AN IMPROVED BICYCLE BRAKE.

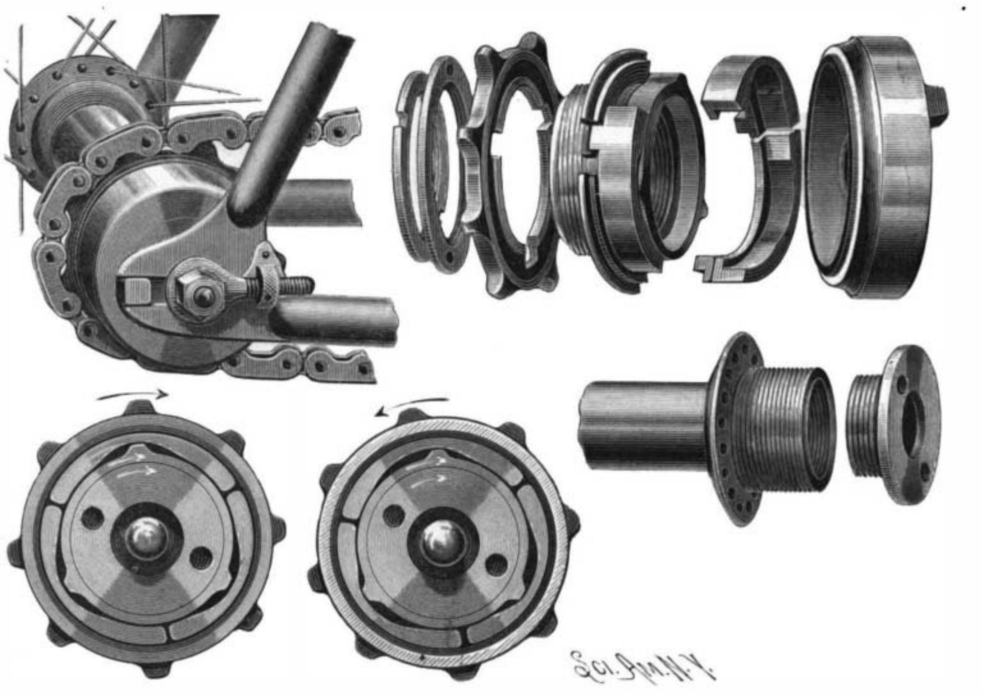
The brake shown in the illustration is the invention of James H. Bullard, of Springfield, Massachusetts, and has been patented in the United States and ten or twelve foreign countries. The brake will be manufactured by the Spaulding Machine Screw Company, of Buffalo, N. Y., and we are informed that it will be found on some of the leading wheels of 1898.

Like all rear hub brakes, it is actuated by back pedaling, and its construction is so clearly shown in the illustrations that an extended description thereof is not called for. Suffice it to say that a sleeve screws onto the hub and is locked thereon by a check nut which may be screwed either into the end of the hub, as shown, or onto the outside thereof. The sprocket rotates on the sleeve within the limits of the slots in the flange on the sleeve through which the studs on the brake shoes pass to engage in slots in the web of the sprocket. In one of the figures one brake shoe is shown on the flange and the other two removed therefrom. When pedaling forward, the said studs abut against the forward ends of said slots in the flange to drive the machine. When back pedaling is applied, the sprocket moves the brake shoes backward circumferentially on the sleeve, and the inclines on the underside of the brake shoes ride up on the projections on the sleeve, lying under the center of the brake shoes, and the latter are moved outwardly into engagement with the case, which is stationary and concentric with the hub. The slots in the web of the sprocket are inclined relative to the center of the hub, to the end that in pedaling forward the brake shoes may be forcibly held against the sleeve and out of contact with the case. The circular nut and its checknut on the rear end of the sleeve serve to clamp the web of the sprocket between it and the flange on the sleeve, whereby the sprocket is made to rotate on its hub under more or less resistance. This adjustment can easily be made in a few moments from the rear of the machine and is a very important feature, for it enables the brake to be adjusted to suit the strength of any rider—man or child. It is obvious that a back-pedaling brake which could be operated by a child would be unfit for use by a heavy rider, as the latter would unconsciously apply the brake by very light back-pedaling pressure put upon the cranks. Furthermore, this sprocket resistance aids in holding the brake set when once it has been applied.

Another important feature of the brake is that its construction insures the rider against loss of control of the machine, however inexperienced he may be; for, as the brake shoes are moved to the rear to apply the brake, as soon as they come into contact with the case the friction between the latter and the shoes tends to cause a still closer contact between them as the speed accelerates, for this friction tends to cause the brake shoes to move still further in the direction given to them in the first instance by the sprocket wheel, thus setting the brake harder.

Notwithstanding the fact that the brake is, in a manner, self-setting, as above described, the self-setting movement is always a gradual one, for even if the brake is but lightly set the shoes are more or less wedged between the case and the projections on the sleeve, and hence quite a little power must accumulate before they will move, and the farther to the rear they move the harder they move, for they are constantly being wedged harder against the inside of the case, and besides this there is the sprocket resistance to overcome, so it is at once apparent that the brake cannot be set too suddenly by reason of its being partly self-acting.

It is obvious, therefore, that, should a rider start coasting down a hill with the brake too lightly set and the feet off the pedals, any increase in the speed of the machine would set the brake harder, and finally bring it to a stop. If a rider should lose the pedals with the brake not set, it is only necessary to hold the toe of the foot so that the flying pedal can strike it, and the brake is immediately brought into action and brings the machine under control within a few revolutions. It is a safe coasting brake, a brake that can be suited to all classes of riders—a strong brake, acting with a minimum of backward movement (about one-eighth inch on rear sprocket), and as light as it can safely be made (weight seven ounces), and it is mechanically perfect.



THE BULLARD AUTOMATIC REAR HUB BRAKE.

A STATUE of Balboa, the discoverer of the Pacific Ocean, will be erected in Golden Gate Park, San Francisco. It will be executed by Mr. Douglas Tilden, and is the gift of Mayor Phelan.

The Artificial Coloration of Flowers.

BY WILLIAM BROCKBANK.

The excitement about blue carnations led my neighbor, Mr. W. Dorrington, and myself to endeavor to solve the mystery by imitating it, and we soon discovered that, although flowers could not be tinted by immersing them in dye solutions, they could readily be colored by placing their stalks in aniline solutions.

Aniline scarlet dissolved in water to about the transparency of claret has a very rapid action on flowers, coloring them pink and scarlet. Indigo carmine produces beautiful blue tints. The two combined dye various shades of purple, with curious mottled effects, some parts of the flowers becoming pink and other parts blue and purple. Greens are produced by using the blue dye with yellow. We also tried indigo and cochineal, with partial success. Lily of the valley flowers became beautifully tinged with pink or blue in six hours; narcissi are changed from pure white to deep scarlet in twelve hours, and delicate shades of pink are imparted to them in a very short time. Yellow daffodils are beautifully striped with dark scarlet in twelve hours; the edges of the corona also become deeply tinged, and the veining of the perianth becomes very strongly marked. Coelogyne cristata, Lapageria alba, Calla æthiopica, cyclamens, snowdrops, leucojums, hyacinths, Christmas roses, Solomon's seal, tulips, and many leaves were found to become colored very quickly by the process.

The more interesting question of how this rapid change is brought about soon attracted my attention, and proved extremely interesting. The coloration is mainly confined to the vessels. There is a system of veins in plants, the vein tubes being clearly seen under the microscope, passing through the leaves, petals and other parts of the flowers. In these tubes the motion of the colored water can be seen, and it became evident that it was by these that the color is conveyed and left in every portion of the plants. In the case of cut flowers the action is very rapid, the water tubes beginning at once to absorb the fluid, which was passed along by either capillary attraction, contraction or possibly by some more active life force acting within the veins. My experiments in proof of this were made at first entirely with cut flowers. I afterward tried the experiment by taking a Roman hyacinth very carefully out of the soil and placing the roots in aniline water. In twelve hours the petals began to color, and the flowers gradually became pink tinted throughout. This experiment was repeated on many narcissi and other bulbs. It cannot, however, be said that the root fibers were unbroken. Probably they were so, as I have failed to color any flower by merely watering the soil with colored water. The filtering appendages to the roots evidently prevent the absorption of much of the color, as the petals of the flowers do not become either so quickly or so deeply tinged when the plant has its root as with cut flowers. It was, however, clearly seen that the vein tubes proceeded from the root, thus completing the water system of tubes from root to flower.

The veins when colored are beautifully seen under the microscope as clear tubes running in parallel lines, the interspaces filled by cellular matter. The tubes gradually branch out as they proceed, and as they approach the margins they are finely branched. When the colored water reaches the margins of the petals they thus become deeply tinctured, especially in the narcissi, illustrating the cause whereby the daffodil so frequently obtains the deeper color at the edge of the corona. It is the same with the leucojum and the snowdrop.

Very singular results were obtained in the variegated leaves of the aucuba and ivy plants, which, at the winter season, one would suppose had the leaves quite dormant. Single leaves with their stalks placed in aniline dye water began to color in about three hours. They were thus shown to have the absorptive power quite apart from the stem.

Another remarkable instance was seen in Lapageria alba, which has a very thin, wiry stalk and a large, waxy flower. With the stalk placed in dye water, the whole flower became beautifully veined with pink in three or four hours—a singular fact when one considers the minuteness of the tubes through which the liquid has to be drawn. It is difficult to believe that this can be accomplished by capillary attraction only. In Eucharis amazonica, which has thick stalks, the flower does not become tinted at all, but the style is dyed a deep red. The pistils of flowers always become deeply colored, which is an important fact, showing that the solid matter of the coloring solution is thus secreted (deposited) by the fruiting vessel of the flower. White tulips furnish excellent illustrations of artificial coloring, as they can be readily tinted either pink, blue, green or purple in a few hours. The vein tubes which are thus displayed in the petals agree with the strongly marked features, known as the "flamed" or "feathered" varieties, of the florist. It is generally known that all tulips raised from seed are self-colored when they first bloom. They are then called "breeder tulips," and the enthusiastic amateur florist grows on his "breeders" for six or seven years, until they "break," when they become either "flamed" or "feathered" varieties. Now a florist may ascertain in six hours whether his breeder tulip will become a feathered or a flamed sort, and whether it will be worth growing on for the breaking time, because the veining of the petal is shown by the color, and it is that which makes the feature when the tulip is fully matured. Blue tulips have always been desired, and they can thus be artificially produced for florist purposes.

Daffodil and narcissi generally can be greatly varied in color, and especially by showing their exquisite veining when thus treated. The tube and the corona take a darker and richer tone of color than the perianth, thus agreeing with the fact that all daffodils are more or less dicolor. The Christmas rose is also an interesting flower when artificially colored. Straight tubes cross the petals from base to point, with numerous cross tubes, and the main ones branch out angularly, thus dividing the snow-white petals in a network of red lines. The interspaces are filled with oval cellules, and as the tubes are permeable, the cellular spaces become suffused with a delicate shade of pink. Snowdrops and leucojums are also very interesting when thus treated. Their petals are veined with about eight tubes at the base, which pass across the petal to its point in nearly parallel lines, strongly and clearly marked. These are branched near the tip of the petal in fanlike form, producing rich pink margins to the flower. The double white camellia is another very pretty illustration, as it easily assumes a pink shade throughout. It is difficult to imagine how this is done, as the camellia has a small woody stalk, and in the case of a double flower, with forty or fifty petals, the attachment of each of them to the tube in the stalk must be very slight, and yet every petal becomes tinted in a few hours.

White lilacs take the color perfectly, becoming either pink or blue at pleasure. The abutilon has the calyx colored, but not the petals. These are already strongly vein-marked, and they seem to refuse the new comer. Primulas take the color readily, but the common wild primrose will not be changed. Forced leaves of the Swede turnip, grown in the dark for culinary purposes, are extremely susceptible to coloration. They begin to color in about three hours, and in twelve hours are beautifully fringed with red, and suffused with rich orange. Thus tinted, they are beautiful objects for table decoration.—Gardeners' Chronicle.

A SANITARIAN who visits the palace of Versailles should never inquire about the arrangements in which he has interest. In its palmy days it possessed only a single bathroom, which was never used. A colossal "vasque" of marble was placed in one of the corners of the building, but neither the Grand Roi nor one of his marshals could attain the courageous mood that was necessary in order to bathe in so much water. As the marble bath was useless, Madame De Montespan asked for it, and Louis XIV was glad to be rid of so unnecessary a superfluity. It was placed as an ornament on the lawn of her property, the "Ermitage," and there it remains.