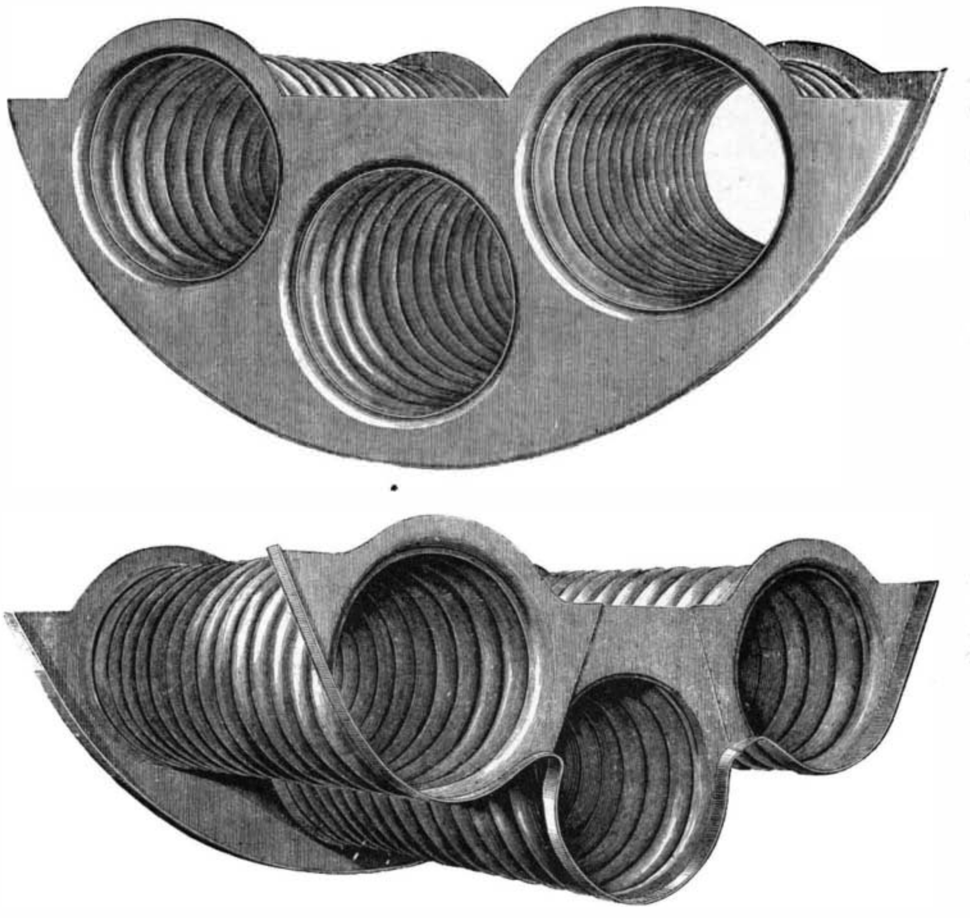
CORRUGATED BOILER FLUES.

Various modifications of construction have from time to time been applied to boiler flues in order to protect them against collapsing strain. Flanged flues have been employed and also flues with U-joints at every length of plate, or with chambers of alternately large and small diameters. Mr. Samson Fox has lately proposed still another construction, which consists in corrugating the flues in the direction of circumferential rings.

Fig. 1 represents some of Mr. Fox's corrugated flues, and Fig. 2 the special machine used for making the same, our engravings being taken from *Iron*. The flue is of 4 feet diameter, about 8 feet long, and of half-inch plate, and is claimed to be nearly ten times as strong as a plain flue of similar section. The machine shown in Fig. 2 is constructed as follows: Two chilled rolls, alternately grooved and recessed to give the required corrugations, are arranged one over the other. The plates are first rolled plain, welded up, and then placed in the corrugating machine. To do this, one end bearing of the top roller divides so that it may be lifted and the flue inserted between the rollers. The bearing is then screwed home again by the right and left hand screw, and the rollers are revolved by the usual universal breaking clutch by any steam motor. The lower roller is capable of rising vertically and is pressed upward by a lever arrangement driven by a special steam piston attached to the piston rod seen in front of the illustration. The pressure is thus gradually put on the grooving rollers and the plate is squeezed or swaged into the corrugated shape. After the operation the length of the flue is not found to be materially altered, thereby showing that the material is swaged out slightly thinner to cover the larger surface required for the corrugations. The plate, when corrugated, will be thus slightly thinner than when plain, and the plain ends will be the thickest parts. This is an advantage, as thin plate is undoubtedly the best for heating surface, and the stoutest material is required at the ends for riveting through. It is only the very best class of homogeneous plate that would stand this drawing; and, in fact, we understand that many of the best brands will not stand it, but show lamination. The corrugating is, therefore, in itself as severe a test as can be applied, not only to the welded joint of the flue, but also to the plate itself, and is therefore a valuable guarantee, when successfully accomplished, of the thorough good quality of plate and workmanship.

Iron quotes the following tests of the strength of this flue: Two flues, each 7 feet long and of ⅜-inch plate, with 3 feet 2 inches mean diameter, the one plain and the other corrugated, have been subjected to water test. The plain flue showed signs of distress at 150 lbs. per square inch, and totally collapsed at 225 lbs. In the case of the corrugated flue, the pressure was brought up at once to 1,000 lbs. per square inch, and it was only at 1,020 lbs. that the flue began to collapse. After partial collapse of 6 inches, the pressure was taken off, and once more gradually accumulated. It was then found that 450 lbs. was reached before the collapse continued. At this pressure the flue ultimately collapsed—without crack or flaw—simply by the straightening out of the corrugations. The comparisons, then, are, in this case, as about 7 to 1 for initial signs of distress; and after collapse has actually taken place, the strength of the corrugated flue is still as about 2 to 1 compared with the plain flue. The plain flue also cracked from the tension produced upon the plate by bulging in, while the corrugated flue allowed for the bulging action by flattening out its corrugations, and thus saving the plate from fracture.



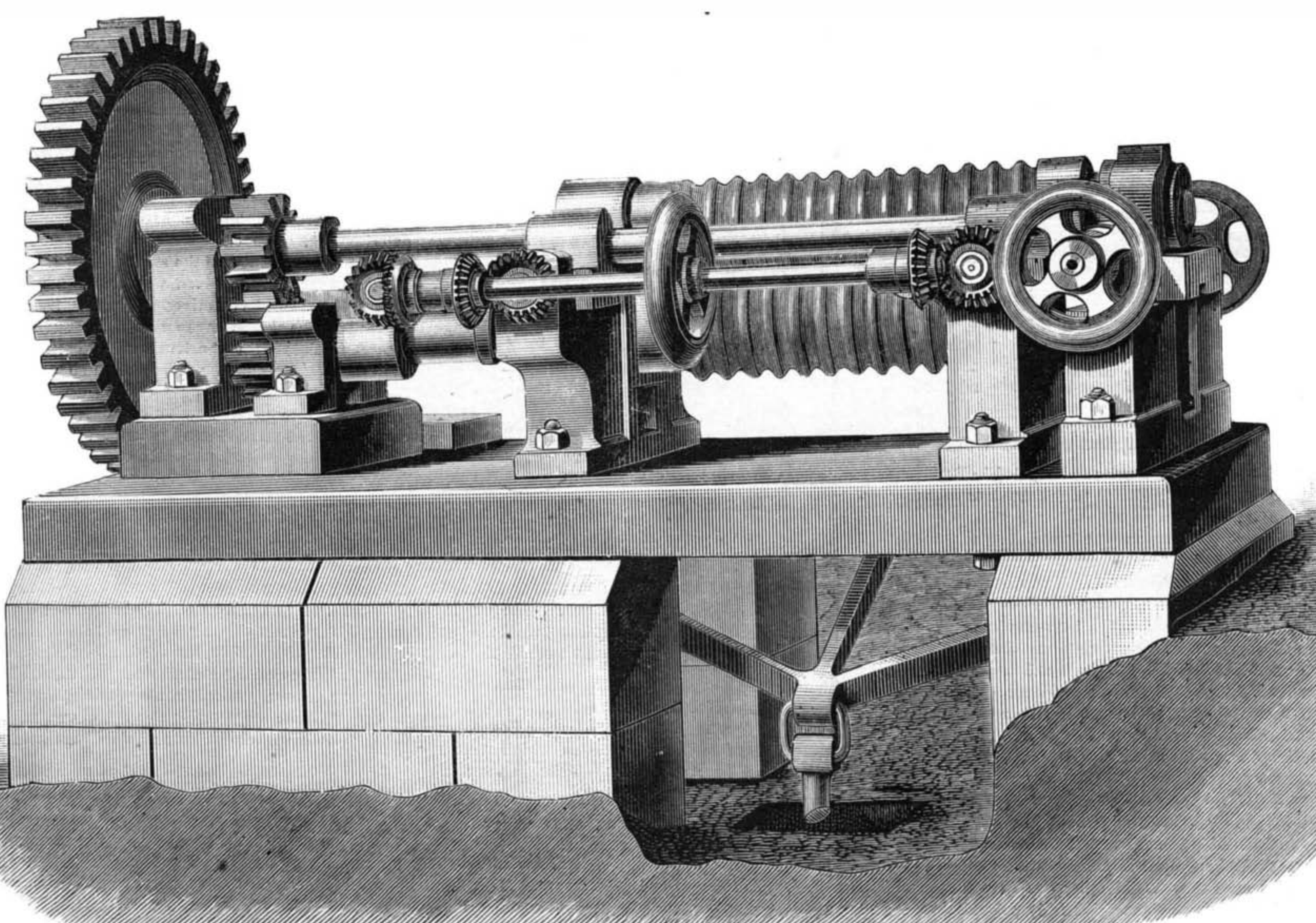
CORRUGATED BOILER FLUES.—Fig. 1.

Friction and Singeing Lights in Factories.

A fire broke out in the mule spinning room (fifth story) of a large Philadelphia cotton and worsted mill, 5:15 P.M., December 5, and but for the prompt action of the employés the fire would probably have caused the destruction of the establishment. Cause named as "friction," but the source of the friction is not stated; and how such cause could be discovered in the sudden commotion always occasioned by an alarm of fire in a factory is not very clear.

The spinning room in any cotton, woolen, or worsted mill is, or should be, a comparatively safe portion of the working parts of such establishment. In a cotton mill there is naturally more danger, especially from the illuminating lights—as we have before noticed—through fine flyings in the air, which accumulate on the machinery and floors, together with roving scattered on the latter; but in a woolen or worsted spinning room the danger of fire should be slight, on account of less flyings and the inferior inflammability of the material.

The spindles of mules, and flyer and throstle spindles of spinning frames, though revolving very rapidly, are so often, carefully, and regularly oiled, to prevent undue wearing, that their heating to a dangerous degree is extremely rare. It should never occur at all, and probably would not unless the lubricant were inferior or adulterated with a dangerous admixture. Petroleum, as a lubricant, which is now, in combination with sperm or lard oil, largely used on machinery in every part of factories, instead of being calculated to cause fires, rather tends to repress them, or, as the employés say, has a cooling tendency. Notwithstanding this, it does, in time, cause considerably more wear to spindles and shafts than sperm or lard oil, though the latter often has sufficient sulphuric acid left in it from its refinement to be very hurt-



MACHINE FOR CORRUGATING BOILER FLUES.—Fig. 2.

ful to general machinery and the cylinders of steam engines.

The careful general attention we have noticed, also, as a rule, extends to the oiling of all parts of the operating "heads" of spinning mules, both for hand and self-operating, so that only the heating of main or counter shafting for want of oil, and the slipping of loose belts on pulleys, remain as agents of fire in the spinning room. Neither of these is very likely to cause such accident, because most factories now use self-oiling hangers, which, though they need not be replenished with oil for months, are, or ought to be, felt daily, to discover if, by warmth, they show any defect in their working. Belts when slipping almost always "squeal" with the friction, so that their want of being "taken up" is soon attended to. Even were it unnoticed, the slipping could hardly generate sufficient heat to be dangerous, though electricity would be excited, which in a cotton mill might, if long continued, cause ignition of light flyings.

These remarks apply to the spinning department, but other parts of cotton, woolen, and worsted mills are much more likely to have fires arising from friction, as, for instance, the picker, carding, and preparing rooms, where every prudent manufacturer takes extra precautions.

There is one part of the worsted process where an imminent danger from fire seems to exist, but we have never heard of any serious loss occurring therefrom. In the worsted combing machine the long woolen fibres, as they are drawn out by the iron fingers, pass very closely but rapidly over a series of gaslights burning with a low flame. This high degree of heat, directly applied, is required in this process for reasons which it is not necessary to explain here; and, of course, if the machine were suddenly to stop working, the wool remaining over the flame would ignite. It is a special duty of the attendant to watch that this does not occur, and we believe that each drawing frame is now furnished with a self-acting safety apparatus, extinguishing the lights if the machine stops working. At any rate, great care is needed, because the open light in that position is known to be a source of danger, and such care, as already intimated, has largely prevented fires from occurring in these machines.

In many cotton and linen spinning mills (more especially in thread mills), singeing machines are used in which a number of single or twisted threads are all at the same time drawn rapidly through a gas flame, to rid the surface from projecting filaments. Should this machine cease running, and the flame be continued, a fire would result; but this is generally well guarded against, both by the attention of employés and a safety apparatus for extinguishing such flame.

This "fire protector" has now, we believe, an attachment to each thread, consisting mainly of an eye through which the thread runs, the eye being connected with delicate levers, which turn off the gas, so that if the thread break and the eye drop, the flame is instantly extinguished. The sudden stopping of a machine of this kind is never allowed when at work, without the lights being put out, except when it is accidentally caused by the breaking or flying off of a driving belt. In such case, the first act of the attendant is to extinguish all the flames before the motion of the wheels is perceptibly checked.

More care is required in these singeing frames than in the worsted combing frames, because of the higher inflammability of the material, and also because should a thread break and the protector not instantly work, the thread at the back of the eye may pile forward and ignite itself and all other threads on each side of it. All recent singeing machines have, we believe, the separate attachments mentioned to each thread, though in former years it was not so. The improvement renders the machines much more costly, but greatly diminishes their fire risk.

In some factories certain kinds of fine cotton and linen fabrics are singed after the weaving, by being drawn rapidly over a low, continuous gas flame. In such machines, stop-motions for the gas, and great care and precaution in management, are necessary for the safety of the cloth and the mill.—*American Exchange and Review.*

Caventou.

Caventou, the distinguished French chemist, died in Paris in May last at the age of 82. Medicine is indebted to him for some of its most valuable remedies. In conjunction with Pelletier, Robiquet, and others, he discovered strychnia in 1818, brucia and veratria in 1819, quinia and cinchona in 1820, and caffeina and theina in 1821. The discovery of quinia should of itself immortalize his name. Though laden with the highest honors which a gratified country could bestow, he was one of the most modest of men. Just before his death he requested to be buried without military honors, and that no discourse should be pronounced over his tomb. His request was complied with, though all the members of the Academy of Medicine and of the School of Pharmacy attended his obsequies.

What the Telephone Might have been Called.

We prophesied even better than we knew the other day when we said that the adoption of so short a name as "Fernsprecher" for the telephone by the Germans was a matter of congratulation, because they would otherwise soon find a way of smothering it under some frightfully polysyllabic title. To show how closely the fortunate instrument has escaped this fate, a correspondent in Heidelberg writes us that no less than fifty-four names were proposed in German, all of varying degrees of length and atrocity. Some (we will not inflict the reader with the original titles) signified "mile tongue," "kilometer tongue," "speaking post," "word lightning," "world trumpet," and finally one inventor, collecting all his energies for a grand effort, triumphantly produced "doppelstahlblechzungensprecher." The jaw can be replaced by pressing on the lower molars with the fingers, and guiding the muscles with the thumbs.

ASTRONOMICAL NOTES.

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, January 16, 1878.

PLANETS.

	H.M.		H.M.
Mercury rises	5 59 mo.	Saturn sets	7 20 eve.
Venus sets	6 23 eve.	Uranus rises	5 25 eve.
Mars sets	11 42 eve.	Uranus in meridian	0 15 mo.
Jupiter rises	5 19 mo.	Neptune sets	11 7 eve.

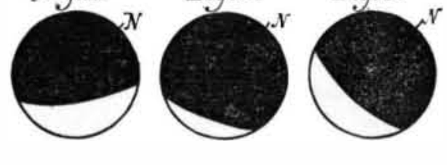
FIRST MAGNITUDE STARS.

	H.M.		H.M.
Antares rises	2 17 mo.	Sirius in meridian	8 52 eve.
Regulus rises	5 31 eve.	Procyon in meridian	9 45 eve.
Spica rises	10 08 eve.	Aldebaran in meridian	6 42 eve.
Arcturus rises	9 10 eve.	Algol (2d mg. var.) in merid.	5 13 eve.
Altair rises	3 31 mo.	Capella in meridian	7 20 eve.
Vega sets	5 40 eve.	7 stars (cluster) in meridian	5 53 eve.
Alpheratz sets	10 05 eve.	Betelguese in meridian	8 01 eve.
Fomalhaut sets	5 03 eve.	Rigel in meridian	7 21 eve.

REMARKS.

The most remarkable event of the week is a partial eclipse of the moon February 17, in the morning. The beginning and middle only are visible, the setting eclipsed. The last contact of the moon with the shadow occurs 51 m. after sunrise and 49 m. after the setting of the moon, and is invisible east of the Mississippi river. The eclipse begins at 4 h. 47 m. morning; middle, 6 h. 15 m. morning; end, 7 h. 43 m. morning. For the time of beginning, middle, and end at any other place, add the difference of time longitude if east, subtract the same if west of New York city. Examples: Boston, 12 m. east, begins at 4 h. 59 m. morning; Philadelphia, 4 m. west, begins at 4 h. 43 m. morning. The following figures represent the phases of the illuminated

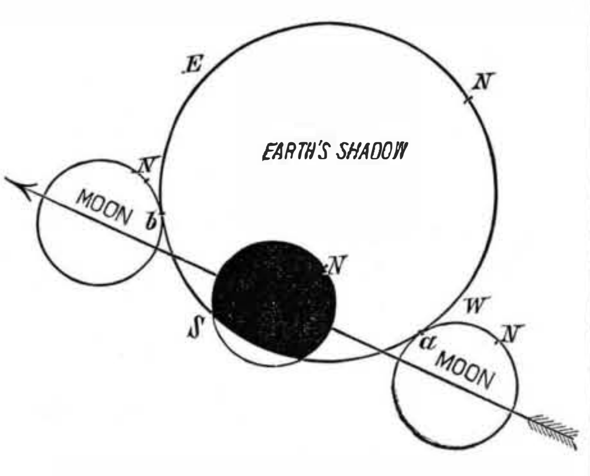
Fig. 1. Fig. 2. Fig. 3.



crescent as they appear with respect to the horizon, at three intervals, as stated below, N being the north point. Fig. 1 represents the phase at 5 h. 45 m. morning, one half hour before the middle, and 58 m. after beginning, the moon being about one hour high. Fig. 2 shows the phase when at the middle, or when the eclipse is largest, 1 h. 28 m. after first contact, the moon being 39 m. high. At this time ·84 of the moon's diameter will be in the earth's shadow. This multiplied by 12 gives the size of the eclipse in digits, which is 10·08 digits. Fig. 3 shows the phase at 6 h. 42 m. morning, 10 m. before the moon sets, and one half hour after greatest obscuration.

Fig. 4 shows the middle of the eclipse and the points of

Fig. 4.



first and last contact of the moon with the earth's shadow, and the moon's path through the shadow with reference to the western horizon. The point of first contact is at *a*, 82° from the north point (N) toward the east. The point of last contact, *b*, is 31° from the north point toward the west. Hold the engravings so that N will point toward the north star.

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations of the following notes, which are merely approximate, have been made by students in the Astronomical Department of Vassar College.

Position of Planets for February, 1878.

Mercury.

On February 1 Mercury rises at 5h. 49m. A.M., and sets at 3h. 6m. P.M. On February 28 Mercury rises at 6h. 11m. and sets at 4h. 15m. P.M.

Mercury is at its greatest elongation west from the sun on February 2, and should be looked for before sunrise, south of the point of sunrise.

Venus.

On February 1 Venus rises at 8h. 2m. A.M., and sets at 7h. 43m. P.M. On February 28 Venus rises at 5h. 30m. A.M., and sets at 5h. 1m. P.M.

Mars.

Mars rises on February 1 at 10h. 21m. A.M., and sets at 11h. 53m. P.M. On February 28 Mars rises at 7h. 19m. A.M., and sets at 11h. 35m. P.M.

Mars is becoming more distant, and therefore smaller, but is easily recognized, and by February 8 will be known by its approach to the moon, then nearly at first quarter. The recent report of Professor Pickering, of the Observatory of Harvard College, gives the diameters of the two satellites of Mars as determined by the 15-inch telescope. The outer satellite is six miles in diameter, and the inner seven miles. Only a few of the very largest telescopes can render such minute bodies visible.

Jupiter.

Jupiter has passed to the western side of the sun, and must be looked for before sunrise.

On February 1 Jupiter rises at 6h. 10m. A.M., and sets at 3h. 22m. P.M. On February 28 Jupiter rises at 4h. 44m. A.M., and sets at 2h. 4m. P.M.

Saturn.

The ring of Saturn is at this time (January 15) exceedingly narrow, looking like a bright line projecting on each side of the planet. It will become more and more threadlike, and, according to the *Nautical Almanac*, will disappear on February 6. As Saturn shines by reflecting the light of the sun, when the sun is in the plane of the ring only its edge is illuminated, and this edge being supposed to be less than a hundred miles in width, cannot be seen at so great a distance. Astronomers will watch this disappearance of the ring with great interest, although Saturn ranges so nearly with the sun in February that only a few early evening hours can be used.

On February 1 Saturn sets at 8h. 8m. A.M.; on the 28th at 6h. 39m. P.M.

Uranus.

Uranus is in its best position in February, coming to the meridian on the 18th very near midnight, at an altitude of about 61°. It will at that time be west of the star Regulus by 41', and above that star by half a degree, or the diameter of the moon.

On February 1 Uranus rises 6h. 25m. P.M., and sets at 7h. 59m. of the next morning. On the 28th Uranus rises at 4h. 33m. P.M., and sets at 6h. 11m. of the next day.

Neptune.

On February 1 Neptune rises at 10h. 43m. A.M., and sets just after midnight. On the 28th Neptune rises at 8h. 58m. A.M., and sets at 10h. 23m. P.M.

Another Railway Bridge Disaster.

The Ashtabula bridge disaster seems to have been repeated on a smaller scale in the recent breaking down of a bridge near Tariffville, on the line of the Connecticut Western Railroad, during the crossing of a passenger train. The structure was a Howe truss of two spans, each 163 feet in length, supported in the middle by a pier of solid masonry. The height over the stream was 10 feet. The train consisted of two 60 ton locomotives and appendages, six heavily laden passenger coaches, one baggage and two freight cars. The first span was crossed in safety, but when the locomotives reached the middle of the second span, the right side suddenly settled, a break followed, and the cars crashed through. Thirteen persons are known to have been killed, and many others are injured.

The bridge is said to have been in good condition, and the timbers where broken off and splintered exhibit no signs of deterioration. The calamity seems simply to have been owing to the weakness of the structure, the iron tie rods of which appear to have given way first, under the unusual weight of the two locomotives and loaded train. That any railroad bridge should have fallen under such a load is incomprehensible if the construction had been correct in the beginning. The commonest test of such a structure is to run as many locomotives or cars loaded with iron upon it as can be accommodated on both tracks; but even this proceeding is little more than a matter of show for the benefit of the general public, because the engineer knows if he has designed the members of the structure to withstand any load to which they are likely to be subjected, and adopted a factor of safety of 6 besides, that even a double line of locomotives should produce no material deflection. If this bridge simply fell because it could not stand the strain, it was extraordinarily weak, and that fact must have been patent from the outset. It might be well for those charged with the investigation of this disaster to examine into the safety of other railway bridges on the road; and indeed, the matter of overhauling the plans of all their bridges with a view to observing whether their ultimate breaking strength reaches proper limits, or has deteriorated therefrom, might be commended to railway engineers and managers as a good winter's work.

Mechanical Theory of Forgetfulness.

To the Editor of the Scientific American:

Your number for January 12 contains some speculations on a new theory of a Mr. Verdon under the above heading. Permit me to say that this theory, or rather conjecture, will not stand the least examination. Were it true, people who are entirely illiterate ought to have immense potential capacity, and ought to attack any given study with immense advantages. Every one knows that the contrary is the case.