

A VISE FOR JEWELERS, TOOL MAKERS, ETC.

The illustration represents a vise in which the jaws have a positive opening and closing movement in parallel lines, both jaws being simultaneously actuated by a right and left hand screw. This vise was patented by Charles E. Billings, and is manufactured by the Billings & Spencer Company, of Hartford, Conn. The illustration represents the vise held in a special form of clamp fitting it for use as a bench vise. All parts



THE BILLINGS VISE.

are drop forged of the best steel. There is a hole entirely through the vise handle, the lower part of this hole being threaded, and the vise is adjustably held in the bench clamp, at any desired angle, by means of a screw and thumb nut, a pin preventing this screw from dropping out of the clamp. The vise may thus be readily taken out and used as a hand vise, or placed in position as a bench vise. The jaws open three-quarters of an inch, and will grasp and hold central round wire from one-sixteenth up to one-quarter inch in diameter.

ELVIND ASTRUP, Peary's companion, who perished in a Norwegian snow storm last Christmas, has now a memorial stone 26 feet high erected in his memory in the forest of Holmonkollen, at Christiania.

A LOCOMOTIVE HEADLIGHT AND SIGNAL.

According to the improvement represented in the illustration, the light emanating from the lamp in the headlight not only illuminates the track in front of the locomotive, but is also utilized to illuminate signal lenses looking toward the front and to each side. The improvement has been patented by Thomas Frame, of Salida, Col. Fig. 1 shows the headlight and signal in position and Fig. 2 is a sectional plan view. In each side of the headlight casing is a compartment which has at its forward end and on the side a lens, a reflector at the rear of the compartment throwing the light rays through the forward lens, while the rays from the lamp pass transversely through the side lens, as shown in the plan view. Each lens may be screened by panes of colored glass, to signal with any desired colored light. Sheet metal flags for day signaling are also adapted to be displayed on the sides of the locomotive, between the back of the headlight casing and the smokestack, the flags being preferably made of thin metal sheets, differently colored, and each wound on a spring roller, the several rollers being journaled side by side at the back of the casing, and the free end of each sheet being drawn rearwardly and hooked on to a bracket on the smokestack. While any special flag is thus moved into position for signaling, the other flags remain wound up on their rollers.

THE BICYCLE WHEEL.

BY E. D. SEWALL.

The modern bicycle is an excellent example of a meritorious invention consisting, in the language of the patent law, of a new combination of old and well known devices. There is no essential part of the bicycle that is not, in principle, more than thrice the age of the modern safety, while some of the features are inventions of previous centuries.

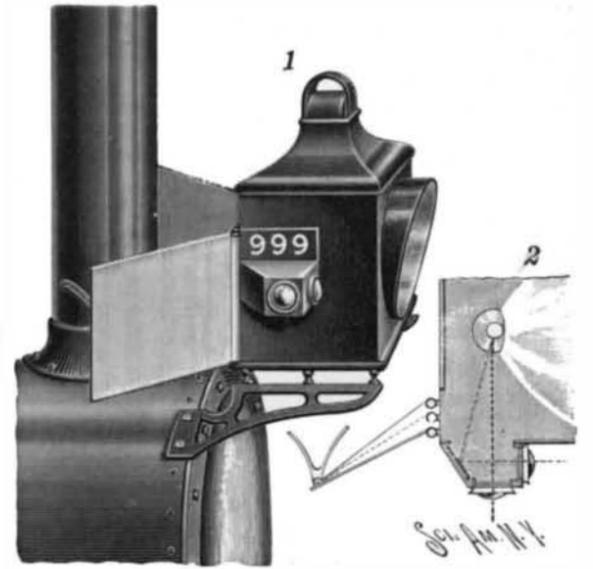
The wheel of the bicycle attracts the eye of the thoughtful observer probably more than any part of the machine. It illustrates perfection in principle and the utmost delicacy of the visible parts.

It is built upon the suspension principle, the load carried upon the axle being suspended from the rim, instead of being supported on the spokes that fall beneath the axle, as in the more ancient and more common form of "compression" wheel. In the suspension wheel the great tensile strength of steel wire sustains a heavy strain and yet enables the wheel to present an appearance of great delicacy. "Spider wheel" it was called in England, when it first appeared on the velocipede, and the name has not yet gone wholly out of use.

Contrary to the general opinion, the suspension wheel is one of the oldest of all the old and well known parts that enter into the combination that makes up the modern bicycle. Both England and France have claimed the honor of its invention. The cycling writers of England brought forward Edward Cowper as the first inventor, placed the date of invention in 1868, and

pointed to the "Phantom" bicycle of 1869 to show it in practical use. The French replied that René Olivier, a distinguished mechanical engineer, who had experimented considerably with the velocipede, had proposed "les roues de fil de fer" in 1864, and had applied them to a two-wheeled velocipede in 1867. A search of the records of the British patent office enabled the English to establish a still earlier date, 1826, while the French did not attempt to claim back of the date of Olivier's alleged invention.

It is a fact, however, that the invention of the suspension wheel precedes the discovery of America by Columbus. The autograph manuscript left by Colum-



FRAME'S HEADLIGHT AND SIGNAL.

bus' great countryman, Leonardo da Vinci, that universal genius, contains a sketch of a suspension wheel, and an autograph note describing the invention as one "by which wheels are strengthened and a light wheel made strong." A model of Da Vinci's wheel has been made from his sketch and placed in the National Museum at Washington. The invention antedates 1490. It is shown in one of the accompanying figures.

The next record of the suspension wheel is found in the British patent office. In 1826 a London accountant named Theodore Jones filed his application for a patent for "an improved construction of carriage wheels, of such nature that the weight they have to carry is suspended from that part of the wheel which happens to be uppermost, instead of being supported, as is usual, by the spokes that happen to be under the axle tree." The spokes of this wheel were light iron rods and the rim was a hoop of iron. The inner ends of the spokes passed through a flanged hub and were held from withdrawal by nuts screwed on their



Fig. 1.—DA VINCI'S SUSPENSION WHEEL, 1490.

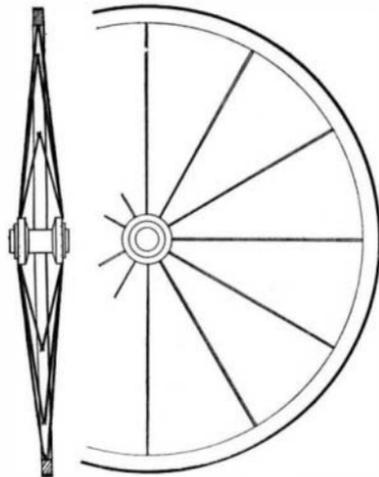


Fig. 2.—"PHANTOM" WHEEL, 1869.

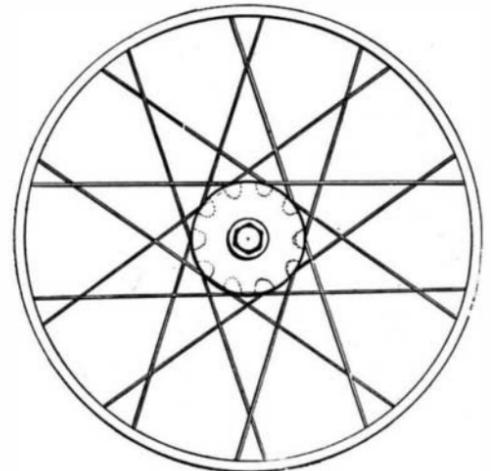


Fig. 3.—FIRST TANGENT WHEEL, 1869.

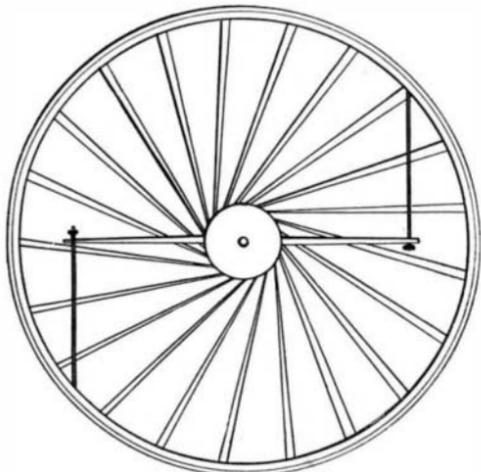


Fig. 4.—CROSS LEVER TENSION WHEEL, 1870.

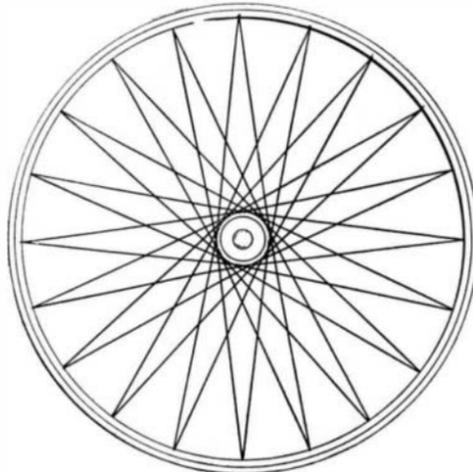


Fig. 5.—STARLEY'S TANGENT WHEEL, 1874.

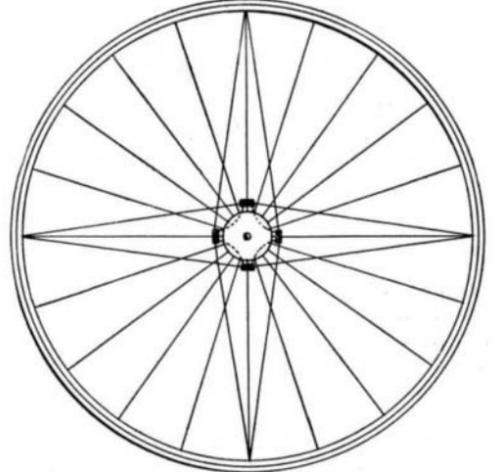


Fig. 6.—COMBINED TANGENT AND RADIAL SPOKES, 1875.

EVOLUTION OF THE BICYCLE WHEEL.