachineable, and so tough when properly treated that it is almost unbreakable, so that its combined hardness and toughness make it an ideal material, in consequence of which pins made of this material will have a very long life. But unless manganese steel is properly treated this metal, notwithstanding its hardness, is very brittle.

The object, therefore, of the present invention is to provide pins of the class specified so constructed that they can be made of manganese steel and successfully treated to obtain that combined hardness and toughness which is essential to enable manganese steel pins to be used in this class of machinery.

It is not practicable to make the pins solid of manganese steel, because in this form the successful heat treatment of the same could not be carried out and consequently the results obtained would be unsatisfactory. In order to properly heat treat manganese steel, it is essential that the structure or article to be treated should be of uniform thickness and not too thick. If too thick the heat treatment is not efficient. As these pins vary in size, frequently having a diameter of from four to five inches, or greater, it would not be practicable to heat treat a solid pin of this diameter. The best results are obtained in the heat treatment of this steel when the thickness of the metal is not greater than approximately three inches, which, however, is too small a diameter for the average sized pin. In order, therefore, to provide a manganese steel pin which will have the desired strength and durability, it must be so constructed that notwithstanding its diameter may be three or more inches the body of metal forming the same will not at any point exceed in thickness that which is beyond the limit of safety. To accomplish this result the pin, during the casting thereof, of manganese steel, which is understood to be an unmachineable metal, is made tubular from end to end thereof, the bore or hole therethrough being of varied diameter, governed by the diameter of the pin, best suited for the treatment process of the pin. The hole may be of any diameter in proportion to the exterior diameter of the pin, provided the walls of the pin, *i. e.*, the metal between the bore and the outer surface, do not in any case exceed approximately three inches. By forming the pin in this manner the result is that when subjected to heat treatment, which consists in placing the pin in a furnace and heating it up to a predetermined temperature, and then rapidly cooling it, as by immersion in water or other heat absorbing element, both the interior and the exterior portions of the pin are toughened, whereas if the pin were formed solid dangerous strains would be generated both by the heating and cooling processes, *i. e.*, if the pin were formed solid, in toughening it by plunging it while hot into water, and during the rapid cooling, there is a tendency toward internal cracks occurring, owing to the fact that the outside portion cools and contracts more rapidly than the center, which we will term the core. During the cooling, the outside of the pin toughens rapidly, and in a pin of a diameter of three inches or over there is a short period of time before the cooling process penetrates throughout the entire body. During that time and while the core is still hot, cracks occur and radiate from the center of the pin to within say one-half or three-quarters of an inch of the outside. These cracks are not perceptible to the eye, but when the pin is in service and under strain, they extend and finally cause breakage. With a hollow pin it is different. The water enters the bore, or core, and cooling occurs from the outside to the inside and vice versa. This eliminates all strain and permits the making of a pin free from flaws and any tendency to break. Furthermore, if the pin were formed solid, while the heat treatment may extend from the surface inwardly a considerable depth, yet,—and this especially when the pin is of large diameter,—an appreciable portion of the core and outwardly therefrom will be left untoughened, or at least not so thoroughly toughened as the outer surface, and as some of this toughened outer surface is necessarily ground away during the finishing of the pin, consequently when the pin in use has become worn down to this untoughened or not so thoroughly toughened portion the pin will quickly break, since, as hereinbefore stated, when not properly toughened manganese steel is very brittle. By so forming the pin that both its exterior and its interior are toughened, the result is that the metal intermediate these two treated or separated portions or surfaces will also be somewhat toughened, possibly not to the same extent as the outer and inner surfaces or portions of the pin, yet sufficiently to insure proper toughness and give to the entire pin that combined hardness and toughness so necessary in an article of this kind; and even though the intermediate metal is not toughened at all, yet when the exterior toughened surface is worn away the interior toughened surface would still remain backing up and reinforcing the untoughened portion of the steel pin, so that breakage thereof would be unlikely, and as the untoughened portion would resist wear practically to the same extent as the toughened portion, a pin made in this manner has a very long life, as has been found from practical experience.

To diagrammatically illustrate the construction of the pin, assume that the pin A be considered as comprising two tubular components or members 2 and 3 respectively, the member 2 being of tubular form and lying outside of the line L, while the member 3, also of tubular form, lies inside of such line L. If now the casting is subjected to heat treatment, it is evident the effect thus produced by such treatment will begin at the outer and inner surfaces 2′ and 3′ respectively, and will proceed inwardly toward the line L to a greater or lesser depth. This results in the formation of two thoroughly toughened steel tubular members or portions 2 and 3, one adjacent to and forming the wall of the hole 10 of the pin and the other adjacent to and forming the outer wall, and separated from each other by a hardened portion or zone which it is apprehended has also been materially benefited and rendered somewhat tough. After the pin has been made and treated in the manner indicated, it is usually finished, this being done by grinding, which may take place, for instance, down to the line indicated by 5. This removes a part of the toughened portion at the surface.

In one form of pin it is prevented from rotating by means of an arm or projection 12 having an opening 13 for the reception of a bolt or screw to connect it to the link of the dredge-chain. Consequently in this form the wear of the pin comes largely on one side, for instance, it may finally reach down to a line indicated by 6, see Figs. 3 and 4, thereby removing from that side of the pin the larger part, if not the whole, of the thoroughly toughened portion of the manganese steel which originally formed the strong and resistant surface portion or outer wall of the pin at that side thereof. Thus, it will be observed that during this wear reduction, which would eventually bring an ordinary steel pin to a condition requiring replacement, that notwithstanding the thoroughly toughened outer wall or surface 2 has been worn away the thoroughly toughened interior portion or wall 3 has met with no impairment whatever, but retains its full measure of strength and its original highly resistant character in a tubular form around the interior of the pin, whereas if the pin were made solid this would not be the case, and in consequence when the toughened outer surface had been worn away there would not be sufficient toughened portion remaining to prevent the breaking of the pin, and in consequence it could not be made of manganese steel, since in this form it would not be practicable to heat treat it, and unheat-treated it would be brittle.

In the present improvement, notwithstanding the toughened portion 2 may be entirely worn away the wearing qualities of the pin, owing to the hardened character of the steel of which it is formed, is still present, even though the wear may come on that portion of the pin between the lines 6 and 7, which may not be so thoroughly toughened, and the unbreakable quality of the pin is still present, owing to the fact that a large portion thereof is still very tough on account of its construction and treatment, and in fact the pin may still be considered as having three toughened zones, b, c, d, all acting to prevent the breakage of the pin. In practice the locking arm is in some forms preferably made tapered, as is also the free end of the pin, and the end thereof where the locking arm is located.

The present improvement is particularly adapted for use with heavy dredges, especially those now employed in gold mining by deep dredging, and this improved pin acts after the manner of a beam in which one side corresponds to and acts as the compression member, while the other side corresponds to and acts as the tension member, this latter member being unimpaired by the wearing away of one side of the pin as described in connection with Fig. 3.

I claim as my invention:

1. An unmachineable metal, tubular dredge-bucket or chain pin.

2. An unmachineable metal, cast, tubular dredge-bucket or chain pin.

3. An unmachineable metal, tubular dredge-bucket or chain pin having a pair of separated tubular thoroughly toughened surfaces.

4. A manganese steel, tubular dredge-bucket or chain pin having a pair of treated surfaces, one forming the interior and the other the exterior surface thereof.

5. A cast manganese steel dredge-bucket or chain pin, heat treated and having exterior and interior tubular surfaces, one forming the interior wall of the pin and the other the exterior wall thereof, with a thoroughly treated zone between such outer and inner walls.

6. A cast manganese steel dredge-bucket or chain pin, heat treated and having exterior and interior tubular surfaces, one forming the interior wall of the pin and the other the exterior wall thereof, with a pair of toughened zones between such outer and inner walls, separated by a hardened zone of metal.

7. An unmachineable metal, tubular, dredge-bucket or chain pin having a pair of separated toughened portions, one constituting the exterior and the other the interior wall of such pin.

8. A cast, unmachineable metal dredge-bucket or chain pin having two toughened, tubular walls or portions, one constituting the exterior and the other the interior surface of such pin, and separated by thoroughly hard metal.

9. A cast, unmachineable metal dredge-bucket or chain pin having two toughened tubular walls or portions, one constituting the exterior and the other the interior surface of such pin, and separated by a thoroughly hard zone of metal, said pin having a locking arm at one end thereof.

10. A wear-resisting, thoroughly treated, toughened, unmachineable metal dredge-bucket or chain pin.

11. A hollow, cast, manganese steel, dredge-bucket or chain pin.

12. A hollow, cast, toughened, manganese steel dredge-bucket or chain pin.

13. A cast, unmachineable metal dredge-bucket or chain pin, having a bore extending therethrough of such size that whatever the diameter of the pin be the metal between such bore and the exterior surface will not exceed approximately three inches.

14. A cast, toughened, manganese steel dredge-bucket or chain pin, having a bore extending therethrough of such size that whatever the diameter of the pin be the metal between such bore and the exterior surface will not exceed approximately three inches.

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Witnesses:
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