J. E. ALEXANDER.

CYLINDER FOR PAPER DRYING MACHINES.

APPLICATION FILED NOV. 26, 1917.

1,348,469.

Patented Aug. 3, 1920.

2 SHEETS—SHEET 1.

FIG. 1.

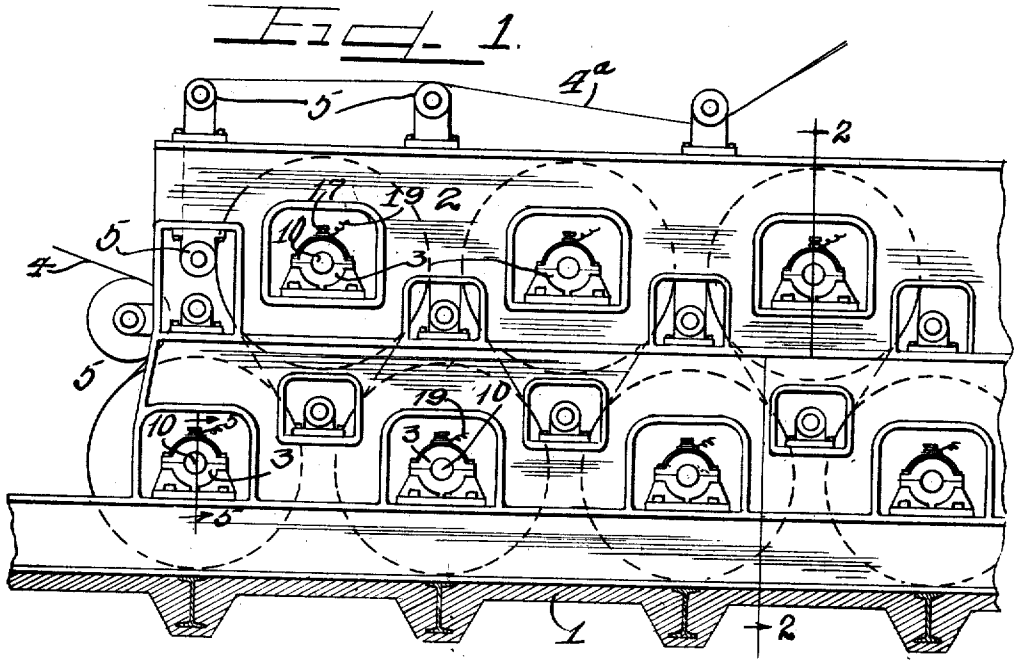
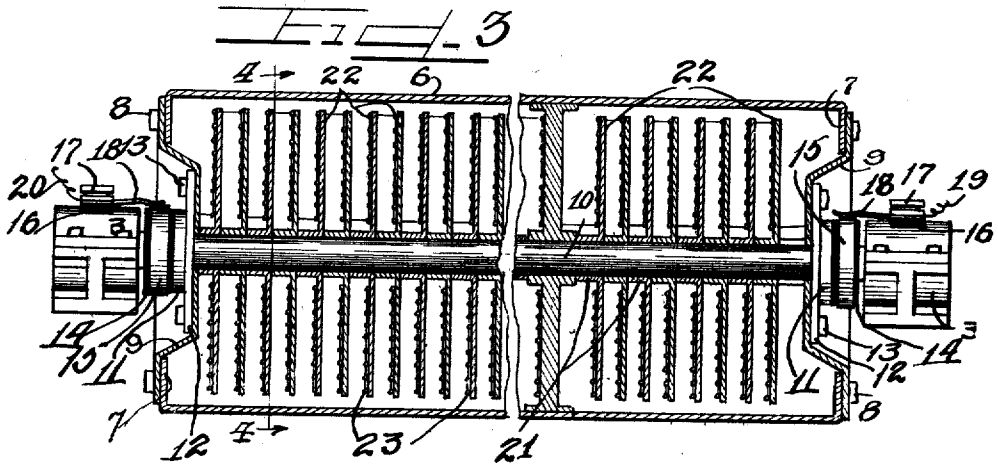


FIG. 3.



Witnesses

J. W. Angell

Charles W. Hills Jr.

Inventor

John E. Alexander.

By Charles W. Hills Atty.

J. E. ALEXANDER.

INDER FOR PAPER DRYING MACHINES.

APPLICATION FILED NOV. 26, 1917.

1,348,469.

Patented Aug. 3, 1920.

2 SHEETS—SHEET 2.

Fig. 5

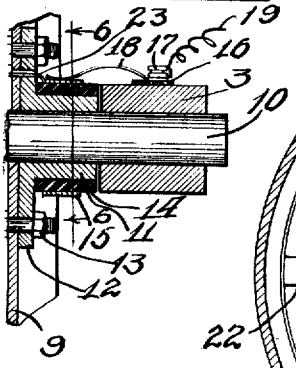


Fig. 4

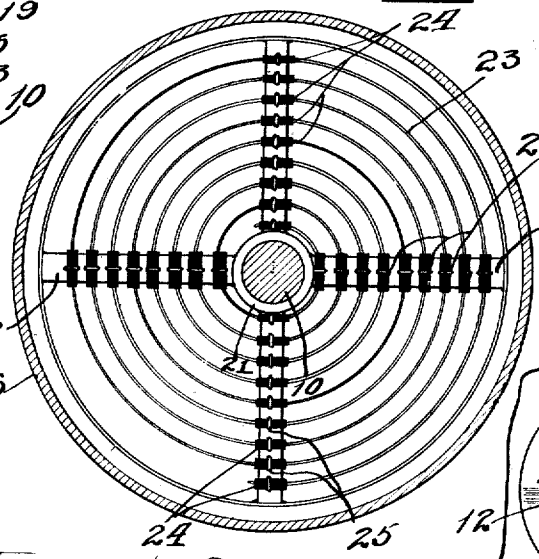


Fig. 7

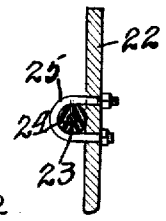


Fig. 6

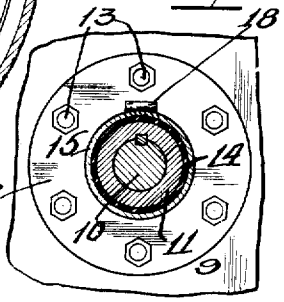
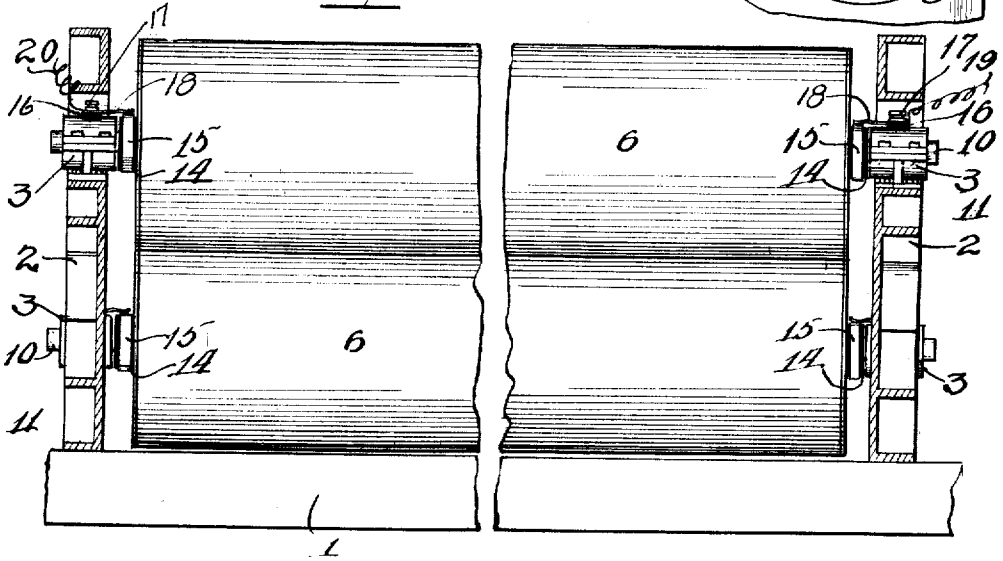


Fig. 2



Witnesses

C. F. Peterson.

Charles W. Hills Jr.

Inventor

John E. Alexander.

By Charles W. Hills Atty.

UNITED STATES PATENT OFFICE.

JOHN E. ALEXANDER, OF PORT EDWARDS, WISCONSIN.

CYLINDER FOR PAPER-DRYING MACHINES.

1,348,469. Specification of Letters Patent. Patented Aug. 3, 1920.

Application filed November 26, 1917. Serial No. 204,088.

To all whom it may concern:

Be it known that I, JOHN E. ALEXANDER, a citizen of the United States, and a resident of the city of Port Edwards, in the county of Wood and State of Wisconsin, have invented certain new and useful Improvements in Cylinders for Paper-Drying Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to an electrically heated cylinder for a paper drying machine, the construction of said cylinder being comparatively simple and adapted to be readily carried out in the reconstruction of steam rollers or cylinders which are almost universally used in paper drying machines.

It is an object of this invention to construct an electrically heated drying cylinder for use in paper drying machines.

It is also an object of this invention to provide a drying cylinder for a paper-making machine, said cylinder adapted to be heated by electricity which is permitted to flow through a coiled resistance wire mounted within said cylinder.

It is an important object of this invention to construct a cylinder having a plurality of coils of resistance wire mounted therein formed from a single length of wire, said coils being connected with an electric circuit whereby said cylinder is heated and adapted for use as a drying member in a paper drying machine or other similar device.

Other and further important objects of this invention will be apparent from the disclosures in the specification and drawings.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a side elevational view of a paper drying machine with parts omitted and broken away, and equipped with electrically heated drying cylinders embodying the principles of this invention.

Fig. 2 is a section taken on line 2—2, of Fig. 1, with parts in elevation.

Fig. 3 is a longitudinal vertical central section taken through one of the cylinders, showing parts thereof in elevation.

Fig. 4 is an enlarged detail section taken on line 4—4 of Fig. 3.

Fig. 5 is an enlarged fragmentary detail section taken on line 5—5 of Fig. 1, with parts broken away.

Fig. 6 is a section taken on line 6—6 of Fig. 5.

Fig. 7 is an enlarged fragmentary detail section taken transversely through one of the insulating blocks of the heating coil.

As shown on the drawings:

The reference numeral 1, indicates a floor or foundation upon which is mounted a paper drying machine comprising in part, a framework 2, in which is journaled in suitable bearings 3, a plurality of staggered electrically heated drier units or cylinders, embodying the principles of this invention, and adapted to uniformly dry a paper web 4, which is guided by means of a guide belt 4^a, which passes around suitably spaced guide rolls 5. Said web 4, passes around and between the staggered drier cylinders, whereby said web 4, is thoroughly dried uniformly in its passage through the paper drying machine.

Each of the drier units or cylinders comprises a cylindrical casing 6, the ends of which are bent inwardly to form flanges 7, to each of which is rigidly secured by means of bolts 8, or other suitable means, a centrally apertured end plate 9, for closing the ends of said casing 6. Projecting longitudinally through the casing 6, and out through the central apertures in the end plates 9, is a shaft or axle 10. Keyed on or otherwise rigidly secured upon each projecting end of the axle 10, adjacent the outer surface of the end plates 9, is a hub 11, having integrally formed at right angles to the inner end thereof an apertured flange plate 12, which lies flat against the outer surface of one of the end plates 9, and is rigidly secured thereto by bolts 13, or other suitable means. Each of the hubs 11, has engaged or rigidly secured thereon an insulation band or ring 14, upon which is securely mounted a contact ring 15. Rigidly secured upon the top of each of the bearings 3, is a small insulating plate 16, upon which is secured a binding post 17. Held in position upon the insulating plate 16, by the binding post 17, is one end of a spring finger or contact member 18, the other end of which is curved and bears upon one of the contact rings 15. Connected to the binding post 17, at one end of the drier unit, is a lead wire 19, and similarly connected to the binding post 17, on the

opposite end of the drier unit is another lead wire 20. Said wires 19 and 20, are adapted to be connected to a source of electrical energy.

As clearly shown in Figs. 3 and 4, an electric heating unit or element is disposed within the casing 6, and comprises a plurality of adjacently disposed spiders, each having a hub 21, keyed or otherwise rigidly secured upon the shaft 10, and a plurality of radially disposed spider arms 22, the inner ends of which are integral with the hub 21. Rigidly secured to the contact ring 15, at one end of the drier unit is one end of a resistance wire 23, which is threaded through an aperture in the respective end plate 9, and the flange plate 12, and is then wound into coils in the interior of the casing 6, each coil being rigidly secured to the respective arms 22, of one of the spiders within the casing by means of insulating blocks 24, and staple bolts 25. The heating coils are all integrally connected one to another, being formed out of the resistance wire 23, the opposite end of which projects outwardly through a suitable opening in the end of the drier unit and is rigidly secured to the contact ring 15, which connects up with the lead wire 20. The coiled wire 23, thus forms an electric heating unit within the drier unit, whereby when an electric current is established through the lead wires 19 and 20, and through the heating coils connected in series therewith, said coils become heated and so act to heat the metal cylinder casing 6, to afford a means for uniformly drying a paper web which is run through the paper drying machine equipped with electrically heated drier units, as shown in Fig. 1.

The operation is as follows:

The drier units are rotatably journaled in the bearings 3, and may be rotated by any suitable means. To heat the drier units, the circuits to the wires 19 and 20, are closed by suitable switches, thus permitting the current to enter the drier units through the wire 19, the respective binding post 17, contact members 18, and contact rings 15, thus connecting up with the coiled resistance wire 23, flowing therethrough and out of the drier unit through the lead wire 20. The circuits thus established heat the coils of wire within the drier units, the heat from which is radiated to heat the drier unit casings 6.

It will, of course, be understood that various kinds of electric heating elements other than the type shown may be installed within the casing 6, and that numerous different ways of connecting up said electric heating elements with sources of electrical energy may also be provided. Due to the simplicity of construction of the electric drier units as hereinbefore described, it will be seen that large paper-making machines at present equipped with steam heated drying cylinders may have the drying cylinders thereof readily converted into electric drying cylinders, if so desired, thus reusing parts of the old drying machine and thereby reducing the cost of changing from a steam heated drying system to an electrically heated drying system.

I am aware that numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

1. A drier unit comprising a casing, a shaft projecting therethrough to permit said casing to be rotatably mounted, spiders secured on said shaft within said casing, a plurality of connected flat spirals of wire secured on said spiders, and means connected with said flat spirals of wire to permit an electric current to be passed therethrough to heat the same and said casing.

2. In a drier unit of the class described embracing a casing, means for rotatably supporting the same, a plurality of electric heating coils within said casing formed from a unitary piece of wire, spiders mounted within said casing for supporting said coils, and insulating blocks disposed between said spiders and said coils.

3. In a drier unit of the class described, a cylinder, a shaft for rotatably supporting the same, a plurality of supporting members within said cylinder rigidly secured to said shaft, insulating blocks secured in radial rows on said members, electrically heated wire coils within said cylinder held in position by said insulating blocks, and means connected with said coils to permit an electric current to flow through said coils to heat the same and thereby heat said cylinder.

4. A drier comprising a casing, a shaft projecting therethrough for rotatably supporting the same, a plurality of spiders disposed adjacent one another within said casing and keyed to said shaft, insulating blocks secured in radial rows on said spiders, a single wire attached to all of said spiders and insulated therefrom by means of said blocks, said wire coiled to form a flat spiral on each of said spiders to permit uniform heating of the air in said cylinder, and means connected with the ends of said wire to permit an electric current to be passed therethrough.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

JOHN E. ALEXANDER.

Witnesses:
EARL M. HARDINE,
CHARLES W. HILLS, Jr.