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(Illustrated articles are marked with an asterisk.)

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"Science Record" for 1876.

To prepare the matter for a volume of 600 pages is a work of considerable magnitude at any time; and to gather the requisite material, so that it includes everything new in the fields of mechanical, chemical, and physical science discussed during an entire year, and then to arrange and classify the subjects, is by no means a small task. The SCIENCE RECORD, which we expected to issue on January 15, and for which several hundred persons are waiting, will not, for the reasons above hinted at, be ready till about February 10. The printers and binders have promised us a large edition early in February, when the orders on our books will be filled in the rotation in which they were received.

The volumes for the previous four years, from 1871 to 1875, are on hand, ready for present delivery. See advertisement on another page.

MACHINE MERCY.

While crossing one of the ferries between this city and Brooklyn the other day, we formed one of a knot of persons who curiously watched an individual who had clambered up on the walking beam of another steamboat that was passing us, and who, clinging to the beam, was swayed up and down as he coolly scrubbed at some portion of the bright work. The general sentiment of the people about us seemed to be one akin to admiration at the man's daring; but in that view we profoundly differed from our neighbors, and thought to ourselves that the workmen was, to say the least, a fool. Why could he not wait five minutes until his boat came to rest in the slip, and then clean and polish to his heart's content while the beam was stationary? In fact there was no reason that we could perceive, and hence we were driven to the above uncomplimentary opinion, as we always are whenever we witness a presumably rational human being peril life or limb uselessly.

"Familiarity breeds contempt" is a trite old proverb, and one which appears to be especially true in regard to people accustomed to dealing with machinery. It is not so in many other cases; soldiers who handle fire arms and explosives all their lives are proverbially the most careful persons with their deadly weapons. They seldom blow off their fingers or the tops of their own skulls, through pure negligence, as many an unfortunate sportsman has done: for the reason, perhaps, that long experience with gunpowder impresses them with the merciless nature of that material when it is ignited. But machine attendants somehow manage to get a different idea, and almost, it appears, arrive at a notion that a machine is a sort of sentient being which knows them, and won't smash or bite off their limbs as it will those of other people. What scores of workmen we have seen with stumps of fingers! Machine and circular saws especially are peculiarly partial to such diet. We read of a case recently of a workman who was descanting on the advantages of his saw, and whomerely wanted to point out how truly it ran. He pushed his finger forward a little too far, and whiz! off it went. He felt a peculiar sensation, not a hurt (for it is well known that there is no pain attending the lopping off of a member by a very rapidly revolving blade), and, half instinctively, he poked out another finger, and that likewise departed. Then he discovered that something was wrong, and subsequently that he was *minus* two fingers. Fingers cut off are trivial accidents to some that occur through carelessness. Not very long ago, a woman in a New England mill went to work with her hair down. She moved carelessly around among the buzzing wheels and shafts, and the first thing she knew her tresses were caught, and no Pawnee on the plains could have scalped her more neatly. Her misfortune benefited Science, however, for it gave the doctors a splendid opportunity to try the efficacy of transplanting skin. Medical skill healed the wound, we believe, but her flowing locks were gone. A workman was strangled in a somewhat similar way, his loose neckcloth catching and twisting itself about a shaft, which could not be stopped in time; another, we remember, met a more horrible fate by becoming entangled with a shaft which swung him around and around, dashing him against the beams and floor at every turn, until, before the motion could be arrested, he was literally torn to pieces. We have seen men on steam vessels crawl down among the machinery, with a light in one hand and a tool in the other, and try to work, dodging some moving part at its every revolution, the rolling of the ship making their position still more perilous. A case happened, a very short time ago, in which a machinist entered the narrow enclosure in which the paddle shaft crank of a steamer worked. He knew perfectly well that steam was up, and that the vessel would shortly get under way; but for some unaccountable reason, he chose at the last minute to get under the crank, perhaps to put the last touch on some repairing job. It was his last touch, for the engineer, whom he did not notify of his intention, happened to work the starting bar to give the engine a turn or two. The crank came over and smashed the unfortunate being out of all human semblance.

We might go on and multiply instances of this kind indefinitely: doubtless there are few of our readers who cannot do likewise. But despite the knowledge of the prevalence of these casualties, people continue to be careless. The engineer doesn't realize that the engine which he has rubbed till he can see his face in any part of it, or whose motion he has controlled for the last ten years, will crush him if he once gets in its clutch. Hasn't he a pet name for it, and doesn't he pat the cylinder affectionately, and view it all love with a kind of fatherly interest? Certainly he reasons somehow that the insensate iron and steel will spare its master. Then there is the machinist. Did he not put up those countershafts, and fit that belting? What if he does get up on a ladder, and try to slip a belt already on the driven pulley over a big driver with the latter in motion? He laughs when the risk of his getting caught between belt and pulley is pointed out, guesses he knows this gear, and "he's done it a thousand times," and the thousand and first time may result in a horrible death. Locomotive engineers are also frightfully reckless. With an engine going forty miles an hour, it is much more prudent to slow down or even stop in order to oil a squeaky bearing than to climb out on the side and hang over so as to reach the place with the oil can. Better lose a minute or two of time than risk life. The men who run our locomotives have plenty of chances to display heroism and daring at the right time; and it is for the very reason that they are so rarely found wanting in those qualities that we hate to see them uselessly peril their lives.

In a word, workmen should learn that there is no such thing as familiarity with machinery. Study your machines, we say, know every bolt, every nut, every piece of metal in them, know how to repair, to build, to invent improvements, know how to exact their utmost capabilities; but for your own safety, and for the sake of those dependent on your labor, do not relax one instant's care, nor persuade yourself that you can rely upon your dexterity or upon any half supposed merciful attribute in moving masses of metal.

PROGRESS OF THE GREAT JETTY WORKS AT THE MOUTH OF THE MISSISSIPPI.

On January 15, 1876, the jetty works constructed under the United States grant, made to Mr. James B. Eads on March 3 last, had been so far extended into the sea that the almost complete control of the river discharge had been accomplished through a distance of 1½ miles from the land's end, and within 2,500 feet of the crest of the bar.

Through the extent of this mile and a half, the river current had swept out 1,263,222 cubic yards of the bar on December 25, 1875, and the removal by the river is progressing at the rate of about 30,000 cubic yards per day; 2,000,000 yards more will have to be scoured away before 20 feet depth of water is secured across the bar.

The works on each line of jetty are partially constructed out beyond the crest of the bar to the full distance they are intended to be built, and the work on this portion of the jetties is being pushed with the utmost vigor, over 25,000 cubic yards of willow mattress work having been constructed and securely placed in position, and ballasted with stone, within the last 30 days—the total amount laid thus far being about 125,000 cubic yards. The construction of 20,000 additional yards is all that is now required to build the jetties up above mean low tide, and out to the crest of the bar, 10,500 feet from the land's end at the mouth of the Mississippi.

It is confidently believed that a sufficient amount of material is now in place, if no more work were done, to insure a depth of 20 feet of water across the bar, within three or four months. One remarkable feature, thus far developed, is the deepening of the water between the incomplete jetties on the outer slope of the bar, which is doubtless caused by the tidal action that is now partially controlled by the jetty works beyond the crest. This deepening clearly shows how groundless are the fears that the effect of the jetties would simply be to pile out the excavated material on the outer slope of the bar. The fact that the crest of the bar has not deepened, notwithstanding the immense amount of material excavated from above it, between the lines of the jetties, is in exact accordance with the theory upon which Mr. Eads has based his application of the jetty system to the improvement of the mouth of the Mississippi.

Those predicting the failure of the system have constantly asserted that the chief part of the sedimentary matter of the river was pushed out to sea, on the bottom, by the action of the current; while Mr. Eads has persistently declared that this was a grave error, and that these matters were almost wholly borne to the sea suspended in the water of the river, and that, the more rapid the current, the greater would be the amount of material held by it in suspension; and hence an increase of current above the normal in any part of the river, flowing over a strictly alluvial bed, would cause the water to take up an additional load of this matter, which it would retain in suspension so long as the velocity of current was maintained; and when thus charged, it would be simply impossible for it to take up any load or produce any additional scouring. The current receives its first acceleration at the upper end of the jetty works, and here it first becomes charged with the surplus load. It receives no further acceleration in its passage over the crest of the bar (owing to the incompleteness of the work there), over which it escapes laterally. The enlargement produced by the excavation gradually reduces the current, where it occurs, by the enlargement of the channel, and the acceleration and extra loading of the water then takes place lower down and nearer the crest of the bar. The effect of this is to shorten up the base of the bar, and to deepen the channel above it, before the crest of the bar is reduced.

The original crest of the bar was a plateau 3,500 feet wide, over which an average depth of only 7½ feet of water could be found, between the parallel lines of the jetties, which are placed 1,000 feet asunder. This plateau is now reduced to a width of less than 600 feet, and will gradually be reduced to nothing, before the deepening of the bar crest will begin to take place. As the current is quite as rapid now across the crest of the bar as it is between the completed parts of the jetties, it is evident that, if the sedimentary matters of the river were pushed along the bottom, by the current, the deposits which are most elevated, like the summit of the bar, would be the first to be pushed off, and piled up beyond the bar crest, in the sea water beneath the river discharge, or in what has been termed the "dead angle." The base of the bar on the 20 feet line of depth was nearly 10,000 feet long when the jetties were commenced. This base has been shortened still more than the plateau forming the bar summit, and is now only about 6,200 feet long, measured in the direction of the jetties.

REMOVAL OF SNOW FROM CITY RAILWAY TRACKS.

For a considerable time past litigations have been prosecuted on the part of residents along the line of some of our city street railways, with the object of preventing the companies from piling up the snow at the sides of the tracks.

On behalf of the residents it was shown that the companies were in the habit of using plows and rotary sweeps piling the snow up in continuous banks between and at the sides of the tracks and in front of the adjoining dwellings, rendering all approach to the latter by ordinary vehicles practically impossible. It was claimed that the