each would have had for his task that for which he was best fitted, where there would be no over-reaching by the strong and crafty, no oppression of the weak and feeble, and all would be able to realize the highest happiness possible for mortals. It may be that our investigators, as seems possible with some of their witnesses, have this in their mind; but this is a practical age, and the public would have had greater confidence in their accomplishing something for good, if ever so little, if they had confined themselves to a much narrower range of investigation.

AUTOMATIC SAFETY APPLIANCES.

It is a trite saying, that in the knowledge of danger there is safety; but this, like many other old saws, is only partially true. The many discoveries and improvements which, during the last half century, have been made in science and the mechanical arts, while they have conduced to the comfort and conveniences of the world, have for the most part been fraught with dangerous and apparently unavoidable concomitants. Many accidents, it is true, might be avoided by unremitting watchfulness, but we have to take human nature and physical endurance as we find them, and it is only in automatic safeguards that in many cases reliance can be placed.

Automatic signals, switches, and self-acting gates at crossings are not in as frequent use on our railroads as they should be. These and many other safety devices fail to be adopted, either from some false notion of economy, or from a wrong system of reasoning that, where implicit confidence is placed in them, and they accidentally omit to perform the duty assigned them, the consequences are most serious or fatal. This may be true in a measure, because we have to do with perishable materials and imperfect workmanship, but it nevertheless is unsound argument. There is no necessity to rely exclusively upon self-acting devices against accident, but, wherever the same can, they ought to be adopted as additional means of securing safety, and we think that the time is not far distant when they will be thus employed more generally than they now are. Notwithstanding the much that has already been proposed and done in this connection, inventors should not be discouraged because the harvest is not yet ripe. The field is a wide one, and by no means fully explored as yet.

Railroad accidents occur, at times, owing to the failure of the air brakes to act when called into requisition upon some particular occasion, but this does not condemn these devices; they are useful and great means of safety notwithstanding. So it is with automatic safety appliances generally. Additional devices for securing safety and sufficient manual or other force to work them should also be provided. No single safety expedient is reliable. Such devices should always be duplicated or alternatives be at command, and we think that, so far as automatic means are concerned, provision should invariably be made for making them part of the ordinary working plant, so that, although not acting with their full force excepting when needed, they will not rust or bind, but be kept in good working order; or, if this cannot be done, then they should be operated occasionally, at stated periods, to insure their efficiency.

Much attention is now being directed to automatic safety contrivances in connection with that modern substitute for long flights of steps in our lofty buildings, the passenger elevator; and although considerable has been already done in this line, and many inventors may find their proposed expedients anticipated, there is still great room for improvement and a fortune to the discoverer of the best device for the purpose. In the same category should not only be included freight elevators, but the many kinds of hoisting machinery in use for different purposes. Take, for instance, the chain hook tackle or grapple employed in our stores and warehouses for receiving and delivering goods in casks and other like packages. How many men are crippled and lives lost by the slipping of the load from the hooks while being raised and lowered through hatchways from one story to another? This need not and ought not to be, as safety devices to catch and hold the load till the hooks could be readjusted might be easily devised. We know of one large warehouse in a neighboring city where accidents from this neglect are of almost daily occurrence.

There are many instances, however, besides these, in which self-acting safety means might be advantageously adopted. We will only mention a few as they occur to us. Automatic fire alarms might be introduced into our dwellings and tenement houses, which either flame or an undue rise of temperature would operate, and so wake the sleeping inmates; this might either be done mechanically or by the breaking or closing of an electric circuit. Self-closing gas taps, too, in the sleeping apartments of our hotels, that is, taps which would close when the light is blown out or otherwise extinguished, and that would require a special manipulation to open them again, might save many a verdant country cousin, careless person, or inebriate from dying of asphyxia. Again, if pistols were made that, by the act of loading them, would expose, and keep exposed till firing them, a plain and unmistakable indicator of their loaded condition, we should read of fewer of those lamentable occurrences in which death results from the foolish practice of pointing at another, though only in jest, a weapon erroneously supposed not to be loaded; and the timid, too, would be less likely to carelessly handle a fire arm that pronounced itself ready to kill.

But why enumerate? The subject of automatic safety appliances is an extensive one, and well worth the attention of the ingeniously inclined, who would also have the comforting reflection that their efforts were being directed toward the saving of human life.

ASPECTS OF THE PLANETS FOR OCTOBER.

JUPITER

is morning star, and wins the place of honor in the monthly presentation for the surpassing beauty of his appearance as well as for the fact that his approach to the earth will soon bring him into a position favorable for telescopic research. No planet in the solar family exceeds in interest for terrestrial observers the one that holds a place second only to the sun in size and majesty. The desire to learn something new concerning our giant brother increases every year, while the constantly recurring red spots, white spots, and intensely colored belts are proofs of Jovian activity that whet the curiosity of diligent observers. Not many aspects of the huge planet's disk at the coming opposition will escape the attention of eager watchers who make a specialty of Jovian astronomy.

On the 27th, at noonday, Jupiter is in quadrature with the sun on his western side, being the third of the great planets to reach this epoch in the synodic course. The Prince of Planets then beams from the starry depths just 90° in longitude west of the sun, rising about six hours after sunset, being near the meridian at sunrise, and setting about six hours after sunrise. Thus, attended by a brilliant retinue of stars, he travels with stately step on the celestial road, and reigns the brightest of them all through the still watches of the silent night.

On the 19th, at one o'clock in the afternoon, Jupiter is in conjunction with Mars. The two planets are then 59′ apart. They will be near enough together to be worth observing when they rise, soon after eleven o'clock, on the evening of the 19th. The ruddy hue of Mars and the golden tint of Jupiter make an interesting contrast, and as clearly determine the individuality of the planet as the familiar features of well known friends distinguish them from each other.

The right ascension of Jupiter is 8 h. 12 m.; his declination is 20° 13′ north; and his diameter is 34″.

Jupiter rises on the 1st about a quarter after twelve o'clock in the morning; on the 31st he rises at half-past ten o'clock in the evening.

SATURN

is morning star, and ranks second to Jupiter in the exceeding beauty of his appearance, shining with a softer light and paler hue. He contributes little to the incidents of the month, but, holding his position near the Pleiades and Aldebaran, contents himself with playing the part of the celestial gem that shines serenely in the heavens, and attracts the admiration of every one whose eyes are turned toward the stars when his presence crowns the night.

The right ascension of Saturn is 4 h. 35 m.; his declination is 20° 1′ north; and his diameter is 18 2″.

Saturn rises on the 1st about half past eight o'clock in the evening; on the 31st he rises about half-past six o'clock.

MARS

is morning star, and comes in for the third place, as he has already attained noticeably increased dimensions and taken on a somewhat fiery hue. An event of unusual interest occurs this month in the progress of Mars. The constellation Cancer, or the Crab, contains a nebulous cluster of minute stars known as Praesepe. The cluster is luminous enough to be distinctly seen by the naked eye on moonless nights. On the 24th, at noonday, Mars is in this cluster, and when he rises in the evening about 11 o'clock, he will be an interesting object for observation, especially through a telescope. There is no need of describing his position, for he is then a short distance to the northeast of Jupiter, and can be readily recognized.

On the 31st, at midnight, Mars takes his turn in coming into quadrature with the sun, the fourth on the list, Neptune, Saturn, and Jupiter having taken the precedence. It will be noticed how nearly Mars and Jupiter travel in the same path, and how close they seem together, though hundreds of millions of miles and the whole family of the asteroids intervene between the outermost of the inner group of planets and the innermost of the outer group of planets. We have referred to the conjunction of Mars and Jupiter on the 21st.

The right ascension of Mars is 7 h. 42 m.; his declination is 22° 14′ north; and his diameter is 7″.

Mars rises on the 1st about half-past eleven o'clock in the evening; on the 31st he rises a few minutes before eleven o'clock.

URANUS

is morning star, and ranks as the fourth for the part he plays on the monthly record. On the 13th, at seven o'clock in the morning, he is in close conjunction with Beta Virginis, being only 5′ north of the star. It will require a powerful telescope to bring to view planet and star after their appearance above the horizon about four o'clock.

The right ascension of Uranus is 11 h. 41 m.; his declination is 2° 43′ north; and his diameter is 3·4″.

Uranus rises on the 1st not far from a quarter before five o'clock in the morning; on the 31st he rises at three o'clock.

NEPTUNE

is morning star and enjoys the distinction of being the first of the morning quintet to appear above the horizon. He is called a morning star, although he rises early in the evening. But the outer planets are all classed as morning stars from conjunction to opposition, regardless of the time of rising. Neptune is rapidly approaching his nearest point to the earth, and if he were not so far away would afford more material for research. To him belongs the honor of being the only planet whose presence was felt and position mapped out before he was actually discovered.

The right ascension of Neptune is 3 h. 15 m., his declination is 16° 12′ north, and his diameter is 2·6″.

Neptune rises on the 1st at half past seven o'clock in the evening; on the 31st, he rises at half past five o'clock.

MERCURY

is evening star until the 6th, and morning star for the rest of the month. On the 4th, at nine o'clock in the morning, he is in conjunction with Venus, the former moving westward toward the sun, and the latter moving eastward from the sun. Both planets are so near the sun that the meeting will be invisible to terrestrial observers.

On the 6th, at eight o'clock in the evening, Mercury is in inferior conjunction with the sun, passing between the earth and the great luminary, and becoming morning star as he reappears on his western side.

On the 20th, at two o'clock in the afternoon, he is in conjunction with Gamma Virginis, being 1° 7′ south of the star. Bright-eyed observers may possibly see the near approach of star and planet on the morning of the 20th, for the planet is then visible, and the star will be a guide to its position. But the atmospheric conditions must be nearly perfect, or the observation will be in vain.

On the 22d, at ten o'clock in the morning, Mercury reaches his greatest western elongation, being at that time 18° 22′ west of the sun. This is the last favorable opportunity during the year for seeing Mercury as morning star. He rises on the 22d an hour and a half before the sun, and must be looked for 9° north of the sunrise point. He will be visible at that time, and also for several days before and after elongation.

The right ascension of Mercury is 13 h. 5m., his declination is 10° 34′ south, and his diameter is 9·8″.

Mercury sets on the 1st about a quarter before six o'clock in the evening; on the 31st he rises a quarter after five o'clock in the morning.

VENUS

is evening star, and the only planet playing the part of evening star during the entire month. She might as well be blotted from the sky as far as observation is concerned, but she will make up all deficiencies by the splendor of her appearance in midwinter.

The right ascension of Venus is 12h. 42., her declination is 3° 12′ south, and her diameter is 10″

Venus sets on the 1st a few minutes before six o'clock in the evening; on the 31st she sets about half-past five o'clock.

THE MOON.

The October moon fulls on the 16th, at 37 minutes after one o'clock in the morning, Washington mean time, or 49 minutes after one o'clock, New York time. The new moon of the 1st passes near Venus and Mercury on the morning of the change. The full moon of the 16th is in close conjunction with Neptune on the 17th. She is in conjunction with Saturn on the 19th, about four o'clock in the morning, being 1° 13′ south. In some localities between 47° and 70° south declination, the moon occults Saturn for the seventh time during the present year. On the 23d, the moon is at her nearest point to Jupiter and Mars at nearly the same time. On the 27th, she passes Uranus, and on the 29th she is near Mercury for the second time. On the 31st, the second new moon of the month is near Venus.

ECLIPSE OF THE MOON.

There will be a partial eclipse of the moon on the 16th, visible in the United States and on the Pacific Ocean.

The eclipse will commence at 1 h. 2 m. A.M., New York time. The middle of the eclipse will occur at 1 h. 58 m. A.M. The eclipse will end 2 h. 54 m. A.M. As but twenty-eight one-hundredths of the moon's diameter is obscured, the phenomenon is remarkable for being the only lunar eclipse visible in this latitude during the year.

ECLIPSE OF THE SUN.

An annular eclipse of the sun will occur on the 30th, visible on the Pacific Ocean, and partly visible on the Pacific coast of North America and Asia. As the ring of sunlight surrounding the moon's dark disk will be invisible in this region, the event will be of little importance. An annular eclipse, though a beautiful phenomenon, bears no comparison to a total one in scientific importance.

The inhabitants of the islands of the Pacific will not be likely to entertain the men of science during its occurrence, though the moon casts her shadow over the same waste of waters and not very far distant from the lone island made memorable as the point of view for observing the total eclipse of the 6th of May.

Product of the Hen.

The hen has in her ovaries, in round numbers, more than 600 egg germs, which develop gradually and are successfully laid. Of these 600 the hen will lay 20 in her first year; 135 in her second, and 114 in the third. In each one of the following four years the number of eggs will be diminished by 20, and in her ninth year she will lay at most 10 eggs. In order to obtain from them sufficient product to cover the expense of alimentation, they should not be allowed to live over four years.—*Annales de la Sociedad Odontologica, Havana.*

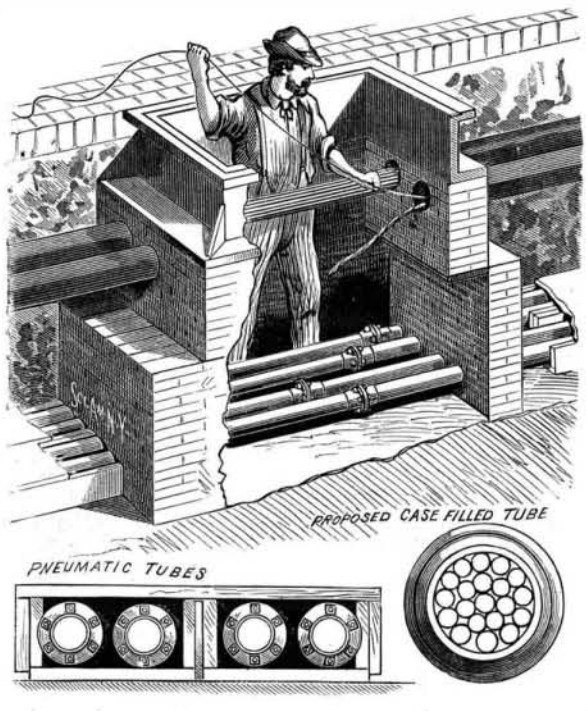
Texas.

General McClellan, who has recently visited many parts of the Texas Panhandle, predicts that by the year 1890 the State will have a population of 5,000,000, while he also affirms that it can support 20,000,000 without overcrowding. The capabilities of Texas are only just being discovered; it is larger than France, with a better soil and an equal climate, is well watered, and is being completely intersected by railroads. There was a large increase of population between 1870 and 1880, and there will be a still larger during the present decade. The State is already second only to Georgia in the production of cotton, and it produces more cattle than any other two States. It is anticipated, moreover, that the social and commercial relations between California and the Southwest will in a few years become very close.

The Northwest Texas Cattle Raisers' Association has recently been in session at Fort Worth. The organization has a membership of 223, who each own from 1,000 to 60,000 cattle, and represent a grand total of 1,400,000 cattle. There are several members who can boast of the ownership of from 40,000 to 60,000 head, and fourteen who lay claim to over 20,000. A striking instance of the profitable nature of the ranching business is furnished by the brothers Hartwell, who went from Bloomington, Ill., in the fall of 1875. The aggregate of their worldly possessions amounted to $48,000. This sum they invested in 4,500 cattle. Now they are the owners of 60,000 head, and are worth at least $1,500,000. The largest ranch in the State is that of Mr. Charles Goodnight, at the head of Red River. He began buying land only four years ago, and now he controls 700,000 acres. To inclose his landed possessions, 250 miles of fencing are required. He has the finest, though not the largest, herd of cattle in Texas. His recent sale of yearlings fetched $20 per head, the average price being $15. The Matador Cattle Company's ranch is another immense property, which was recently sold to a company of Scotch capitalists for $1,250,000.

A Useful Bath Bed.

A correspondent in the *Lancet*, writing from Liverpool, describes and recommends the following substitute for a water bed, which has been introduced into an infirmary in the latter city. It consists of a large wooden tank, about five feet long by two and a half feet broad, and a little more than a foot in depth. It is lined inside with zinc, and has a tap fixed to the bottom for draining purposes. It is supported on an iron bed cot, and is filled with water to within a few inches of the top. A large mackintosh sheet is spread over the surface of the water and allowed to fall over the sides of the tank for a foot or so on each side. This sheet may be fastened, if necessary, to the side of the tank. The patient is laid on the mackintosh sheet, a blanket or linen sheet intervening, and he practically floats in the water. The water can be kept at any temperature that is thought proper. At present the bath bed is being used for a case of typhoid fever with hyperpyrexia, and is filled with cold water at a temperature of 60° F., so that the patient has all the benefit of the cold water treatment by plunge bath or douche without the many inconveniences. In many cases of collapse, also where warmth is useful, the temperature of the water can be raised to 80° or 90° F., and kept at that temperature. The bath bed can be used besides for cases of prolonged illness with tendency to bedsores, for the prevention of which it is superior to the ordinary water pillow.

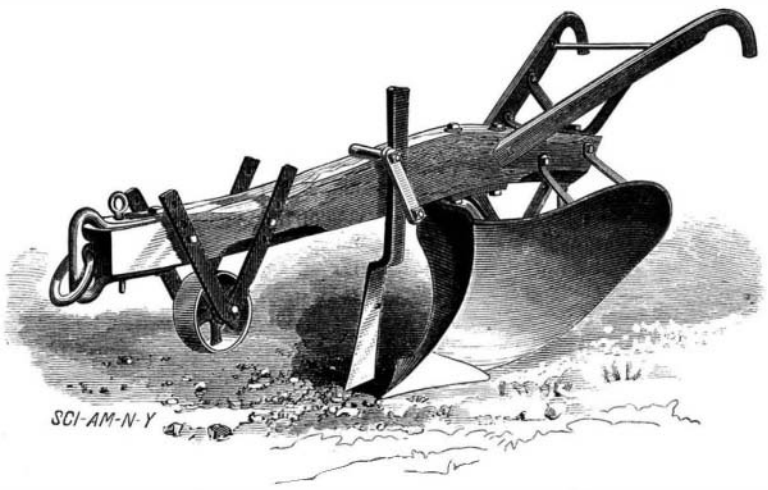


WESTERN UNION UNDERGROUND SYSTEMS.

W. H. HERRICK, whose engraving of automatic water still appeared on page 146, present volume SCIENTIFIC AMERICAN, desires parties to address him at Grinnell, Iowa.

IMPROVED PLOW.

Letters patent have recently been issued to Mr. Charles C. Coleman, of Honolulu, Hawaiian Islands, for an improved double mould board furrowing plow, the object of which is to make a furrow from 12 to 16 inches deep in previously plowed and prepared land for planting sugar cane. The essential feature of the plow consists in making the mould board so that all its horizontal lines from the apex to the rear end are straight instead of concave, as heretofore made. This form presents the same angle to the earth all the way from front to rear, thereby avoiding the greater angle along the rear part, which causes the earth to clog until the cavity is filled up to a straight line, making the plow draw very hard by reason of the increased friction and of the mass of earth that must be pushed ahead. The mould boards are extended higher and lower and also further back to prevent the earth from running back into the furrow when plowing deeply, and also to enable the angles of the board to be made sharper for a given width of furrow. The inventor states that he has found, in actual use, that the plow readily clears itself in soil which cakes on the ordinary plow.



COLEMAN'S IMPROVED PLOW.

THE WESTERN UNION UNDERGROUND SYSTEMS.

Two systems of underground tubes are now being laid in this city to connect the Western Union building, at the corner of Broadway and Dey Street, with a new structure now being erected by the company on the southwest corner of Fifth Avenue and Twenty-third Street, a distance of about two and a half miles. For convenience in constructing, both systems are being placed in one trench, the lower, or pneumatic one, being sunk below frost line, while the other, designed for electrical conductors, is about midway to the surface.

The pneumatic system is, practically, the extension of similar methods which the company has used for shorter distances during several years. By its use the present delay, caused by telegraphing messages from uptown stations to the central office and there recopying them, will be avoided, as the first copy taken will be sent direct through the tubes. As the work has but just been commenced, we can give only a general idea of the projected plan, omitting all details. There are four separate lines of brass tubes, whose ends are bolted together and which are inclosed in pairs in flat boxes. When in use the exhaust and pressure methods will be combined; that is, engines will furnish an exhaust in front of the piston carrying the message, and at the same time exert a pressure behind it.

The upper system may be considered as the beginning of the movement to place all telegraph wires in the city underground. The capacity of the pipes now being laid is not only amply sufficient to carry all the Western Union wires which, from their location, belong in them, but there will be room for future demands. Extensions will be made when practicable, and as fast as possible the overhead wires will be transferred to the tubes.

This system consists of two iron pipes five inches in internal diameter, the joints being made in the ordinary way with lead and jute. The engravings show the manhole from two points of view; one looking perpendicular to the line of direction of the trench, and the other at right angles.

The manholes are walled with masonry as shown, and of a size sufficient to easily admit a man, and are about 400 feet apart. A single iron wire is pushed through, as the sections of pipe are laid, from one manhole to the one adjoining, and to this wire the cables will be attached and pulled through. The inductors will be No. 16 copper wire insulated with either kerite or gutta-percha, but in localities where the heat from the steam pipes will be felt, it may be necessary to substitute rubber. It is calculated that the tubes will carry 300 wires.

After a cable has been placed in position in the tube it becomes a difficult matter to remove it when, for repair or other purpose, this is desired. This will be especially difficult if the defective cable should happen to lie in the bottom of the tube; the weight of the other cables bearing upon it and the long distance it would have to be pulled would make a resistance sufficient to strip it of its coating. To obviate this a plan has been proposed of filling the interior of the iron tubes with small tubes made of paper, in each one of which a cable would be placed. The removal of any particular one would then be an easy operation requiring but little time and labor. In the lower corner of one of the engravings is shown a cross section of a tube filled in this manner.

Hemlock as a Beverage.

The *Northwestern Lumberman* claims that until lately beer has never been supposed to have any very intimate connection with the lumber business, except it adds as an internal fuel to fire the ardor of a lot of dock wallopers or to induce a lot of men to hustle up a drive. Now it is asserted that beer is made of which hemlock bark is a principal ingredient, though it never has had much of a reputation beyond the modesty of a plain tea. The cargo arrivals of hemlock bark are numerous, and it is stated by persons who claim to understand the ropes that the tanneries are not the only importunate consumers, but that the bark is extensively ground and sold to makers of beer at outside points. How much or how little is consumed in Chicago in that way seems to be a vague proposition. The following elucidation of the subject has been furnished by a man who investigated it:

It is used as an adulteration for beer. Large quantities of it are ground up and shipped to other points. Chicago brewers can afford to make pure beer, and the *Lumberman* says they do; but this bark is fixed up here and sent to other places. I suppose you know, adds the writer, that brewers do not report the ingredients of which their beer is made, as they once did. The courts have decided that they are not compelled to do so. I have made some casual inquiries, and I learn that tanbark and soda are the principal substances used. A little rice malt gives it body and makes it hold the foam. Hemlock bark is a new discovery in this respect, and is useful because it takes the place, to a certain extent, of both malt and hops. It is not poisonous, but it certainly cannot be said to contain any nourishment. It adds the pungent, bitter taste, and gives the dark reddish color to the liquid. It is very cheap, and the brewers who use it must grow rich very fast.

Passage of a Ramrod through the Brain.

Dr. G. Fisher reports an instance of recovery after severe injury to the brain, which recalls the well known case of Dr. Harlow, of Vermont, in which a tamping iron was forced through the head by a premature explosion. In this case an iron ramrod was discharged during the loading of a gun. It entered the back to the right of the fourth dorsal vertebra, passed upward along the ribs, and through the muscles of the neck, and forced a passage through the skull and the brain, projecting out nearly twelve inches from the left side of the head. An incision was made in the neck, and the ramrod was forced back by a hammer and extracted through the wound thus made. The patient recovered, but lost the sight in the right eye. A ramrod being propelled in the same direction through a dead body, it was found that in its course through the neck no important nerves or vessels were injured. The instrument passed through the right optic foramen, tore the optic nerve, and passed through the fissure between the frontal lobes. The destruction of brain substance in this region was only a little over an inch in extent, and was confined to the anterior portion of the left frontal convolution. According to our present knowledge, such an injury should cause no motor or sensory disturbances. The author apprehended the appearance in time of insanity as the result of the accident.—*Centralbl. für Klin. Med., August* 18, 1883.

WESTERN UNION UNDERGROUND SYSTEMS.