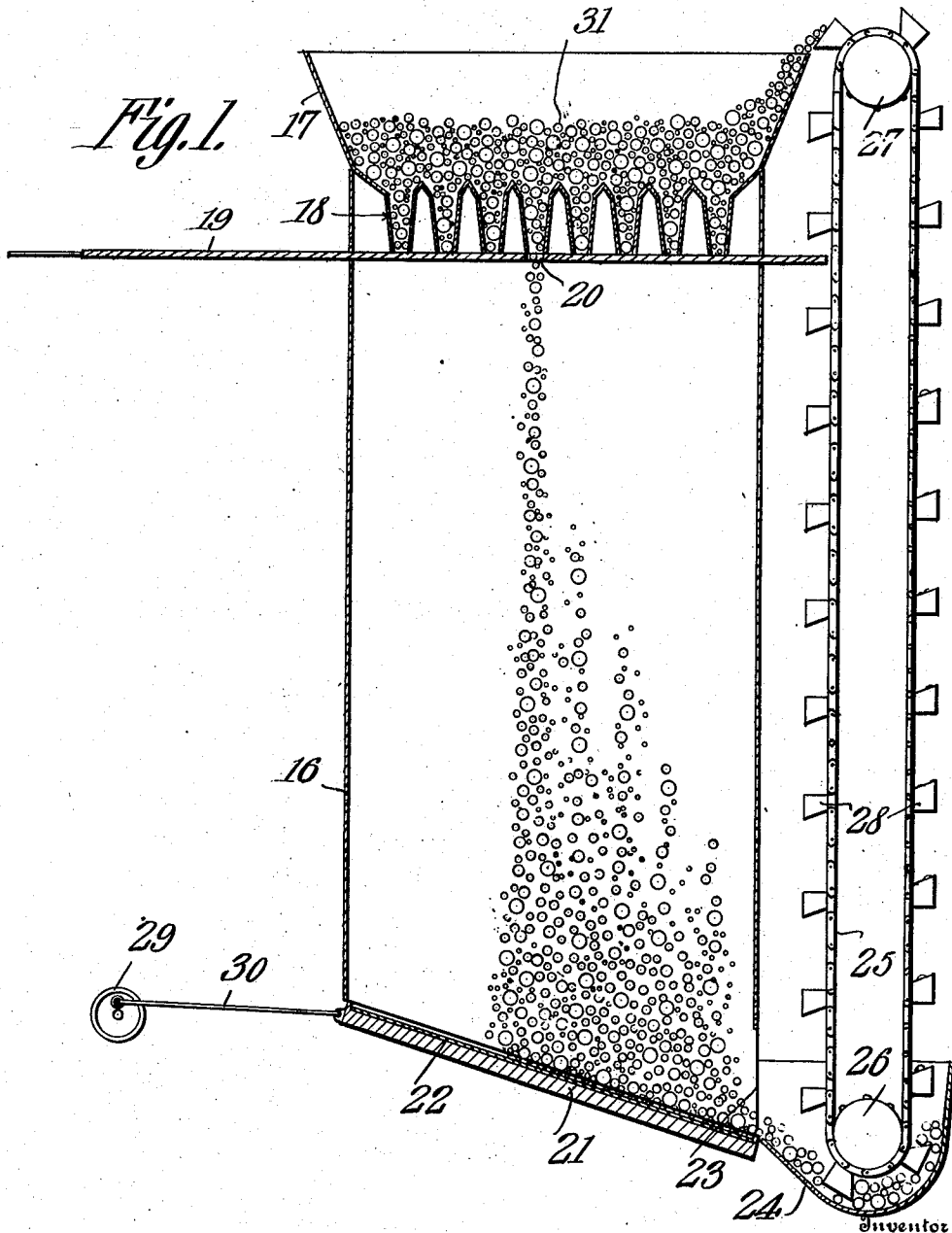


A. RIDD.
METHOD OF FINISHING METALLIC SURFACES.
APPLICATION FILED DEC. 16, 1908.

937,180.

Patented Oct. 19, 1909.

2 SHEETS—SHEET 1.



Witnesses

E. J. Chapman
H. J. Chapman

Ambrose Ridd.

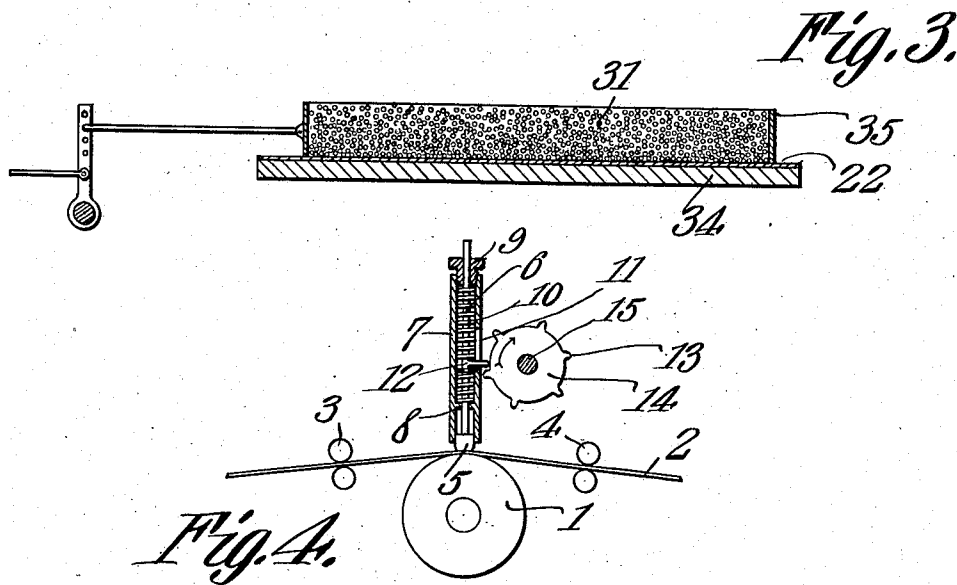
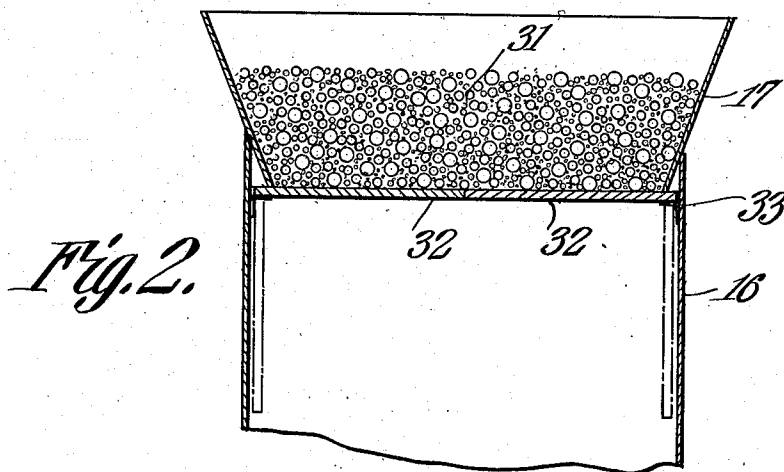
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Attorneys

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UNITED STATES PATENT OFFICE.

AMBROSE RIDD, OF NEWPORT, KENTUCKY.

METHOD OF FINISHING METALLIC SURFACES.

937,180.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed December 15, 1908. Serial No. 467,710.

To all whom it may concern:

Be it known that I, AMBROSE RIDD, a citizen of the United States, residing at Newport, in the county of Campbell and State of Kentucky, have invented a new and useful Method of Finishing Metallic Surfaces, of which the following is a specification.

This invention has reference to improvements in the method of finishing metallic surfaces whereby there is produced upon such surfaces a pitted, indented, or mottled effect.

The invention is designed primarily for the finishing of the surfaces of sheet iron and steel such as Russia iron, polished or planished sheets or the like, but the invention is also adapted for the finishing of the surfaces of other metals than iron or steel whether sheet metal or other types of metal.

By the present invention there is produced upon the surface of the metal, especially in the case of sheet metal and more particularly that type of sheet metal known as Russia iron, the slight indentations or wavy effect peculiar to Russia iron while the surface is smooth and highly polished or planished.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings,

Figure 1 is a vertical section showing a form of apparatus for carrying out the invention. Fig. 2 is a vertical section of a portion of another apparatus for carrying out the invention. Fig. 3 is a vertical section of still another form of apparatus for carrying out the invention, and Fig. 4 is a sectional view of still another apparatus for carrying out the invention.

While the invention is adapted for the finishing of the surfaces of metal structures of various types whether the metal be in the form of sheets or plates, or in other forms whether curved or straight or irregular, a means for treating sheet metal and specifically for treating Russia iron will first be considered with reference to the showing of Fig. 4. There is shown a roll 1 which is assumed to be of suitable size and the surface of this roll is highly polished. Over this roll there is passed a sheet 2 of sheet iron or other sheet metal held taut or in a tightly

stretched condition with relation to the roll 1 by other rollers 3—4, located on opposite sides of the roll 1 and gripping the sheet 2 tightly while the same is fed across or over the roll 1. Arranged in radial relation to the axis of the roll 1 and in the radial plane of the longitudinal axis of the roll 1 is a number of hammer heads 5, only one of which is shown in the drawings in Fig. 4. These hammers have slightly rounded highly polished heads where they are designed to be brought in contact with the sheet 2 and each hammer is carried on the end of a stem 6 passing through a sleeve 7 in the longitudinal axis of the latter, being guided by a suitable diaphragm 8 near one end of the sleeve 7, and a longitudinally adjustable plug 9 screwing into the other end of the sleeve. Within the sleeve 7 the stem 6 is surrounded by a spring 10 the normal tendency of which is to urge the hammer head 5 toward the roll 1. On one side the sleeve 7 is provided with a longitudinal slot 11 through which projects a pin 12 extending laterally from the stem 6. The pin 12 is in the path of the teeth 13 of a wheel 14, mounted on a shaft 15 receiving motion from any suitable source of power. The arrangement is such that as the wheel 14 revolves a tooth 13 will engage the pin 12 and raise the same until the tooth passes from under the pin when the reaction of the spring 10 which was compressed by the raising of the finger 12 and with it the stem 6 and hammer head 5 will cause the return of the hammer head 5 toward the roll 1 with a speed and force commensurate with the strength of the spring 10. When the next tooth 13 engages the finger 12 the operation is repeated and this operation is continued during the rotation of the wheel 14, the hammer 5 delivering a number of blows during each rotation of the wheel 14 depending on the number of teeth 13. During the continued blows being delivered by the hammer head 5, the sheet 2 is slowly fed between the hammer heads 5 and the roll 1 being held in a taut or stretched condition by the gripping rollers 3 and 4, one of which pair of rollers may be used as the feeding rollers although other feeding rollers may be employed if desired. During the passage of the sheet 2 over the roll 1 the latter is slowly rotated and will thereby impart a polish to the correspond-

ing face of the sheet 2. The other face of the sheet 2 is subjected to the oft repeated blows of the hammer heads 5 which may be made to deliver blows either rapidly or slowly in accordance with the speed of the wheel 4 and the number of teeth 13 and with greater or less force as desired by adjusting the tension of the spring 10 through the medium of the screw plug 9. The hammers 5 may be all arranged to operate in phase or they may be arranged to operate in dephased relation by the proper arrangement of the wheels 14 on the shaft 15. By this arrangement the mottled or wavy appearance imparted to the corresponding surface of the sheet 2 may be varied as desired, and further variation may be effected by regulating the speed of passage of the sheet 2 by the hammers 5.

It is characteristic of the structure just described that the surfacing is performed very expeditiously. Another means for producing a like effect upon sheets or plates or other structures of metal is shown in Figs. 1 and 2 but reference will be had first to the structure of Fig. 1. In this figure there is shown a casing 16 supported in an upright position by means not illustrated. At the top of the casing 16 there is provided a hopper 17 formed along the bottom with a series of spaced discharge funnels 18 which may be co-extensive in one direction with the corresponding diameter of the casing 16, the latter being considered as substantially rectangular in cross section. The lower ends or discharge mouths of the funnels 18 are closed by a plate 19 traversing the casing 16 and capable of being moved across the same against or in close relation to the discharge ends of the funnels 18. Through the plate 19 is a passage 20 equal in area to the area of the discharge end of any one of the funnels 18. By moving the plate 19 the opening 20 may be brought into coincidence with the discharge end of the funnels 18 in succession for a purpose which will presently appear. The bottom of the casing 16 is closed by a plate 21 set at an incline and having its upper surface highly polished. This plate is designed and is formed to receive a sheet 22 of the metal to be treated. The lower end of the side wall of the casing 16 above the lower end of the plate 21 is omitted to form a passage or mouth 23 opening into a receptacle 24 into which there extends the lower end of a bucket conveyer 25 of the endless belt type running over a supporting roller 26 extending longitudinally through the receptacle 24 at a distance above the bottom of the same and over another roller 27 adjacent to the upper end of the hopper 17 so that the buckets 28 on the conveyer 25 will dip into the receptacle 26 and receive a charge of material which may be therein and elevate the same and discharge

it into the hopper 17. A reciprocatory motion is given to the plate 21 by means of a crank wheel 29 connected to the plate by a link 30, it being understood that a suitable driving power will be applied to the crank wheel 29 or the shaft upon which the said wheel is mounted.

The hopper 17 is supplied with a suitable quantity of hardened steel balls with highly polished surfaces and these balls may be all of the same size or the mass of balls within the hopper 17 may be of various sizes, but all the balls should be so related to the discharge ends of the funnels 18 as to freely pass through the same without clogging and escape through the opening 20 in the plate 19 when the said opening is coincident with the mouth of a funnel 18. Now assume that the plate 19 is in a position where the opening 20 therethrough is out of coincidence with any one of the discharge ends of the funnels 18, and let it be further assumed that this opening 20 is to the right of the right-hand funnel 18 as viewed in Fig. 1. Let it also be assumed that the crank wheel or disk 29 is being rotated and the plate 19 is reciprocated thereby. Now the plate 19 is moved toward the left until the opening 20 is coincident with the discharge end of the first of the funnels 18 to the right of the hopper 17 as viewed in Fig. 1. This will permit the outflow of a stream of balls 31 from the particular funnel 18 under consideration which stream of balls is narrow in the direction of travel of the plate 19 but as wide as the width of the plate 22 in a direction at right angles to the direction of travel of the plate 19. This stream of balls will gravitate to the plate 22 and each ball will strike the same with a blow depending on the distance through which the ball has fallen and the weight of such ball. After striking the plate 22 the balls will, because of the inclined position of said plate, gravitate through the mouth 23 and fall into the receptacle 24 where they are scooped up by the buckets 28 and carried again to the hopper 17, it being understood of course that the conveyer 25 is in operation. Because of the reciprocation of the plate 21 in a direction across the stream of balls the active zone of the stream of balls is correspondingly enlarged. The plate 19 is now moved toward the left as viewed in Fig. 1 until the opening 20 is coincident with the second funnel 18 and a second stream of balls is released and the plate 19 may be then moved to the third and fourth and succeeding funnels 18 until the opening 20 has traversed all the funnels 18 and corresponding streams of balls have been released in succession. By properly timing the travel of the plate 19 in the manner described the streams of balls may be made to follow each other in such timed relation as to not interfere one with the other and if de-

sired the movement of the plate 19 may be made quite rapid since the crowding of the balls in rolling down toward the mouth 23 is immaterial so long as it does not interfere with the striking of the balls in their fall from the funnels 18 upon the plate 22.

By the structure of Fig. 1 the plate 22 has its entire surface on the side toward the hopper 17 subjected to the multiple blows of succeeding streams of balls falling thereon in successive order from the discharge end of the casing 16 toward the other end thereof so that the succeeding streams are not interfered with by the balls of preceding streams in order of time.

By the means illustrated in Fig. 1 there is produced upon the surface acted on by the balls 31 the desired indented, mottled or wavy appearance due to the many blows imparted to the surface by the falling balls, the indentations overlapping and intermingling because of the reciprocation of the sheet 22 on the carrier plate 21 across the paths of the falling balls.

A great variety of effects may be produced by either using balls all of the same size or of mixed sizes, and when balls all of the same size are used different effects are obtained with balls of one diameter from that obtained with balls of other diameters. Furthermore other effects are produced by varying the speed of reciprocation of the plate 22 under the showers of balls or by varying the distance through which the balls are permitted to fall. If the vertical height of the casing 16 be comparatively great with relation to the incline of the plate 21 then the difference in fall of the streams of balls due to the inclination of the plate 21 may be neglected.

With the structure shown in Fig. 1 the finishing of the surface of the plate 22 may be very expeditiously performed being limited only by the speed of gravitation of the balls.

In Fig. 1 the surface of the sheet 22 acted on by the balls is subjected to thin streams of balls successively released acting progressively across the plate. Instead of this the entire mass of balls may be released substantially simultaneously so as to fall as one shower upon the plate. Means for this purpose are shown in Fig. 2 where the hopper 17 at the upper end of the casing 16 has its lower end closed by doors or valves 32 and these doors or valves may be hinged at their outer edges to the casing 16 as indicated at 33 and when closed together their inner edges may meet. When these doors are released, being normally held in the closed position by any suitable means, they will drop out against the side walls of the casing 16 and the mass of balls 31 will drop as a single shower co-extensive with and on the surface of the plate 22, the structure being otherwise as shown in Fig. 1.

In both structures shown in Figs. 1 and 2 the effect produced will depend on the size of the balls and the gage of the metal being treated. In the structure of Fig. 1 if the sheet 22 being treated is only of the size of the casing 16 or plate 21 then such plate 22 may simply rest on the plate 21 and participate in the reciprocatory movement thereof. If however, it be desired to treat long webs of sheet metal then such webs are fed through the plate 21 in a direction toward or from the observer in the structure as viewed in Fig. 1, and may be fed along the plate 21 in the manner illustrated for feeding the sheet over the roll 1 in Fig. 4. In either of the structures shown in Figs. 1 and 2 the operation is repeated upon the same surface of the metal as often as may be necessary to produce the desired result upon the surface being treated before a fresh surface is presented to the action of the balls.

The two structures shown in Figs 1 and 2 may be taken as indicative of any suitable means for permitting a shower of balls to fall upon the sheet or other form of metal being treated, and the invention is not to be considered as confined to the particular structures illustrated, since any means which will produce the desired action of the balls may be employed.

The direct impact of the balls will polish the upper surface of the sheet and the force of the blows transmitted through the sheet where it comes in contact with the smooth and highly polished steel plate underneath will cause the polishing of the opposite side of the sheet. The surface of the sheet where struck by the balls is more or less indented by the impact of the balls and since the supporting plate is at an incline the balls strike the same and then bound off at an angle producing a gloss or polish thereby. In order to produce upon the indented surface of the plate a high gloss or polish a structure similar to that shown in Fig. 3 may be used. There is provided a highly polished plate 34 of a size sufficient to receive the sheet to be treated and, by means not shown, the plate is assumed to be tightly gripped and stretched on said plate so as not to move or buckle under the treatment to which it is to be subjected. Resting on the sheet 22 on the plate 34 is a box or crate 35 somewhat smaller than the size of the sheet 22 so that it may be moved over the said sheet without overriding the edges thereof. Now by means of mechanism such for instance as shown in Letters Patent #808,691 granted to me on January 2, 1906, for a method of planishing sheets of metal, or by any other suitable means, this crate is moved over the plate within the limits of the said plate. Within the crate are placed numerous small balls 31 to a depth of several inches with the lowermost balls in direct contact with the indent-

ed surface of the plate. The to and fro movement of the crate with the balls therein will quickly burnish the surface of the sheet to a very high luster.

5 The entire process is performed cold.

What is claimed is:—

1. The method of planishing sheet metal consisting in subjecting one surface of the metal sheet to blows from highly polished
10 bodies while the other side of the metal sheet is in contact with a highly polished support in the line of travel of the said highly polished bodies.

2. The method of planishing sheet metal
15 which consists in subjecting one surface of the metal sheet to blows from highly polished bodies, while the other side of the metal sheet is in contact with a highly polished support in the line of travel of the said
20 highly polished bodies, and at the same time causing a transitional movement of the metal sheet.

3. The method of planishing metal which consists in subjecting the surface to be
25 treated to the impact of balls directed thereagainst.

4. The method of planishing metal which consists in subjecting the surface being
30 treated to the impact of highly polished balls directed thereagainst.

5. The method of planishing metal which consists in subjecting the surface being
35 treated to the impact of highly polished hardened steel balls directed thereagainst.

6. The method of planishing metal which consists in subjecting the surface being
treated to the impact of balls gravitating thereagainst.

7. The method of planishing sheet metal
40 which consists in subjecting the surface being treated to the impact of balls directed thereagainst, while the other side of the metal sheet is in contact with a highly polished support.

8. The method of planishing sheet metal
45 which consists in subjecting the surface being treated to the impact of highly polished balls directed thereagainst while the other side of the metal sheet is in contact with a
50 highly polished support.

9. The method of planishing sheet metal which consists in subjecting the surface being
55 treated to the impact of highly polished balls directed thereagainst, while the other side of the metal sheet is in contact with a highly polished surface and at the same time causing a transitional movement of the metal sheet.

10. The method of planishing metal which
60 consists in subjecting the surface being treated to the impact of a rain of balls directed thereagainst.

11. The method of planishing metal which
65 consists in subjecting the surface being treated to the impact of a rain of balls di-

rected thereagainst and at the same time causing a transitional movement of the said metal.

12. The method of planishing metal which consists in subjecting the surface being
70 treated to the impact of balls directed thereagainst while the said surface is inclined to the direction of travel of the balls.

13. The method of planishing sheet metal which consists in subjecting the surface being
75 treated to the impact of balls directed thereagainst while the said surface is inclined to the direction of travel of the balls and is supported by an unyielding backing.

14. The method of planishing sheet metal
80 which consists in subjecting the surface being treated to the impact of highly polished balls directed thereagainst while the said surface is inclined to the direction of travel of the balls and is supported by a highly
85 polished unyielding backing.

15. The method of planishing sheet metal which consists in subjecting the surface being
treated to the impact of highly polished balls directed thereagainst while the said
90 surface is inclined to the direction of travel of the balls and is supported by a highly polished unyielding backing, and at the same time imparting a transitional movement to
95 said sheet.

16. The method of planishing sheet metal which consists in subjecting the surface of the metal being treated to the impact of
highly polished balls gravitating there-
100 against while the said surface is inclined to the direction of travel of the balls and is supported by a highly polished unyielding backing.

17. The method of planishing sheet metal which consists in subjecting the surface being
105 treated to the impact of highly polished balls gravitating thereagainst while the said surface is inclined to the direction of travel of the balls and is supported by a highly
110 polished unyielding backing, and at the same time imparting a transitional movement to the said sheet.

18. The method of planishing metal which consists in subjecting the surface being
treated to the impact of balls of different
115 sizes directed thereagainst.

19. The method of planishing metal which consists in subjecting the surface being
treated to the impact of balls of different
120 sizes gravitating thereagainst.

20. The method of planishing sheet metal which consists in subjecting the surface being
treated to the impact of balls of different
125 sizes directed thereagainst while the other side of the metal sheet is in contact with a highly polished support.

21. The method of planishing sheet metal which consists in subjecting the surface being
treated to the impact of highly polished
balls of different sizes directed thereagainst

while the other side of the metal sheet is in contact with a highly polished support.

22. The method of planishing sheet metal which consists in subjecting the surface of the metal sheet to blows delivered by balls of different sizes gravitating thereagainst while the other side of the metal sheet is in contact with a highly polished support and at the same time causing the transitional movement of the said metal sheet.

23. The method of planishing sheet metal which consists in subjecting the surface being treated to the impact of highly polished balls of different sizes directed thereagainst while the said surface is inclined to the direction of travel of the balls and is supported by a highly polished unyielding backing.

24. The method of planishing sheet metal which consists in subjecting the surface being treated to the impact of highly polished balls of different sizes gravitating thereagainst while the said surface is inclined to the direction of travel of the balls and is supported by a highly polished unyielding backing.

25. The method of planishing sheet metal which consists in subjecting the surface being treated to the impact of highly polished balls of different sizes gravitating thereagainst while the said surface is inclined to the direction of travel of the balls and is supported by a highly polished unyielding backing, and at the same time imparting a transitional movement to said sheet.

26. The method of finishing metal surfaces consisting in first producing indentations therein and then subjecting the said

indented surface to the polishing action of a heavy member having a mobile surface in contact with the indented metal surface.

27. The method of finishing metal surfaces consisting in first producing indentations therein and then subjecting said indented surface to the polishing action of a mass of balls thereover and in direct contact therewith.

28. The method of finishing metal surfaces, consisting in first producing indentations therein and then subjecting such indented surfaces to the action of a mobile weight having a mobile surface in contact with the indented surface.

29. The method of finishing metal surfaces consisting of first producing indentations therein by the impact of balls directed thereagainst, and then subjecting such surface to the action of a mass of balls moved over the said surface in direct contact therewith.

30. The method of finishing metal surfaces consisting in first producing indentations therein by the impact of balls directed thereagainst and then subjecting such surface to the action of a mass of balls moved over the said surface in direct contact therewith, the said balls being of smaller size than those producing the indentations.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

AMBROSE RIDD.

Witnesses:

JOHN MOSPENS,
MATT MOORE.