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NEW SERIES.

## Vent Stopper for Cannon.

The most common cause of accidents with cannon is the imperfect closing of the vent in loading. When a cannon is fired, pieces of the cartridge bag are frequently left in it on fire, but the smoke soon extinguishes them; if any atmospheric air, however, gets access to them they continue to burn, and when the cartridge is run down it is kindled, causing a premature discharge, which generally blows off the gunner's arm, and is very apt to kill him. To prevent this, a man is stationed at the vent to keep it tightly closed during the process of loading, but it seems to be almost impossible to teach men to perform this service thoroughly; hence the great number of accidents.

To secure a perfect closing of the vent in all cases is the object of the invention here illustrated. An elastic leather pad, A, is secured to the lower side of the lever, B, which is hinged to the breech of the gun in such position that, when it is turned down, the pad is brought directly over the vent. A hook or catch, C, is fixed to the gun on the side opposite the hinge, in a way to catch by a spring over the lever as the latter is turned down, and hold it securely in place with the pad pressed down upon the vent.

It would seem to be impossible for the most unskilled soldier to avoid closing the vent perfectly with this simple arrangement.

The patent for this invention was procured, through the Scientific American Patent Agency, May 28, 1861, and further information in relation to it may be had by addressing the inventor, J. J. Hirschbühl, at Louisville, Ky.

## THE MYSTERY OF COMETS' TAILS.

There is nothing in nature more mysterious than the growth and motion of the trains of comets. When a comet is first discovered by a telescope it generally has no tail, appearing like a faint star seen through a haze. As it approaches the sun the tail is developed, starting out on the side next the sun, but being immediately turned back, as if it were a flame acted on by a powerful blast coming from the sun. The nucleus or head of the comet is matter, though lighter than the thinnest fog, but the tail is either not matter at all, or it is acted on by forces which do not manifest themselves on this earth. If the train were simply matter, acted on by gravitation, it would follow the head in its track around the sun, consequently bending, as the head sweeps around the part of its orbit nearest the sun, into nearly a semicircular curve. Instead of this, the train *always points from the sun*, swinging around as the stream of light from

a lantern in the fog does when the lantern is turned. As the trains are sometimes of such length that they would reach from the sun to the earth, and as the comet when nearest the sun moves through many degrees of its orbit in a few hours, the end of the train is swept around with a velocity which forbids the belief of its being matter possessed with the property of inertia.

The velocity, too, with which the tail is shot forth is irreconcilable with the idea of its being subject to the law of inertia. The tail of the great comet of 1680, immediately after its perihelion passage, was

gradually diminishes till it disappears altogether. Sometimes, however, the train is obliterated in the vicinity of the sun, the comet emerging from the sun's light without any tail whatever. At other times the tail is the longest just after the perihelion passage; at others there are two or three or more tails branching out like a fan. They are frequently curved like Donati's in 1858, and exhibit a great variety of singular phenomena, which are an incomprehensible mystery to the students of astronomy.

At about the same time, Bissel and Prof. Pierce, each independently of the other, offered the suggestion that the trains of comets may be electricity. Perhaps they are simply light; the sun's rays, in their passage through the unknown substance of the nucleus, may acquire the power—analogue to polarization—of producing the vibrations which constitute light.

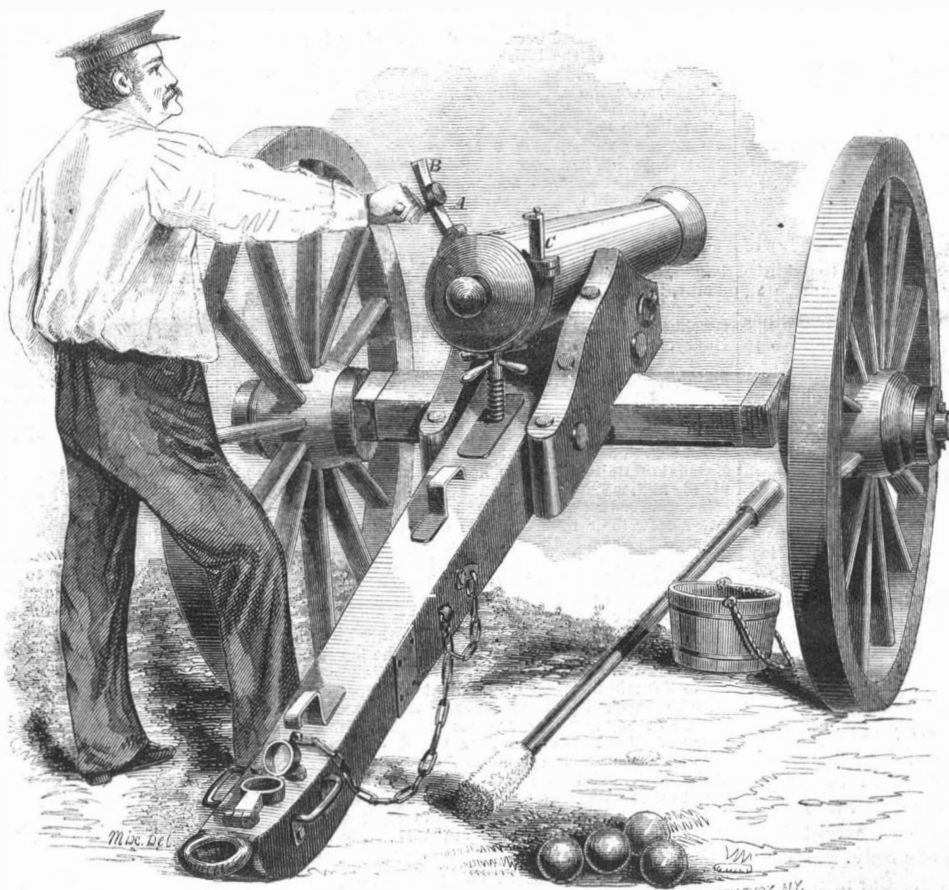
The heads of comets are unquestionably formed of material substance, as they are acted on by gravitation, and reflect the sun's light, but this substance is generally of extreme tenuity. Stars of the smallest magnitude have been seen through the densest portion of the head, and, in the language of Sir John Herschel, "The most unsubstantial clouds which float in the highest regions of our atmosphere must be looked upon as dense and massive bodies compared with the filmy and all but spiritual texture of a comet." In some, however, a very minute stellar point has been seen, indicating the existence of a solid body.

Among the mysterious phenomena presented by

the head, is its diminution in size as it approaches the sun, and its rexpansion during its retreat. It also throws off nebulous envelopes one after another, during the formation of the train, in a very curious manner.

Many of the comets move in elliptical orbits, and continue to revolve around the sun. But the orbits of a few have been ascertained to be hyperbolas, and these consequently will never return. Light, ethereal volumes of vapor, they come from unmeasured distances above, below, or on either hand, with constantly accelerating velocity, rush in strange turmoil around the sun, and then move more and more slowly away on their solitary courses into the depths of space.

THE total quantity of iron and steel of all kinds exported from Great Britain, in 1860, was 1,442,045 tons. This does not include articles of hardware, only the unfabricated material. In the same year 778,775 cwt. of hardware were exported, valued at \$15,154,014.



## HIRSCHBUHL'S VENT STOPPER FOR CANNON.

found by Newton to have been no less than sixty millions of miles in length, and to have occupied only two days in its emission from the comet's body.

One of the most singular phenomena of comets' tails is the violent commotion observed in them. Flames stream forth from the nucleus in fan-shaped and various other and swiftly changing forms, toward the sun at first, but bending quickly back as if encountered by a furious blast, and then streaming away millions of miles into the sky. This may be owing to the intense heat to which they are exposed from their proximity to the sun. The great comet of 1843 approached the sun within about a seventh part of the sun's radius. Sir John Herschel calculates that at this distance the heat of the sun would be 47,042 times greater than it is at this earth, and at least 24½ times greater than the heat in the focus of Parker's great lens, which melted cornelian, agate and rock crystal.

Usually, as the comet moves away from the sun, the train, which it is now pushing partly before it,