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Contents:

(Illustrated articles are marked with an asterisk.)

FACTS ABOUT THE CROTON WATER SUPPLY.

One of our cotemporaries says, very irreverently, of the Croton, that it is "played out," and recommends resort to Artesian wells.

The aqueduct which conveys the Croton to the city is constructed to bring down 60,000,000 gallons per diem, but when the pressure is ample at the dam, which it is for ten months in the year, it delivers as much as nine or ten millions of gallons in excess of that quantity, and at the same time a vast amount of water runs over the lip of the dam.

Mr. Jarvis, some years ago, gaged the river at its supposed lowest point, and estimated the minimum supply at about 32,000,000 gallons, or about one half of the quantity required, and he recommended storage reservoirs to satisfy the wants of a future large population.

It will be recollected that in providing for its transmission over the High Bridge, the Commissioners then in charge laid but two iron pipes capable of carrying only a part of what the aqueduct brought, it being then supposed that the city would not require a larger quantity; but during Mr. Craven's administration of the Department additional pipes were laid equal to the whole power of the aqueduct. The growth of population and the use of the water for manufacturing purposes made this additional provision necessary.

Under the auspices of Mr. Craven, the Croton valley, which consists of 328·82 square miles, was carefully examined to ascertain its capacity to accommodate a still larger population, with its additional manufacturing wants, and it was found that in Putnam and Westchester counties there were fifteen places at which storage reservoirs might be conveniently constructed.

On the Muscoot, which receives the outlet from Lake Mohopac and falls into the Croton near Katonah; there were four of such sites. A, containing 485 acres, capable of storing 5,211,015,625 gallons. B, of 192 acres, capable of storing 1,701,835,207 gallons. C, 730 acres, capable of storing 6,589,101,562 gallons; and F, 600·75 acres, capable of storing 6,120,335,937 gallons. On the west branch of the Croton, which, after receiving the middle branch, unites with the east below Croton Falls village, there are three: D, covering 1,008 acres, and capable of storing 9,033,632,812 gallons; E, of 303 acres, to hold 3,369,206,857; and K, immediately above Croton Falls village, consisting of 512·74 acres, to contain 5,671,449,219 gallons. On the middle branch, two: L, 262·75 acres, to hold 2,328,218,733 gallons, and G, 452·19 acres, to contain 4,861,035,156 gallons. On the east branch three: H, containing 384·67 acres, to contain 2,490,062,500 gallons; I, 449 acres, to contain 4,205,820,651 gallons; and J, 191·38 acres, to contain 2,314,074,703 gallons. On the Titicus, which unites with the Croton at Purdy's Station on the Harlem Railroad, one, M, which floods 492·75 acres, to store 4,392,131,445 gallons. On Cross river, an affluent of the Croton, at Katonah, N, covering 197 acres, for storing 1,676,049,171 gallons; and O, on Beaver's Dam Brook, which crosses the Harlem below Mount Kisco, consisting of 239·47 acres, and to store 2,182,337,109 gallons. Their joint capacity exceeds sixty-one billions of gallons, and they cover over six thousand five hundred acres of land.

In 1867, Mr. Craven, finding that it had become necessary to guard against the want of water in a season of drought, procured authority to construct one of the fifteen reservoirs, which he had located; and after commencing the one marked G, and abandoning it, because of the danger of flooding the celebrated Tilley Foster iron mine, finally decided on building the one at Boyd's corners designated as E.

By reason of the failure of the original contractors, the dam at E, now raised (except at the north end) over 40 feet of the 64 which is required, is being worked by their securities under such disadvantages that it will not be finished much before 1871, but it is possible to use it in the summer of 1870 for storage up to the hight which may then be reached. It will be seen, however, as this reservoir is capable of holding 3,369,206,857 gallons, it will, when finished, supply 60,000,000 gallons per day for about fifty-five days, supposing that the evaporation and loss on its way to the main dam shall be equaled by the ordinary flow of the stream.

Inasmuch, however, as the Croton is supposed to furnish more than half that quantity in the season of the greatest drought, it is clear that the city will, even during dry seasons, be supplied with as much water as the aqueduct is competent to deliver.

The great drought which has prevailed for most of the summer, along nearly the whole Atlantic coast, was broken so far as this region is concerned, by the rain which fell on the last Saturday and Sunday of September; but as the ground was dry beyond any recent experience, the dam at Croton was raised only a few feet. The rain of Saturday evening and Sunday and Monday, the 2d, 3d, and 4th of October, had, however, a visible effect in swelling the Croton to the proportions of a freshet, yet although more rain is wanted, all fears of a scarcity of water may now be dismissed. Under any circumstances the minimum flow will furnish thirty gallons per day to each inhabitant, which is more than will be required for household purposes.

On Monday, the 4th inst., the water in the main dam had risen by 10 o'clock, A. M., so that it commenced to run over, and at 2 P. M. the volume pouring over was a foot in depth. Inasmuch, however, as the city is now using nearly the whole supply, the reservoir in the city will scarcely be filled before some time in November.

Nothing has contributed more to the convenience of the city than its supply of water at an elevation which, among other benefits, makes it the power or carrier for removing the refuse from houses. The growth of New York in manufacturing industry, has been so much promoted by using the surplus, that the time is not distant when other storage reservoirs and a larger or additional aqueduct will be required. From the particulars we have given, it will be seen that whenever the city chooses to avail itself of this bounteous provision, not only our increased domestic wants, whatever their extent, will be easily satisfied, but there will be a surplus to be devoted to manufacturing purposes.

The lowest elevation of any of these reservoirs is the one laid out on the Beaver Dam brook, which is 250 feet above tide water. The others vary between this and 600 feet. The formation of the valleys of Putnam and Westchester is highly favorable to these structures, and it is probable that no city of great extent is more liberally provided. Each location is inclosed with high hills, which, after allowing a sufficiently wide expanse, suddenly contract so that a short dam will complete the reservoir. The Croton was wisely chosen for this purpose, and so far from being "played out," it will eventually supply the largest population known to modern times.

The Commissioners who manage the Croton are not armed with any other authority over the contract now being executed except to declare it void, and then to relet the work. If proper vigor were used by those who act for the contractors, the work could be finished by next summer, but it would be a losing job. The contract called for its completion before this, and it is probable that sympathy for the securities, and the want of agreement which is shown between the city government and Board—which latter has the confidence of the community—prevent effective steps to secure the prompt completion of the work. The expenditure originally authorized is limited to a sum which does not permit the additional expense which haste would require. It is scarcely probable that a drought next summer will follow the one of this year, but if it occur the loss to the city will be visited upon those who are responsible for the delay.

CIRCULAR MOTION AND RECTILINEAR MOTION.

We find in an exchange an article endeavoring to draw amusement from the writings of Vitruvius, upon the principles of mechanics. One of the extracts made from this ancient author, who lived a short time previous to the birth of Christ, is the following: "I have briefly explained," he says, "the principles of machines of draft, in which, as the powers and nature of the motion are different, so they generate two effects, one direct, the other circular, but it must be confessed that neither rectilinear nor circular motion can without the other be of much assistance in raising weights."

Now, so far from seeing anything very amusing in this statement, the more we consider it the more we feel surprise at the comprehensiveness of the proposition. We see in it a generalization, the truth of which is exemplified in every machine. So large a proportion of the motions of the parts of machinery may be included in the classes rectilinear and circular, that the very few exceptions wherein the curvilinear motions are other than these, are scarcely worth consideration; and wherever they are employed it is always at a sacrifice of economy in power, the former motions being the least expensive of movements. Where, as in the case of the crank and pitman, a rectilinear motion and circular motion are coupled, there may be a loss in the application of the power to useful work, always consequent upon the increase of the number of moving parts in a machine; but when a crank drives a pitman, or winds up a rope on an axle, the losses suffered in these arrangements of working parts, are consequent upon practical difficulties. In theory there should be no loss. We know that these losses are referable to friction, inertia of parts, rigidity, etc., and therefore in theoretical formula for computing the powers of such arrangements, we do not take into account these losses. In the practical application of theory, allowances are made for such losses, but fewer such allowances are requisite when circular motion is employed than when any other is used to perform work. Motions in right lines, in circles, or arcs of circles, have proved in an experience of twenty centuries, to be, as Vitruvius said they were, the motions to be principally relied upon in mechanics.

Of these, circular motion is by far the most extensive in its application, and it is often an element where it is scarcely suspected.

The power of the inclined plane is generally referred to the plane itself, and mathematical demonstrations are based upon its proportions and inclination, but in the case of a round body rolled up the surface of an incline, the power may be calculated directly from the dimensions of the circle and the angle of ascent. In this case the element of rotary motion is generally overlooked, although it most certainly is an important element in lessening friction, which, when bodies are simply slid up an incline is an enormous source of waste; and, as we have said, it may be made the basis of computation for mechanical power.

It also is an element in the use of all hand percussive tools, as the hammer, ax, etc. The lever, too, also involves circular motion. It is evident that Vitruvius saw the full importance of these motions when he penned the paragraph alluded to; and as to confining the proposition to the raising of weights, it is not improbable that he comprehended the fact that a constant force is required to raise a given weight to a given hight in a given time, and appreciated the utility of making the force required to thus raise a given weight the standard for the measurement of power applied to any kind of work.

In modern times we use the foot-pound as a unit of work and thus have applied a hint which might easily have been drawn by a reflective mind from the passage quoted.

We may justly pride ourselves on modern progress in science; but the old philosophers undoubtedly saw and comprehended more than is sometimes credited to them.

THE EXHIBITION OF THE AMERICAN INSTITUTE.

An interesting branch of American manufacture, is that of SPOOL COTTON THREAD. This is exhibited in all the processes of the manufacture from the raw cotton to the finished thread by Greene & Daniels, of Providence, R. I. The first process is the carding, which is done in the ordinary way of carding cotton. It is then drawn in the usual manner, and then taken to a lap machine, consisting, essentially, of the old-time railway head, with drawing rolls attached. This machine is very compact, and, we are told, is the best machine for the purpose now in use. It is strictly an American machine. The cotton next goes through a process called combing, on a machine called a combing machine, the only machine of foreign construction employed in the work. This contains eight thousand needles, the action of which upon the cotton gives it a peculiar silky, light, and gauzy appearance, and the operation of combing may be considered as the finishing operation in preparing the cotton for thread; all the subsequent operations tending directly to the formation of the thread itself. The cotton, after combing, is drawn three times, and then spun into roving not larger than wrapping twine. It is now spun into yarn of wonderful fineness and uniform thickness, on a ring spinning frame. It next passes to a doubler, and is laid up in two or three-ply, as desired. From this machine it passes to a twister, which speedily reduces it to a fine and beautiful cord. These cords are then twisted on another frame to make a three or six-cord thread, as required. It is next reeled into skeins, then bleached, when it is ready for spooling. The spooling machine is a small but pretty machine, on which the winding is done with great celerity. The thread is now ready for market, except packing, etc. The finished thread shown is of excellent quality, and its applicability to sewing-machine work is demonstrated by its use on a sewing machine in the same inclosure with the machinery for manufacturing the thread. This display excites much interest in the visitors to the fair, and is a fine feature of the exhibition.

Adjacent to this inclosure stands a

CIRCULAR LOOM

for weaving twilled shade line, used for hanging pictures, window shades, etc. This loom weaves a texture which covers a strong central linen cord. The outer texture is of wool, silk, or cotton, or mixtures of these materials. The peculiarity of this loom is, that the shuttle stands still and the warp travels. It cannot be well described without diagrams, but it is a very ingenious, compact, and beautiful machine. It is exhibited by Palmer & Kendall, of New York.

S. R. Parkhurst, of Newark, N. J., exhibits a

BURRING MACHINE,

with patent steel ring feed rollers adapted to clear all grades and qualities of wool, even the most difficult Mestizo. He also exhibits a newly constructed double-cylinder

WOOL AND COTTON PICKER,

which, it is claimed, will pick, dust, bur, oil, and mix the wool ready for the cards at a single operation. He also exhibits a Double-cylinder Cotton Gin, improved by the addition of double cylinders and connected with a steel brush, and an endless slotted apron to convey the cotton in the seed to the ginning cylinders, thereupon securing the seeds and conveying them away from the ginning parts of the machine. It is claimed that this gin will separate the seed from 700 lbs. of cotton per hour, without injury to the staple. A

METALLIC WASTE CARD,

for working or reducing yarn, thread waste, and soft flannels to wool is shown by Chas. G. Sargent, of Graniteville, Mass.

These machines are, in principle, carding machines, clothe