Jan. 6, 1953 N. P. BEDSON 2,624,178

COOLING OF THE ROD IN ROD ROLLING MILLS

Filed Dec. 23, 1948

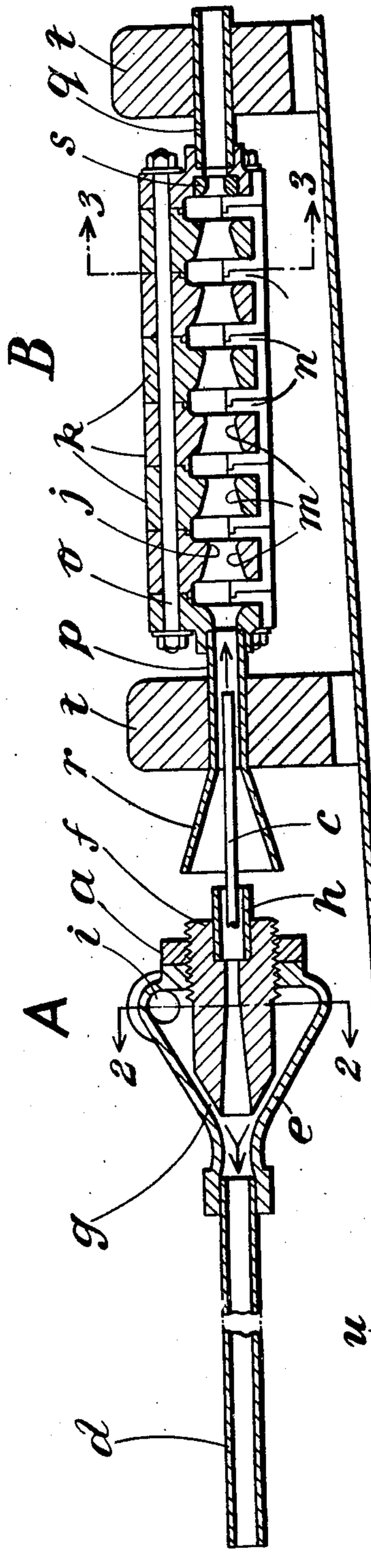

Fig. 1.

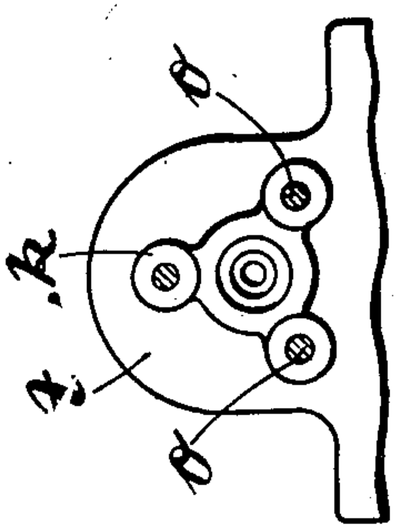

Fig. 3.

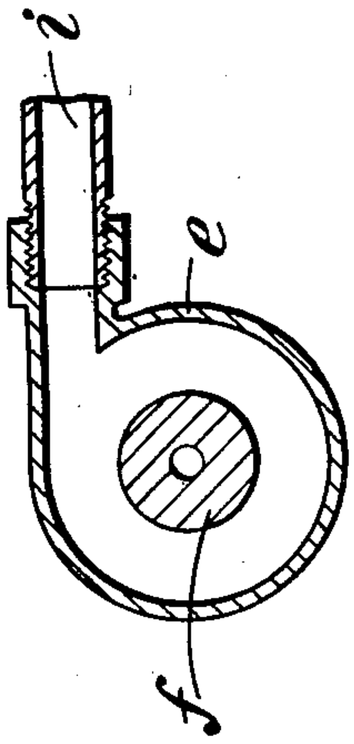

Fig. 2.

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Patented Jan. 6, 1953

2,624,178

UNITED STATES PATENT OFFICE

2,624,178

COOLING OF THE ROD IN ROD ROLLING MILLS

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Application December 23, 1948, Serial No. 66,972
In Great Britain June 7, 1948

6 Claims. (Cl. 62—1)

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This invention relates to the cooling of the rod in rod rolling mills and has for its object to provide a simple and efficient cooler and means for shedding the water from the rod.

The invention comprises a cooler in which a swirling mixture of air and water is produced and caused to pass co-axially through a tube surrounding the rod in a counter direction to the movement of the rod, and a water shedder through which the cooled rod passes, the bore of the water shedder having a number of ridges which wipe the rod and intermediate gaps through which the water collected at the ridges drains away.

The invention further comprises a mixing chamber having an outer conical or tapering casing fixed at its smaller end to the tube, an inner nozzle, through which the rod travels, secured to the mixing chamber, the bore of the nozzle diverging towards the tube, the nozzle being mounted coaxially within the outer casing and providing an annular chamber between the nozzle and the casing which has an outlet space between the end of the nozzle and the inner surface of the casing at its smaller end, and a tangential water inlet at the larger end of the casing through which water under pressure flows into the annular chamber to produce a swirling stream of water drawing in air through the inner nozzle.

The invention further comprises a water shedder having a number of similar parts, each part having a central tapering bore, longitudinal bolts which secure the parts together on a common axis, there being gaps between the central bores of the several parts through which water may escape and drain away, guide tubes for each rod as it passes through the several parts and means to support the guide tubes.

Referring to the accompanying explanatory drawings:

Figure 1 is a sectional elevation of a cooler and water shedder constructed in accordance with the invention.

Figure 2 is a sectional and elevation on the line 2—2 of Figure 1.

Figure 3 is a sectional end elevation on the line 3—3 of Figure 1.

The rod *c* issuing hot from a roling mill is passed successively through a cooler A and a water shedder B. The cooler comprises a tube *d* through which the rod passes in counter direction to a stream of water and air, produced in a chamber secured to the tube. The chamber comprises an outer casing *e* which tapers towards the end

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into which the tube *d* is secured, such casing having a tangential water inlet branch at *i* so that the water issuing into the casing under pressure, which may be of the order of 80 lbs. per square inch, travels with a strong swirling motion to the small diameter end of the casing. Coaxially within the latter is a nozzle *f* through which the rod passes, the nozzle diverging towards the end where the rod enters. A gap is left at *g* between the conical end of the nozzle and the interior of the casing so that the swirling stream of water can issue therethrough and surround the incoming rod. A renewable tube *h* is provided in the outer end of the nozzle *f*. The nozzle *f* screws into the end of the casing *e* and is held in place by the locknut *a*.

When the device is in operation, air tends to flow into and through the nozzle *f* due to the ejector action of the swirling water stream issuing around the end of the nozzle, with the result that a swirling stream of aerated water travels along the tube *d* around the rod passing therethrough.

From the cooler the rod *c* passes to the water shedder B, which comprises a series of parts *k* mounted on a common axis, each part having a tapering bore *m*, with gaps *n* between the tapering bores, through which water may escape and drain away. The parts *k* are held together by longitudinal bolts *o* which also secure the guide tubes *p* and *q* by which the water shedder is supported in suitable stands *t*.

The rod *c* passes through the converging mouth *r* of the guide tube *p* and through the central bore of the water shedder where, due to its vibrating movement, it throws off the water adhering thereto, such water being wiped off by contact of the rod with the nozzle parts *m* and draining through the gaps *n*. A renewable bush is provided at *s* which is the main support for the rod in its travel through the shedder. The platform *u* serves to collect and drain away the water from the cooler and shedder.

Owing to the swirling of the water stream, the drag on the moving rod is eliminated or greatly reduced.

What I claim is:

1. Apparatus for treating hot rolled metal rods and the like during axial movement thereof, comprising a guide tube which may be contacted by said rods respectively, a nozzle spaced from the entering end of the guide tube, the nozzle having an outlet so positioned that fluid issuing therefrom is directed into the guide tube and toward the entering end thereof, a fluid supply

conduit for the nozzle, and a fluid intercepting means generally surrounding the path of rods following the guide tube, the intercepting means comprising a series of rigid blocks, each block having a central part in spaced relation to the central parts of the other blocks, and each central part having an axial opening therethrough for the passage of the rods, the blocks being adapted to wipe said rods in the course of their axial movement therethrough.

2. Apparatus for treating hot rolled metal rods or the like during axial movement thereof or the like, comprising a guide tube having an entering and a leaving end through which said rods pass, a swirling nozzle fixedly connected to said guide tube and generally pointing toward the entering end thereof, and a plurality of longitudinally placed rigid water shedding parts each having a middle portion with a central bore therein coaxial with the axis of said guide tube and through which bore said rods pass, said central bores being of a diameter approximating the amplitude of the lateral movement of said rods while running, said middle portions being in spaced relation to each other of such middle portions, the spaces between said portions serving as intermediate draining gaps, whereby said rods may be cooled by cooling fluid from said nozzle and residual cooling liquid removed therefrom by wiping contact with said parts during the passage of said rods through said central bores.

3. Apparatus for treating hot rolled metal rods or the like during axial movement thereof, comprising a tube through which said rods move, a nozzle connected to said tube at a distance from the entering end thereof and having access to the interior of said tube, said nozzle further being coaxial with the axis of said tube, an outer casing forming a part of said nozzle and having an interior wall converging toward said entering end of said tube, an inner nozzle forming a part of said nozzle and having an end toward said entering end of said tube converging toward the axis of said tube, said inner wall of said outer casing and said converging end of said inner nozzle defining an annular gap, means defining a central bore through said inner nozzle coaxial with the axis of said tube, said bore diverging in the direction of said tube, rigid water shedding blocks in longitudinal alignment adjacent the rod-leaving end of said nozzle, said blocks each having central tapering bores therethrough coaxial with the axis of said central bores and said inner nozzle and diverging toward said nozzle, said rods passing through said bores, said central tapering bores having a minimum diameter approximating the

amplitude of the lateral movement of said rods while passing therethrough, said blocks further defining gaps substantially between said central bores therein, whereby said rods are cooled to a predetermined degree with reduced drag and the cooling fluid removed therefrom by wiping contact with said blocks during the passage of said rods through the tube, nozzle and water shedding sections of said apparatus.

4. In the cooling and drying of hot rolled rods or the like during axial movement thereof, the steps comprising, passing a cooling liquid around said rods in a helical manner in contact therewith, removing a portion of said cooling liquid by constricting the passage through which said rods travel, jarring said rods, and wiping off the remainder of said liquid from said rods in the course of their continued passage.

5. In the cooling and drying of hot rolled metal rods or the like during axial movement thereof, the steps comprising, passing a cooling fluid around said rods in a swirling manner in contact therewith, removing at least a portion of said cooling fluid by constricting the passage through which said rods travel, and then jarring and wiping said rods in the course of their continued passage to remove a substantial portion of the remainder of said cooling fluid.

6. In the cooling and drying of hot rolled metal rods or the like during axial movement thereof, the steps comprising, passing a cooling liquid around said rods in a swirling generally countercurrent manner in contact therewith, removing at least a portion of said cooling liquid by constricting the passage through which said rods travel, and jarring and wiping said rods in the course of their continued passage to substantially remove the remainder of said cooling liquid.

NOEL PHILLIPS BEDSON.

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