A CURIOUS INSTANCE OF RE-INVENTION.

BY IRVING U. TOWNSEND, EXAMINER OF TEXTILES, PATENT OFFICE.

Ethnologists claim that primitive or savage man produced with his hands or with the rude implements at his disposal, as perfect specimens of workmanship, as can be made by civilized man of the present day, employing the same instrumentalities. In other words, the same ideas of mechanics seem to present themselves to man in all stages of his development, and are in his lower state of civilization embodied in as faultless construction as is now possible without the aid of machinery. This claim has been verified in what is known as the Wardwell cop of fibrous material, invented by Simon J. Wardwell, Jr., about 1891. In this cop each layer is composed of a large number of spiral windings. The coils of adjacent spirals are laid absolutely side by side without leaving any open space, upon a flangeless paper tube. As shown by the illustrations, the thread encircles the tube twice in passing from one end to the other (this constituting one spiral) and then is bent at an angle and returned to the starting point, lying throughout this course in contact with the portion of the thread just previously laid, the return spiral binding the first one about midway of its length with a V effect, clearly shown in the completed cop. For this reason the cop is often termed the V wind. Throughout the cop the thread is laid in a definite, final position, each spiral corresponding with every other spiral so far as the number of turns around the holder is concerned, and the angles of the different parts of the various coils to the axis of the tube are the same in all the layers, excepting for the changes incident to the increasing diameter of the cop. To lay adjacent spirals side by side, the thread when it reaches the end of its course in one direction is carried across the end of the spiral just previously laid in the same direction, so that when it is given a sharp bend to begin the return spiral (see right hand end of Fig. 2) it still lies side by side with it. To produce this effect there is imparted to the thread what is termed an increment of motion. By this it is meant that the thread guide is traversed at the end of its stroke in each direction a distance further equal to the width of the thread, or the thread guide may make a dwell, while the tube continues to rotate. The sharp bend at each end of each spiral prevents the undue accumulation of thread at the ends of the holder, so that the completed cop is truly cylindrical with flat ends. If the thread were laid in a long curve at the ends, as was the usual practice previously, the result would be a cop considerably narrower at the center than at the ends where the material is heaped up.

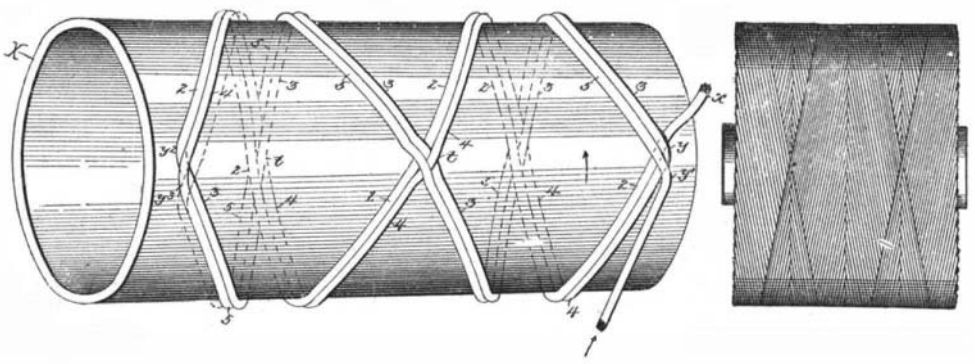
The Wardwell cop is the most compact cop that can be wound, and the definite and accurate winding, with the sharp return bends, permits the thread to be unwound down to the first spiral of the first layer with uniform tension. This is often very important, as where the cop is one of yarn for use in knitting machines.

For many years skilled inventors worked to improve cops of thread, and one wind after another was devised, the culmination being that just described, which it will be observed can be wound by hand with the exercise of great skill and patience, practically as well as by the most highly organized machine, though of course far more slowly. In fact, Wardwell so wound his first cop.

Suit was finally brought upon the patents for the cop and the method of winding it, and it was then accidentally discovered that in the National Museum at Washington and in the American Museum of Natural History at New York there are four large cops of rope or heavy cord, which in the language of the court are "identical in appearance" with the Wardwell cop. They present, at least superficially, every detail of the wind. There are, as the accompanying photographs show, the spirals and reverse spirals tying each other down intermediately between their ends, the sharp return bend at the end of each spiral, the absolute contact of successive spiral coils from end to end, the effect of the increment of motion, and the characteristic V wind. These cops had been for years in the possession of the museums, and it is certain that they were made by Fiji Islanders, undoubtedly by hand. In view of these cops the two patents were held to be invalid and this holding was sustained upon appeal.

The museum authorities have never permitted these

A PRIMITIVE V-WOUND COP IN THE NATIONAL MUSEUM.



A V-WOUND COP FOR WHICH A UNITED STATES PATENT WAS ISSUED.

cops to be unwound, and it cannot be said with certainty that the inner layers, and especially the first few layers, are the same in construction as the outside one. It is possible to begin with a quite different formation and to gradually approach the Wardwell wind. The court held this to be immaterial since the outer layer might be regarded as a first layer, and a cop wound upon that.

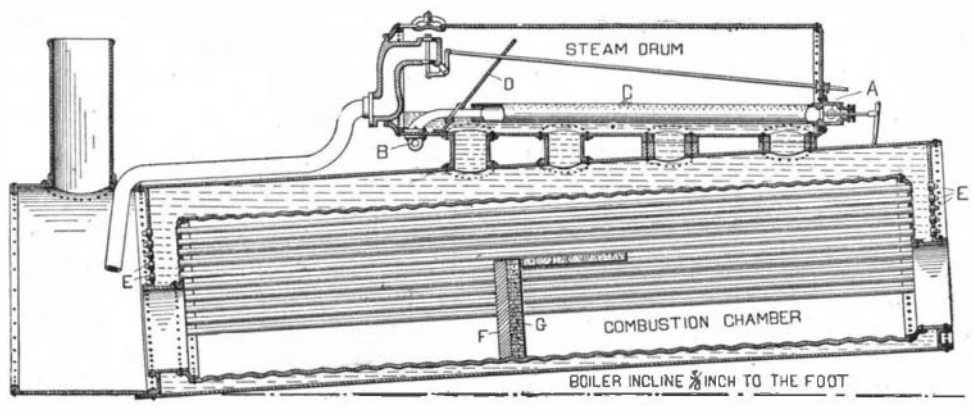
The Patent Office has recently reissued the method patent, specifying the formation of the first layers, because of the doubt as to the internal construction of the museum cops.

AN OIL-BURNING WATER-TUBE LOCOMOTIVE BOILER.

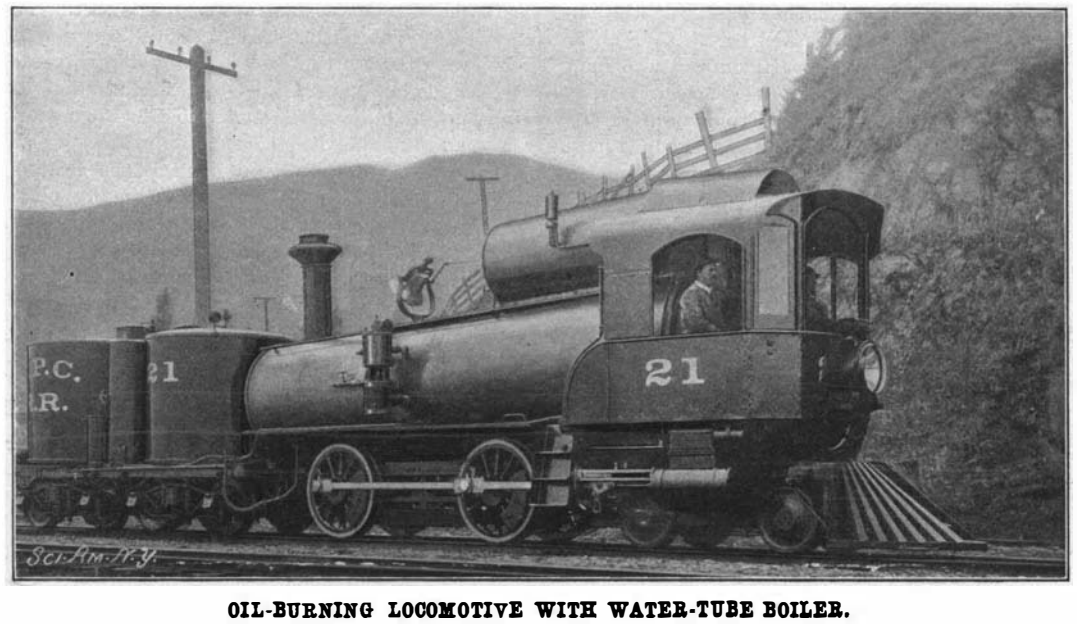
We have received from J. B. Stetson, the President of the Northern Pacific Railroad Company, California, photographs and particulars of a very interesting locomotive which was designed by himself and W. J. Thomas, the Master Mechanic, for use on their road, which is of 3-foot gage and runs from Sausalito, San Francisco Bay, to Cazadero, 100 miles to the north. The novelty of the engine lies in the boiler, which was built on the frame of a small eight-wheel Baldwin passenger locomotive. The designers write us that the boiler was designed for the double purpose of enabling the road to burn crude California oil and of securing economies of construction and maintenance which are characteristic of the water-tube boiler. They endeavored to build a boiler that "would cost less in the first instance and, after it was built, would cost less to maintain; one that would do away with the troublesome flue-sheet with its 200 or 300 flue ends in the fire, and would also get rid of the thick seams, the rivets around the flue-sheet, to say nothing of the hundreds of stay bolts, etc."

The construction of the boiler is very clearly shown in the accompanying longitudinal section. It will be seen that the barrel is placed on an incline of 5/8 of an inch to the foot (this was done to secure better circulation), and that a corrugated firebox runs through the whole length of the boiler. The latter is supported at each end on a 20-inch nozzle, and about its mid-length there is a cast-iron bridge wall and flue-support, *F*, with a protection of firebrick, *G*. The oil is introduced through the nozzle at the front end of the boiler, and what is known as the sunlight type of burner is used. The oil is carried to the burner through the exhaust pipes, where it is heated to the correct temperature for atomizing. Above the boiler is a large horizontal steam dome, containing the inlet for the feed water, which enters the dome by way of the long, perforated pipe, *C*. At each end of the boiler are flue-cleaning plugs, *E*, placed directly in line with the water-tubes, by the removal of which it is an easy matter to give the tubes a thorough cleaning. The shell of the boiler is 7-16 of an inch thick. Its length, including the smokebox, is 19 feet 6 inches. The firebox is 41 inches in diameter by 16 feet in length; the shell is 3/8 of an inch in thickness; the heads, 1/2 an inch; and it contains forty-nine 3-inch tubes. It will be noticed that the cab is placed at the head of the engine, an arrangement which the designers claim gives the engineer and fireman a better lookout, especially on sharp curves, and a more perfect command of their engine. The throttle levers, valves, etc., are all placed at this end and within convenient reach.

It will be noticed that the tender is of decidedly original design, the tanks being cylindrical and placed vertically. The water tank has a capacity of 1,200 gallons, and the oil tank of 1,000 gallons. The lagging has been carried entirely over the smokebox, with the result that it is an easy matter to retain the heat; so much so, that by closing the top of the stack it has been found that steam can readily be held for as long as ten hours, and that it can then be utilized for firing up without the necessity of using any wood or coal fuel. The engine has been in use on the road for about four months, and we are informed that it is giving very satisfactory service.



SECTION THROUGH BOILER.



OIL-BURNING LOCOMOTIVE WITH WATER-TUBE BOILER.

Paris is the center of an international telephone wire net; its extreme ends are London, Hamburg, Berlin, and (in connection with the French-Italian line about to be opened) Turin and Milan. The Paris-Berlin line is the longest, with about 625 miles of wire. The Paris-Hamburg line is about the same. The distance from Paris to Turin, measured by an air line, is about 375 miles, and that between Paris and Milan about 470 miles. But all these lines are eclipsed in length by that between Paris and Cologne, not by the direct line, but by indirect connection, often rendered necessary by breaks in the other service. In such cases, a person in Paris desiring to speak to Cologne is connected via Berlin. This roundabout way increases the wire distance about 375 miles, making the total about 1,000 miles. The Cologne Gazette states that this does not impair the distinctness of the message, and no loss of time is noted in using this increased distance.