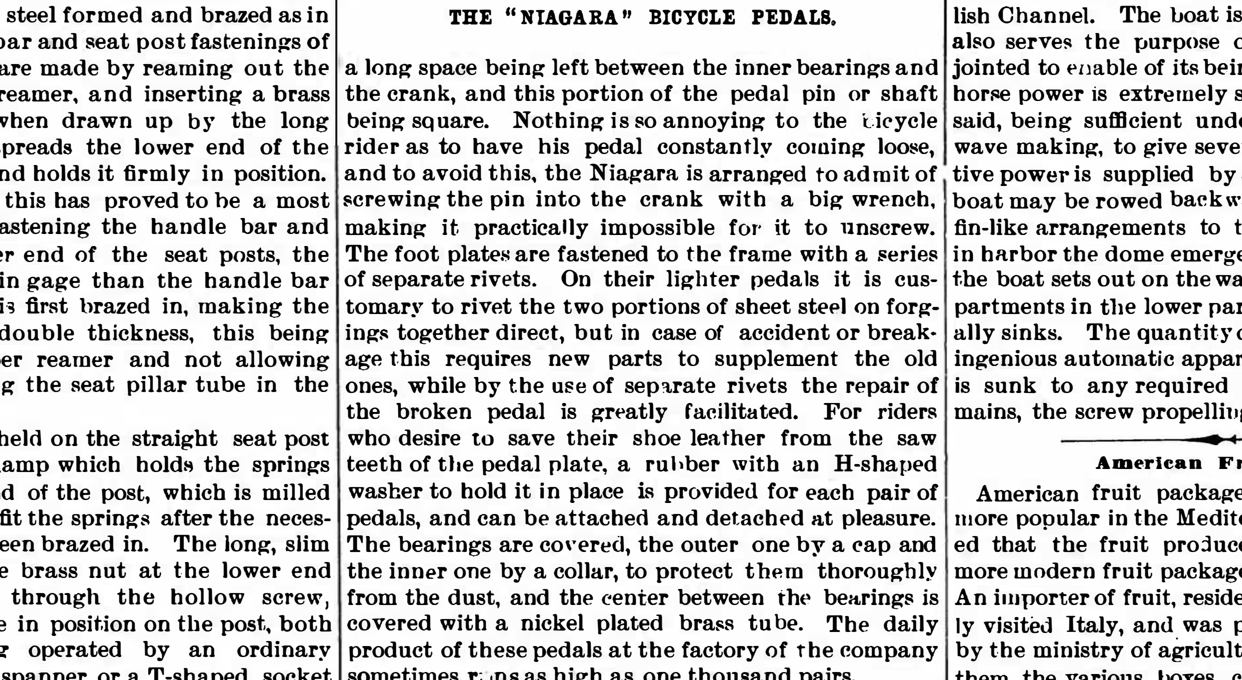
BICYCLE FRAME IMPROVEMENTS.

The accompanying illustrations show the methods used in putting together the sheet steel frame connections and the continuous crank shaft and cranks of the 1896 bicycle of the Barnes Cycle Company, Syracuse, N. Y. These frame connections are made by punching from a fine grade of drawing steel the necessary blanks, and forming them with special tools in press, so they will fit inside of one tube, going through a slot in the tube, the outer end to be formed so as to fit in another tube which is milled out the proper form to butt up against the first tube. These connections have pointed continuations which act as reinforcings, stopping the vibration, and lessening the chance of broken frame tubes from this cause. Besides these connections there are other pieces formed up to fit in each half of the main connection so as to give a brazing surface at the bottom, and one entire side also on the curved side, which, after being brazed up with the other pieces, form the strongest possible joint in use. All of these connections are riveted together and riveted to the tubes before being brazed, and are put together in such a manner that they would hold, if necessary, without being brazed. This pattern of connection is used in both heads, seat pillar and bottom bracket connection, as shown in Figs. 2 and 4. The rear fork connection also of this machine has an internal joint which is left smooth on the outside, and is made entirely of sheet steel formed and brazed as in one piece. The handle bar and seat post fastenings of this particular machine are made by reaming out the lower end with a taper reamer, and inserting a brass and taper nut, which, when drawn up by the long screw seen in the cuts, spreads the lower end of the tube, which is slotted, and holds it firmly in position. After a few seasons' use this has proved to be a most satisfactory method of fastening the handle bar and seat posts. In the lower end of the seat posts, the tube of which is lighter in gage than the handle bar post, a reinforcing tube is first brazed in, making the tube at that point of double thickness, this being reamed out with a taper reamer and not allowing any chance of spreading the seat pillar tube in the frame.

The saddle (Fig. 5) is held on the straight seat post by a hollow screw and clamp which holds the springs firmly on the upper end of the post, which is milled out the proper shape to fit the springs after the necessary reinforcings have been brazed in. The long, slim screw which tightens the brass nut at the lower end of the seat post passes through the hollow screw, which holds the saddle in position on the post, both of these screws being operated by an ordinary monkey wrench, a flat spanner or a T-shaped socket wrench.

The crank shaft forging is made of a high grade crucible steel in one piece, and the bearings are all of crucible steel, hardened, tempered and ground afterward, so they are perfectly aligned. The stop cone on the crank shaft (Fig. 3) is on right-hand thread, which is self-tightening against the sprocket when machine is running forward. The adjusting cone on the opposite end is slotted, and the washer has two small projections, as shown in the cut, engaging these slots, and, in connection with the projection on the inside of the washer, which fits a slot milled on the crank shaft, prevents the cone from working tight or loose, and keeps the bearings perfectly adjusted. One of these machines has been ridden for some time with the lock nut merely turned up with the fingers, which held it firm enough to not loosen, although the lock nut is intended to tighten up with a wrench perfectly solid.

The bearings cases are screwed in the bottom bracket, the right one having a right-hand thread, and the left one having a left-hand thread, so they both remain screwed up tight and are not affected by the revolving motion of the bearings. These machines are made in several patterns, including the Special, the White Flyer, the Superba, the Racer and the White Flyer Tandems.



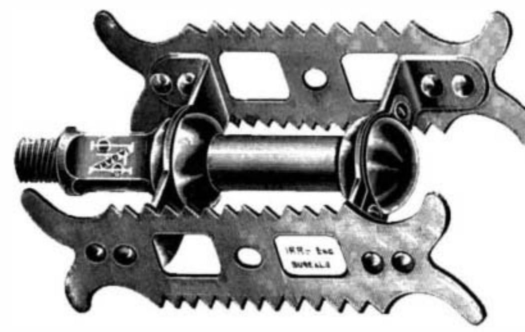
BICYCLE FRAME IMPROVEMENTS—HANDLE BAR, SEAT POST, CRANK AND SADDLE CONNECTIONS.

JAPAN is going to build up her commercial navy by giving subsidies to shipbuilders for every ton above 1,000, and to shipowners for all ships of 1,000 tons that can make ten knots an hour, the subsidy being increased for every 500 tons additional burden or every knot additional speed.

"NIAGARA" BICYCLE PEDALS.

The manufacture of bicycle pedals has become an industry separate and apart from everything else connected with the wheel. Until a few years ago the pedals used by the general trade outside of the great factories were brought from Europe, but American manufacturers are now turning out these goods in large quantities. The Niagara Cycle Fittings Company, of Buffalo, make a line of pedals which have been well known since 1891, as their "Niagara" is now represented by some 500,000 pairs in daily use.

We illustrate one of the many styles of pedals turned out by this company, the "Niagara Middleweight," especially designed for hard work on road wheels. It is of the improved central bearing pattern,


THE "NIAGARA" BICYCLE PEDALS.

a long space being left between the inner bearings and the crank, and this portion of the pedal pin or shaft being square. Nothing is so annoying to the bicycle rider as to have his pedal constantly coming loose, and to avoid this, the Niagara is arranged to admit of screwing the pin into the crank with a big wrench, making it practically impossible for it to unscrew. The foot plates are fastened to the frame with a series of separate rivets. On their lighter pedals it is customary to rivet the two portions of sheet steel on forgings together direct, but in case of accident or breakage this requires new parts to supplement the old ones, while by the use of separate rivets the repair of the broken pedal is greatly facilitated. For riders who desire to save their shoe leather from the saw teeth of the pedal plate, a rubber with an H-shaped washer to hold it in place is provided for each pair of pedals, and can be attached and detached at pleasure. The bearings are covered, the outer one by a cap and the inner one by a collar, to protect them thoroughly from the dust, and the center between the bearings is covered with a nickel plated brass tube. The daily product of these pedals at the factory of the company sometimes runs as high as one thousand pairs.

A New Star in Centaurus.

A new star in the constellation Centaurus was found by Mrs. Fleming on December 12, 1895, from an examination of the Draper Memorial photographs. Its approximate position for 1900 is in R A. 13h. 34·3m., Dec. —31° 8'. Attention was called to it from the peculiarity of the spectrum on Plate B 14,151, taken at Arequipa on July 18, 1895, with the Bache telescope, exposure 52m. The spectrum resembles that of the nebula surrounding 30 Doradus, and also that of the star A. G. C., 20,937, and is unlike that of an ordinary nebula or of the new stars in Auriga, Norma, and Carina. This object is very near the nebula N. G. C. 5,253, which follows 1·28s, and is north 23'. No trace of it can be found on fifty-five plates taken from May 21, 1889, to June 14, 1895, inclusive. On July 8, 1895, it appeared on a chart plate, B 13,965, and its magnitude was 7·2. On Plate B 10,472, taken July 10, 1895, its magnitude was also 7·2. On December 16, 1895, a faint photographic image of it, magnitude 10·9, was obtained with the 11 inch Draper telescope, although it was very low, faint, and near the sun. On this date, and on December 19, it was also seen by Mr. O. C. Wendell with the 15 inch equatorial as a star of about the eleventh magnitude. An examination with a prism showed that the spectrum was monochromatic, and closely resembled that of the adjacent nebula. Although the spectrum is unlike those of the new stars in Auriga, Norma, and Carina, yet this object is like them in other respects. All were very faint or invisible for several years preceding their first known appearance. They suddenly attained their full brightness and soon began to fade. Like the new stars in Cygnus, Auriga, and Norma, this star appears to have changed into a gaseous nebula.—Harvard College Observatory Circular.

New Submarine Boat.

The Goubet resembles a whale in shape, being spindle shaped and measuring 26 feet in length and about 5 feet 6 inches in diameter in the middle, with a capacity of 10 tons. It is cast in three sections of gun metal, which are bolted together. The middle section is surmounted by a dome, also of gun metal, about 1 foot high, by which access is obtained to the interior. The hull is about 1 inch thick in the middle and about one-third of this only toward the ends, but this gives sufficient resistance to navigate at any depth in the English Channel. The boat is propelled by a screw, which also serves the purpose of a rudder, the shaft being jointed to enable of its being moved right or left. The horse power is extremely small (one or two), this, it is said, being sufficient under water, where there is no wave making, to give seven or eight knots. The motive power is supplied by an electrical battery. The boat may be rowed backward or forward by a pair of fin-like arrangements to the fore. When the boat is in harbor the dome emerges. When this is closed, and the boat sets out on the warpath, water is let into compartments in the lower part of the boat, which gradually sinks. The quantity of water is regulated by very ingenious automatic apparatus, and when the Goubet is sunk to any required depth, at that depth it remains, the screw propelling it in a horizontal plane.

American Fruit Packages.

American fruit packages are becoming more and more popular in the Mediterranean trade. It is believed that the fruit producers of Italy will adopt the more modern fruit packages used in the United States. An importer of fruit, resident in New York, has recently visited Italy, and was present at a conference held by the ministry of agriculture of Italy, and he showed them the various boxes, crates, baskets, and the like which are used in the United States. The Italians had never before seen such packages, and their complaint was that they had neither the wood nor the machinery to manufacture them. The New York merchant told them that, as the United States produces the shooks to make boxes for their oranges and lemons, it would be an easy matter for the same country to supply the same packages, at a nominal cost. If these are generally adopted, the United States lumber interests will be benefited. In any event, as the Italian fruit grower becomes acquainted with our modern appliances, he will either purchase the manufactured article in this country or will buy proper machinery and wood here to develop that industry. At all events, it means an enlarged demand for hard wood fruit packages from the United States, either in the form of wood or the manufactured article.—N. E. Lumberman.

Aluminum Coffins.

Coffins are now made of aluminum. Like the modern square burial casket, the aluminum coffin is made of uniform width, with square ends and vertical sides and ends. It is finished with a heavy moulding around the bottom and at the upper edge, and with pilasters at the corners, and has a rounded moulded top. It is provided with extension bar handles. The aluminum casket is not covered, but finished with the metal surface burnished. It is lined in the usual manner. The weight of a six foot aluminum coffin is 100 pounds. A six foot oak casket weighs about 190 pounds, and a cloth casket of the same size with a metal lining about 175 pounds. Other metallic caskets weigh from 450 to 500 pounds. The cost of aluminum coffins is from $750 to $1,000.

[ANTHONY'S BULLETIN.]

Preparing Silver Paper.

We have for some time past felt the need of a good silver printing process suitable for intermittent work, when silver printing may only be required at intervals of weeks or months. Albumenized paper, if kept in stock, is likely to be found spotted, when wanted, from the extreme damp of the rainy season; and, on the other hand, if the weather is at all dry, the prints curl up and are difficult to keep in good order unmounted. The varieties of gelatino chloride paper (P.O.P.) are very difficult to work in this steamy climate, the paper does not keep in good order, is expensive and not always obtainable when required.

We have latterly been using plain salted paper containing a good quantity of gelatine in the salting solution, but even with this it is very difficult to obtain bright prints except from very strong negatives, and the image was always more or less sunk and flat. Increasing the gelatine and adding a little chrome alum to harden it gave much better results, but it was difficult to prepare the paper with a good, even coating without a proper machine for the purpose.

I was very glad, therefore, to see in the British Journal of Photography for August 9 a paper, read by Mr. G. H. Moss before the South London Photographic Society, on "The Preparation of Plain Salted Silver Paper," and more so, on trying his formula, to find that it answered perfectly and practically solved the problem, so far as our work is concerned, and proved itself to be an effective, simple and inexpensive silver printing process, with many special advantages of its own. It is more suited for thick paper than for thin, and the prints show a rich tone, with plenty of brilliancy and detail in the shadow.

The main peculiarity of Mr. Moss' process is, that no colloid material, such as gelatine, albumen or starch, enters into the preparation of the sensitive paper beyond that already contained in the sizing, the advantage of this being that the unstable compounds, which gelatine and albumen form with silver salts, are absent or only present in very small proportion.

The difficulty was to obtain vigor and keep the image on the surface without the colloid, and after many experiments he adopted the following formula for the salting solution :

Sodium chloride in crystals, not table salt	150 grains.
Ammonium chloride	100 "
Potassium bichromate	4 "
Water to	20 ounces.

The bichromate gives vigor to the image, and may be increased for very thin negatives and lessened for hard and dense ones.

Whatman's drawing paper, or Rives' paper, is soaked in this solution for three to five minutes, and hung up to dry. If not required at once, the salted paper can be kept, and is said to improve by keeping, no doubt by the action of the bichromate on the sizing of the paper.

The salted paper is sensitized by floating for about two minutes on the following bath :

Silver nitrate	400 grains.
Citric acid	150 "
Water	10 ounces.

After sensitizing, the surface will be a light primrose, and care must be taken to avoid air bubbles.

The paper when dry is very sensitive, and should be printed rather deeper than desired. The toning can be done as for P.O.P., with a bath of about half the strength. We have found the borax bath in ordinary use answer well. The prints must be well washed after toning and then fixed in hypo solution, 1 to 10 of water, for about ten minutes for thin papers, or up to twenty minutes for rough and heavy papers. After fixing, the prints should be well washed for two hours in constant changes of water.

The paper keeps well after sensitizing, and this is a further great advantage. The absence of colloid material or of any sulphur compounds, as in albumenized prints, tends largely to the permanence of the prints. With reasonable care in fixing and washing, and by using fairly pure papers for salting, the prints may be expected to resist outside influences for a considerable period, not so long, perhaps, as platinum or carbon prints, but certainly much longer than silver prints prepared with albumen or gelatine.

The process seems really a useful one, well worth attention, especially of residents in warm climates.

COL. J. WATERHOUSE.

Gold Beneath the Lava.

The great lava flow covers a section of country in Idaho four hundred miles in length by forty to sixty miles in width. It lies in the southeastern part of the State, on and along the course of the Snake River, and mostly on the north side of that stream.

After flooding the great plain lying to the southward, the lava turned and flowed backward to the north. There it flowed into the mouths of the valleys lying between the foot hills, filling all the streams that flowed out toward the south. The streams thus checked and dammed presently found passages beneath the porous lava, and now flow under it from thirty to fifty miles, to reappear as large springs or to burst forth in cascades and tumble down the walls of basalt that border Snake River. On the line of the back flow, up toward the northern foot hills, lies the most ragged and forbidding portion of the great lava plain.

These lava flows covered rivers, creeks, canyons, valleys, and even basin regions filled with low hills. Many of the streams, gulches, flats, and basins in the country surrounding the lava-covered section on all sides have been wonderfully rich in gold, wherefore it is reasonable to suppose that many of those covered by the lava are also rich in the same way.

The Snake or Shoshone forms the great center of the Idaho river system. It has a course of 850 miles within the State, and, with its branches, drains nearly the whole country. The Clearwater, the Salmon, the Weiser, the Fayette, the Boise, the Lemhi, the Owyhee, and other rivers, tributary to the Snake, were wonderfully rich in gold. The Yankee fork of the Salmon and many other creeks were exceedingly rich in the yellow metal. Rich placers were found in the streams that formed the Boise River in 1862; in the year following in the tributaries of the Owyhee and many other places. The valleys of the Weiser and Fayette, constituting what was known as the "Boise Basin," was one of the richest placer regions ever found.

What are called basins in Idaho are not bowl-shaped depressions, as many suppose, but are sections of low country surrounded by large mountains. Within the basins are many hills and creeks. The Florence Basin was astonishingly rich and many others were little behind it as producers. Prior to 1868 these basins and other surface diggings in little flats and on gulches produced $45,000,000. Up to 1873, by which time most of the famous placers had been worked, the yield from the surface diggings amounted to $75,000,000. Then began the rich discoveries in quartz, but placer mining is still continued and occasionally rich finds are made.

From what has been said of the rich deposits of gold in the basins, valleys, gulches, flats and streams of Idaho, it is reasonable to suppose that under the great lava flow covering an immense area—not less than 20,000 square miles—in the heart of the auriferous region, must lie many exceedingly rich deposits of gold.

The gold placers of both California and Idaho are countless ages older than the lava flows. In California the channels of the ancient rivers beneath the lava are much richer than those of the modern rivers and placers. This is because the channels of the ancient rivers had served as bedrock sluices for untold ages before the disturbing lava flows began. The present rivers of California received the greater part of their gold by their cutting across and carrying away great sections of the rich channels of the ancient rivers. —Dan De Quille, in the Engineering and Mining Jour.

Our Defenseless Condition.

Senator Cullom, speaking recently on the Monroe doctrine, said :

In this connection I desire to call the attention of the Senate to a conversation which I see quoted here as having taken place in China between Mr. Curtis, a very able correspondent, and Mr. Li Hung Chang, the Chinese Viceroy. Speaking to Mr. Curtis about this government, Li Hung Chang said :

"Your government and your people are very unwise if they are not thinking of such things."

Referring to our naked condition of preparation for war.

"Particularly since the events that have occurred in China during the last year. The Japanese are a very aggressive people. They are a warlike people. They like to fight, and they are proud and arrogant. They do not care for the United States, except as a market for their silk and tea, and if your government ever interferes with their plans, either at home or in the Sandwich Islands, you will find that their friendship is only a pretense they keep up to encourage your trade. If President Cleveland had responded to my appeal for intervention during the late war, Japan would have sent her army and her ships from our harbors over to your country and would have taken possession of your Pacific States."

Mr. Curtis says he tried to explain the situation to Li Hung Chang, but "the Viceroy sneered in a contemptuous manner," and said :

"Japan has an army of over 200.000 soldiers and the best guns in the world."

I suppose he realized that from China's experience in the late war.

"She has a larger and better fleet of war ships than the United States. She has ten times as many torpedo boats as your government, and her sailors know how to use them, while yours do not. You have only five ships on the Pacific coast, with a coast line of 3,000 miles to protect, and several populous and wealthy cities with no defenses whatever. You have no forts at San Francisco that could keep out the weakest gunboat in the navy of Japan, and a single ship of the Japanese navy could destroy every city on Puget Sound without the slightest difficulty in a week."

Correspondence.

The Duryea Motor.

To the Editor of the SCIENTIFIC AMERICAN :

In your issue of December 14 you state that of the four gasoline wagons in the Chicago contest, "The Duryea, the Benz-Mueller, and the De la Vergne wagons used modified Benz motors." This is an error, in that the Macy wagon should have been reported as using a Benz motor, instead of the Duryea.

The Duryea wagon uses a motor of new and light design, and, like the wagon, thoroughly American. The Benz motor is a single cylinder, with a heavy fly wheel, and is supplied with gas from a carbureter.

The Duryea motor is a double cylinder, with balanced pistons, light fly wheel, and no carbureter at all. It was designed especially for the purpose, after several years of experimenting with wagon motors, and is not in any sense a copy of or an improvement on any foreign motor. CHAS. E. DURYEA.

Peoria, Ill., December 19, 1895.

Weather Bureau Reports on Envelopes.

We received a newspaper clipping from a Buffalo (N. Y.) correspondent advocating the use of the Post Office for disseminating Weather Bureau intelligence. We referred the matter to the Weather Bureau, and received the following reply :

SCIENTIFIC AMERICAN, New York City :

Sirs : In reply to your communication of the 16th instant, inclosing newspaper clipping and letter from your correspondent at Buffalo, relative to stamping weather forecasts on letters, I have the honor to inform you that the proposition is not to utilize the cancellation stamp, but the "back" stamp. The idea was suggested at the Convention of State Weather Service Directors held in Indianapolis, October 16-17, 1895, by Mr. Frank P. Chaffee, Local Forecast Official, Montgomery, Ala. As the plan was regarded with favor, efforts have been made to give it a practical trial. Should the tests which are now being made in a limited way result satisfactorily, it is possible that the plan may be put into general use. Very respectfully, WILLIS L. MOORE,

Chief of Weather Bureau,

United States Department of Agriculture.

The Bridge of an Ocean Liner.

Let us spend an hour with Captain Randle, of the American liner St. Louis, on the bridge in midocean. He first takes us into the wheel house. It is a room about ten feet long and ten feet wide, with a curved front. A wheel about three feet in diameter is placed in the center of the room, and you are surprised to see that the quartermaster keeps turning it almost constantly. You have always thought that he had simply to keep his eye on the floating compass in the box directly in front of him and hold the ship steady in her course. As you look at the compass you see the ship veering now this way and now that as she rolls and plunges, or as one screw turns faster than the other, and thus pulls the ship around. It is hard to make two independent screws go at exactly the same speed, and so this man at the wheel is busy all the time turning the ship straight. He has to fight the waves and the screws and the winds at the same time, and he is a busy man.

This steering wheel controls the ship by means of a small column of oil in a little tube. By turning the wheel this way or that the oil in the tube is forced up or down, and that opens or closes certain valves in the steam steering gear four hundred feet away, and the rudder is turned as easily as if a child had done it. In most steamships the steam steering gear is controlled by hydraulic power—that is, by water—but the use of a column of oil is an improvement.

As you look about, you see fastened to the cornice, directly in front of the wheel man, a little scale in black with white lines marked off on it. There is a dial on it, and as the ship rolls you see that this is a device to mark the degree of a roll. You may notice that it takes about a second for every degree of a roll. On each side of the room is another long black gage, and the dials point to certain figures, generally between ninety and ninety-five. These dials are little electrical devices, showing exactly how many revolutions the screws are making. The captain, at a glance, knows what is going on in the engine rooms.

Over in the corner of the room is another curious electrical device.* It is a little box with a clock in it. The captain tells you it is the machine that controls the whistle in time of fog. The law requires a long blast of the whistle at such times every two minutes. By pressing in a button on this little clock apparatus, and by setting the clock in a certain manner, the whistle is blown automatically for seven seconds every minute. There can be no error of man in that work. Just as sure as every minute comes around that whistle will blow seven seconds. Under the old way, when a man pulled the whistle cord, there was no exactness in the work. When the fog is over the button is released and the whistle stops.—Harper's Round Table.