fabric, after having been subjected to the first operation, just described, should now be immersed for a period of from one to two hours, or thereabouts, in a hot and moderately strong solution of an alkaline silicate, by preference in silicate of soda. The material or fabric should then be withdrawn from the said bath of alkaline silicate, allowed to drain, washed thoroughly in soft water, and dried, when it will be found to have acquired the properties claimed for it."

AMERICAN NAVAL ARCHITECTURE.

THE STEAMER "NEW BRUNSWICK."

This steamer was constructed by John Englis, foot of Tenth street, East river, New York city. She was built under the direction of Mr. John B. Coyle, of Portland, for the International Steamship Company, and is to ply from St. Johns, New Brunswick, to Portland, Maine, stopping at Calais and other intermediate places, and connecting with the Grand Trunk Railway.

She is very substantially built, adapted to the roughest sea weather, and admirably calculated for the rough and rocky coast along which she is intended to run.

The minute details of her construction are as follows: Length on deck, from fore-part of stem to after-part of stern-post, above the spar-deck, 224 feet; breadth of beam at midship section, above the main wales (molded), 30 feet 8 inches; depth of hold, 12 feet; depth of hold to spar-deck, 12 feet 3 inches; draft of water at load-line, 6 feet 6 inches; area of immersed section, at this draft, 180 square feet; tunnage, 815 tuns.

Her hull is of white oak, chestnut, &c., and square fastened with copper, treenails, spikes, &c. The floors are molded 14 inches, and sided 6 inches. The distance of frames apart at centers is 24 inches, and they are not filled in solid; but iron straps, diagonal and doublo laid, 4 by $\frac{1}{2}$ inches securely fastens them; wrought iron straps, 6 by $\frac{3}{4}$ inches, connect all the top timbers.

The *New Brunswick* is fitted with one vertical beam condensing engine; diameter of cylinder, 48 inches; length of stroke of piston, 11 feet; diameter of water-wheels, over boards, 31 feet; length of wheel blades, 7 feet; depth of same, 1 foot 10 inches; number of blades, 27, and they are constructed of iron.

She is also supplied with one return flue boiler, whose length is 26 feet 3 inches; breadth (front), 13 feet; hight of same, exclusive of steam chimney, 11 feet 7 inches; location, on deck; number of furnaces, 2; breadth, 5 feet 9½ inches; length of grate-bars, 7 feet six inches; number of flues above, 6; number of flues below, 10; internal diameter of flues above, 1 foot 5 inches; internal diameter of those below, two of 22½ inches, four of 15 inches, and four of 17 inches; length of flues above, 18 feet 6½ inches; length of same below, 13 feet 2 inches. The diameter of smoke-pipe is 4 feet 4 inches; the boiler has no water bottom, and uses a blower to furnaces. The engine is fitted with H. Winter's patent expansive gear, and a variable cut-off.

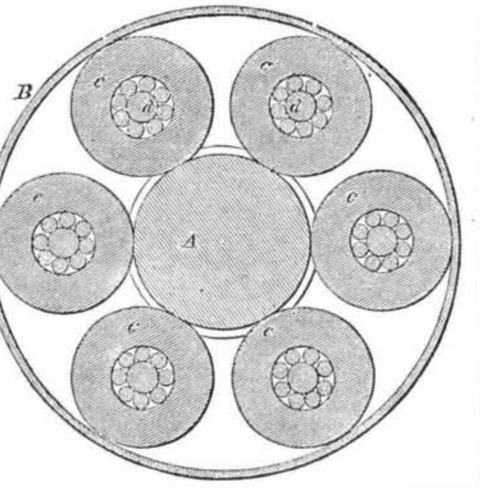
Her rig is that of a schooner. She has water-wheel guards fore and aft, and is well coppered. The bunkers are of wood, and she possesses one independent steam fire and bilge pump, one bilge injection, and the ordinary bottom valves to all openings in her bottom. The water-wheel guards are fitted with sponsons under them; the forecastle of this vessel is inclosed, and her promenade deck, saloon cabin, and state-rooms are very commodious and handsomely finished. The machinery of this steamer was constructed by the Morgan Iron Works, foot of Ninth street, East river, New York city.

The company owning this vessel is a new organization. They will furnish the only means of communication between the places above mentioned, excepting a weary line of stages at present traveling over hills and through woods a great portion of the distance. In addition to the travel which will naturally be created in the British colonies and the United States by the establishment of these facilities, it is confidently expected that considerable European travel will be secured by the line. Canadian passengers will undoubtedly find it a convenient route to Montreal by way of the White Mountains, whilst others can be left at Portland, within reach of all points of the United States, by railroad connections. The company have secured other steamers, which they soon expect to place on the same route.

PRATT'S IMPROVEMENT IN ANTI-FRICTION JOURNALS.

Friction is the greatest evil encountered in the working of mechanism. It not only consumes a large portion of the power, but it slowly and surely destroys the machine, involving all that vast amount of labor which is expended in the renewal of worn out parts. Could this power be arrested in its destructive work, a machine once made would last through all generations, forever. Though this consummation is not to be anticipated, the labors of thousands of active intellects directed to the task, are constantly diminishing the evil, and friction is being constantly reduced by new mechanical devices. The friction of journals, from the immense number of these in use, has been deemed of special importance, and many plans have been proposed and tried for lessening its amount. One of the most obvious of these is the interposition of rollers between the axle and the journal-box, so as to avoid the rubbing of surfaces altogether; a rolling friction only being encountered. A history of all of these plans would occupy too much of our space; suffice it to say, that in all of them some defect in detail has rendered them impracticable. We here illustrate a device, invented by William S. Pratt, of Williamsburgh, N. Y., which, so far as we can judge from its mechanical arrangement, and from a few weeks trial on one of our city railroads, seems to be the last link in the series of inventions necessary to make the friction *roller* journal a practicable device.

The annexed cut represents a cross section of the axle and journal-box, A being the axle, B the box, and C C C C the friction rollers interposed; the axle being se-



cured rigidly to the wheels, and the journal-box to the carriage. The rollers are made hollow and have the axles. *d d*, passing through them, which axles enter at their ends into two disks which are carried around the principal axle, A, by the rolling of the rollers, C C. In order to prevent the wear of the axles, *d d*, these are surrounded by sets of friction rollers as shown.

Friction balls are interposed between the ends of the axles and the external disks, while outside of these disks, between them and the stationary cap of the journal box, is a second set of balls, to relieve the axle of the friction upon its ends resulting from curves and inequalities of the road. The surfaces coming in contact should of course be made of cast steel or chilled cast iron, and a leather washer placed around the axle to exclude the dirt. No oil or other lubricating material is required.

We have seen one of these boxes which, it was stated, had run 1,000 miles, and it was not possible to perceive that it had experienced any wear whatever.

The patent for this invention was granted on May 8, 1860, and further information in relation to the matter, may be obtained by addressing W. J. Demorest, 473 Broadway, this city.

FRICTION ONCE MORE.

MESSRS. EDITORS:—On page 115 present volume of the SCIENTIFIC AMERICAN, I see an article from J. W. Sprague, under the caption of "Friction—The Philosophy of Small Axles," in which I, in common with a large number of practical mechanics, think the subject is not properly discussed, and therefore ask a place in your columns for a few remarks.

Friction as developed by motion is, I think, divisable into two elements; the first a raising of weight, the second a breaking of atoms. We have an illustration wherever there is friction, the protruding atoms of one surface enter the corresponding depressions of the other. This lock of the surfaces can only be destroyed by one of two methods; the first a lessening of their proximity, which must be by lifting the movable one; the other a breaking of the interlocked atoms.

The first of these elements is always present, as is proved by the peculiar motion of the moving body. The presence of the second is shown by the wearing away of the exposed surfaces.

If it were true that all resistance to motion offered by these locked surfaces is overcome by lifting the incumbent weight, which x will represent, then friction would be in a direct proportion to the time occupied in moving, and independent of the distance moved, for the aggregate length of the little falls will be dependant on the time which they occupy. If it were true that all this resistance is overcome by the breaking of particles or atoms, then the friction would be in a direct proportion to the amount of surface passed over, and independent of the time occupied. But since neither the one or the other of these suppositions is true, the friction is neither in a direct proportion to the space passed over, or the time occupied, but in some kind of a proportion to them both—considering all the time the incumbent weight equal to x. When the incumbent weight is changed, the proportion between the amount of resistance overcome by lifting and the amount overcome by breaking will be changed. Quality of metal, nature of lubricating material, velocity, and perhaps other circumstances, all tend to change this proportion. There being so many varying circumstances it would be difficult and perhaps impossible to give a formula for the calculation of the proportions in which these two elements, viz.: attraction of gravitation and cohesive attraction, are united in particular cases of friction.

EDWIN CRAIG.

Camden, Ohio, Aug. 21, 1860.

[Sound, common-sense remarks, that go right to the pith of the matter. Our correspondent will observe, however, that his classification relates only to the modes in which friction is overcome—in one case by breaking off the protruding particles, and in the other by raising the moving body over them. In whatever mode overcome, Morin's experiments, as well as those of other investigators, have settled these three laws of friction:—

1st. Friction is proportional to the pressure.

2d. That it is independent of the extent of the surfaces of contact.

3d. That it is independent of the velocity of motion.

The friction is independent of the velocity, but is proportional to the distance through which one rubbing surface passes over the other. Now, as the distance round a large axle is greater than round a small one, the amount of friction *at each* revolution is in direct proportion to the circumference of the axle.—EDS.

DRAUGHTING LESSONS, GRATIS.—Two large and wealthy associations in this city, will, this winter, give lessons, without charge, to applicants of all ages above fourteen in both architectural and mechanical drawing. The Cooper Institute lesson will be given in the upper story of the splendid building known by that name, and the Mechanics' Society School in the Mechanics' Library premises, 472 Broadway. This is the second winter in both institutions, and the instruction, last season, by the best teachers in the city, was availed of by several hundred persons, including journeymen mechanics and foremen. The example is worthy of imitation by wealthy societies in other cities.

THE FRENCH MEASURES INTRODUCING THEMSELVES.—Nearly all of our microscopists, in their communications to Silliman's *Journal* and other kindred works, use the millimeter as their measure, and in Cooke's "Chemical Physics," and other standard works, the meter and killogramme, as well as the degrees of the centigrade thermometer, are employed without translation. We are beginning to think seriously of adopting this course in the SCIENTIFIC AMERICAN. The people are running ahead of our legislators in making this great reform in our weights and measures.

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