J. E. KILKER & C. W. DAKE.

PROCESS OF MANUFACTURING BUCKET WHEELS.

APPLICATION FILED AUG. 4, 1913.

1,141,190.

Patented June 1, 1915.

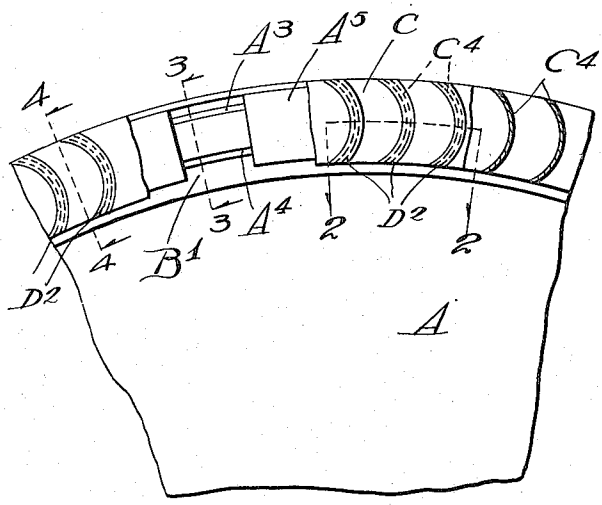


Fig. 1.

Fig. 5.

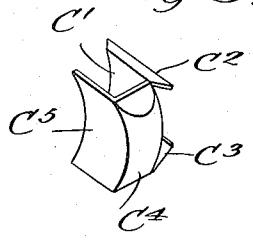


Fig. 2.

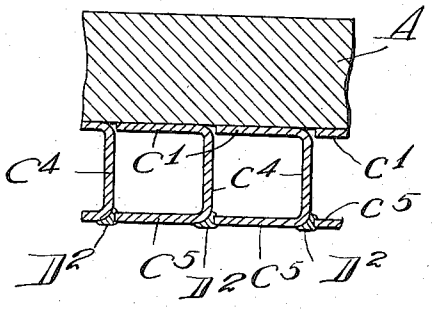


Fig. 3

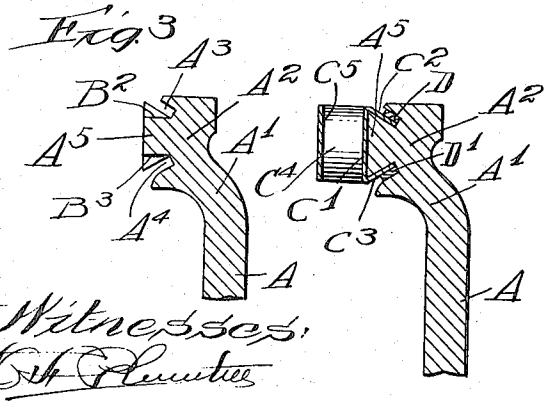


Fig. 4.

Witnesses:
G. A. Plumley
Lauel M. Doremus.

Inventors,
John E. Kilker,
and Charles W. Dake
by Parker & Carter
his Attys

UNITED STATES PATENT OFFICE.

JOHN E. KILKER AND CHARLES W. DAKE, OF CHICAGO, ILLINOIS, ASSIGNORS TO PYLE-NATIONAL ELECTRIC HEADLIGHT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

PROCESS OF MANUFACTURING BUCKET-WHEELS.

1,141,190. Specification of Letters Patent. Patented June 1, 1915.

Application filed August 4, 1913. Serial No. 782,960.

To all whom it may concern:

Be it known that we, JOHN E. KILKER and CHARLES W. DAKE, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Manufacturing Bucket-Wheels, of which the following is a specification.

Our invention relates to improvements in process of manufacturing bucket wheels.

It is illustrated diagrammatically in one form in the accompanying drawing, wherein we have shown only such fragmentary parts of the bucket wheel as are needed to illustrate the novelty of our invention, since the remainder of the wheel is of such an old and well known standardized type as to need no further illustration.

Figure 1 is a fragmentary side elevation with parts in section and parts removed, of a bucket wheel; Fig. 2 is a section along the line 2—2 of Fig. 1; Fig. 3 is a section along the line 3—3 of Fig. 1, and Fig. 4 is a section along the line 4—4 of Fig. 1. Fig. 5 is a perspective view of one of the buckets detached from the rotor.

Like parts are indicated by like letters throughout all of the figures.

A is a bucket wheel, body or spider or disk of the usual type mounted upon a shaft running in bearings not shown. This plate is flanged as at A^1, Figs. 3 and 4, in the usual manner and has a rim A^2 to which the separate buckets are to be attached. This rim is provided, as shown in Figs. 3 and 4, with two circular slots, A^3 and A^4, inwardly converging each toward the other, thus leaving a mitered extension or rib A^5 projecting outwardly from the rim A^2 and bounded on either side by the slots A^3 and A^4.

Recesses B^1 are located on either side of the rib A^5 and form widened or increased areas of the slots A^3 and A^4. It will be noted from Fig. 3 that the walls B^2 B^3 of said recesses are parallel.

The turbine buckets C are mounted on the rib A^5 and consist of a bottom C^1, which is provided with two downwardly extending ears or lugs C^2—C^3, which project into the slots A^3—A^4 and grip the rib A^5. The bottom C^1 of each bucket has upwardly projecting therefrom a bucket wall C^4, which is perpendicular thereto, and this curved bucket wall forms the vane or bucket upon which the steam is designed to impinge. A flat top C^5 projects outwardly from the curved bucket wall, C^4 being parallel with the bottom C^1 and is substantially the same size and shape, so that when the buckets are brought together as shown in Figs. 1 and 2 the open space between the bottom and the top walls of each bucket will be closed by the side wall C^4 of the next adjacent bucket.

D, D^1 are locking or calking rings of copper or other soft metal, which are tightly driven into the slots A^3—A^4 to hold the lugs C^2—C^3 firmly in position and to lock or fasten the separate buckets separately in position on the rib A^5 when they have been assembled into their desired position.

D^2 is a welded, soldered or brazed joint as the case may be, between the outer free edge of the top C^5 and the back wall C^4 of the adjacent bucket.

The use and operation of our invention are as follows: The flanged rotor disk or plate A is first produced in the usual manner in machine shop or otherwise, and then the buckets C, which have been previously prepared, are one at a time separately and loosely positioned on the rib A^2 about the periphery of the rotor A. This is done by dropping each successive bucket into the two apertures B^2, B^3, on either side of the bucket rib A^5 until the lugs C^3 on the bucket C^4 come in line with the slots A^3, A^4, on either side of the bucket rib A^5. The buckets C^4 are then free to travel or to be moved along the bucket rib A^5, to be held loosely in position by the lugs C^3 projecting into the two slots A^3, A^4, on either side of the rib A^5 and engaging it. This process will be continued, each bucket C^4 being pushed around until the rib A^5 is practically filled with or covered by the buckets C^4, which thus form a continuous ring about the periphery of the bucket wheel. The fastening or calking rings or strips D, D^1, are then driven into the slots A^3, A^4, on either side of the bucket rib A^5 and cause the flanges C^2, C^3, on the buckets C^4 to tightly grip the walls of the rib A^5, thus holding the buckets C^4 each separately and individually tightly in position. By this arrangement the buckets C^4 are only held at their bases, and their outer edges or upper surfaces C^5 are free and unsupported. The steam is free to pass from between the buckets across the free unsup-

ported edge of the bucket top C^5, thus, causing vibration and ultimate fracture. In order to prevent this, the edge of each bucket top is welded, soldered, brazed or otherwise individually attached by a heat treating process or otherwise to the back of the bucket immediately preceding it, thus, producing a bucket wheel in which each bucket is separately attached to the body and in which each bucket is attached to each adjacent bucket C^4, thus forming what is in effect a continuous integral bucket ring without adding materially to the total weight of the buckets and greatly strengthening the wheel and the buckets.

The rib A^5 may be considered as a part of the rotor A, either integral therewith or attached thereto in any desired manner, and the buckets C^4 are to be considered as placed upon this rib or portion of the rotor in their proper relation, the rib with the buckets being before or after such arrangement of the latter attached or secured in position on the rotor A. The essential point is that the buckets are brought together in a series or adapted to be secured on the rotor in proper relation, and that when they are so assembled in series they are connected together by a process involving the application of heat.

In our preferred form and process the adjacent buckets are fastened together by welding. It is, of course, quite obvious that to fasten them by soldering, brazing or other heat treatment or even by a mechanical connection would not be to depart from the scope of our invention, and while for the sake of convenience and in view of its preferability we have spoken of this juncture as a welded joint, it is obvious that we should not be limited to a joint which is welded in the narrowest sense of the word but that our invention includes the idea of fastening the parts together by any suitable means particularly any suitable heat treating means or process.

It will be noted that the wheel is made up of a series of separate integral buckets placed one after the other and that they are assembled by feeding them gradually one after the other along the curved track passage or groove in the periphery of the wheel and that they are first fed and held loosely on the wheel, then are rigidly fastened to the wheel one close to the other and then the upper edge or lip of one bucket wall is fastened to the back of the other bucket and that the process consists in these three steps.

We claim:

1. The process of constructing a bucket wheel, which consists in placing and attaching each separate bucket separately in position upon the wheel and subsequently attaching each separate bucket to its neighbor.

2. The process of constructing bucket wheels which consists in separately positioning and attaching each individual bucket to the bucket wheel and subsequently attaching each bucket to its neighbor by a heat process.

3. The process of constructing bucket wheels, which consists in positioning and attaching each separate bucket separately to the wheel and in subsequently closing the open space between the wall of one bucket and the adjacent bucket and rigidly attaching the buckets together.

4. The process of constructing the bucket wheels which consists in separately positioning and fastening each bucket on the bucket wheel, and in subsequently welding each bucket to the adjacent bucket.

5. The process of constructing a turbine rotor which consists in fastening buckets to the rotor body and securing said buckets together.

6. The process of constructing a turbine rotor which consists in fastening buckets separately upon a rotor, and subsequently joining said buckets each together in a series.

7. The process of constructing a turbine rotor, which consists in fastening buckets to a rotor body and welding said buckets together.

8. The process of constructing a turbine rotor consisting in separately making buckets therefor and then welding said buckets together.

9. The process of constructing a turbine rotor which consists in fastening successive buckets into position about the periphery thereof and subsequently fastening the free outwardly projecting flange of one bucket to the back of the one immediately in front of it and closing the aperture between the edge of the flange and the back of said bucket.

10. The process of constructing a turbine rotor which consists in fastening successive buckets into position about the periphery thereof and subsequently fastening the free outwardly projecting flange of one bucket to the back of the one immediately in front of it by a heat process and closing the aperture between the edge of the flange and the back of said bucket.

11. The process of constructing a turbine rotor which consists in fastening successive buckets into position about the periphery thereof and subsequently welding the free outwardly projecting flange of one bucket to the back of the one immediately in front of it and closing the aperture between the edge of the flange and the back of said bucket.

12. The process of constructing bucket wheels for turbines which consists in assembling the buckets in a ring-like series, supporting them loosely in such relation and then connecting the buckets together by a heat process.

13. The process of constructing bucket wheels for turbines which consists in assembling the buckets in a ring-like series, sup-

porting them loosely in such relation and then connecting the buckets together by melting material between them.

14. The process of constructing a turbine rotor which consists in assembling the buckets in a ring-like series, supporting them together loosely in such relation and then connecting them together and closing the aperture between the edge of the flange of one bucket and the back of the next bucket by a heat process.

15. The process of constructing a turbine rotor which consists in mounting buckets on a portion thereof and fastening the buckets together by a heat process.

16. The process of constructing a turbine rotor which consists in assembling the buckets in a ring-like series, supporting them together loosely in such relation and then connecting them together and closing the aperture between the edge of the flange of one bucket and the back of the next bucket by melting material between them.

17. The process of constructing a turbine rotor which consists in mounting buckets on a portion thereof and fastening the buckets together by melting material between them.

18. The process of constructing bucket wheels for turbines which consists in assembling the buckets in a ring-like series, supporting them loosely in such relation and then attaching each bucket to its neighbor by a heat process, and rigidly fastening each separate bucket to a portion of the wheel.

19. The process of constructing bucket wheels for turbines and the like which consists in first assembling successive buckets one after the other on a bucket wheel web in circular separate loose groups each bucket being loosely supported on the web, then bringing said buckets into position on the web so that each bucket is in close contact with the buckets on both sides of it, then fastening each individual bucket firmly to the wheel and fastening each individual bucket firmly to its neighbor by means of a closure which bridges the gap between the lip of one bucket and the back of the next.

20. The process of constructing bucket wheels for turbines and the like which consists in first assembling successive buckets one after the other on a bucket wheel web in circular separate loose groups each bucket being loosely supported on the web, then bringing said buckets into position on the web so that each bucket is in close contact with the buckets on both sides of it, then fastening each individual bucket firmly to the wheel and fastening each individual bucket firmly to its neighbor by means of a closure which bridges the gap between the lip of one bucket and the back of the next, said closure consisting of molten material which joins rigidly the lip of one with the back of the next.

Signed at Chicago, county of Cook and State of Illinois, this 28th day of July, 1913.

JOHN E. KILKER.
CHARLES W. DAKE.

In the presence of witnesses:
MINNIE M. LINDENAN,
LAUREL M. DOREMUS.