

ASPECTS OF THE PLANETS IN SEPTEMBER.

SATURN

is morning star, and wins the first place on the planetary record, for his beautiful appearance in the eastern sky, and also because he reaches one of the great time marks in his course.

On the 16th, at 10 o'clock in the morning, he is in quadrature with the sun on his western side. He then passes the half-way house between conjunction and opposition, and is in favorable position for observation, both with the naked eye and the telescope. He is at the same time conveniently situated for the star gazer, rising now at half after 11 o'clock in the evening, and, at the close of the month, making his appearance at half past 9 o'clock. For a time after his advent Saturn is the brightest star in the myriad host that sparkles in the star depths, but his supremacy lasts but a few short hours, when his fair rival, Venus, appears upon the scene and robs him of the proud distinction.

A peculiar interest is felt in the approach of the ring-girdled planet to the earth at the present time, for knotty problems are to be investigated—with little expectation of their being solved—connected with the complicated Saturnian system. The most magnificent member of the planetary brotherhood is drawing near the terrestrial domain under conditions that will not be exactly repeated until the present generation of astronomers has given place to the one that will succeed it. For though the members of this profession are distinguished for longevity, 25 years spans the length of the highest power of observation in an astronomer's life, while 29½ years must pass before Saturn presents the same advantageous position he now holds.

During this year and the succeeding year the finest telescopic views of Saturn and his rings may be obtained in northern latitudes. For in this time he passes his perihelion, reaches his greatest northern declination, and his rings are open to their widest extent; these events all occurring before the year 1885 closes.

The composition of Saturn's rings is a question of profound interest to men of science. When the rings were first discovered astronomers saw nothing wonderful in the fact that two rings surrounded a planet, and accompanied it in its revolution around the sun, any more than a child wonders at the creations of fairy-land. But as a knowledge of the science and the principles of gravitation advanced, it was found that if such a body were solid it could not be supported, but would soon be precipitated upon the planet. There are those who still believe that the rings are approaching the planet. According to Struve's figures, the fall will take place about the year 2150. The theory next advanced was that the rings were fluid. This was shown to be equally untenable. The next and last important step was a great advance upon the preceding, for the distinguished astronomer to whom it is due proved that there were unanswerable objections against both the solid and fluid constitution of the rings; he also suggested or revived a third theory. This is that the ring is formed of myriads of satellites, too small to be separated in the most powerful telescopes, and too close together to allow the intervals that separate them to be visible. The rings look solid and the surface unbroken on account of the immense distance at which they are observed, something on the same principle that the little drops of moisture, of which cloud and fog are composed, appear like solid masses as we look upon them.

The rings, as is well known, consist of two rings separated by an opening, while the inner ring is joined at its inner circumference to a third or dusky ring, considered partially transparent. There is also a line that looks like a division in the outer ring. A broad field here opens to investigators, and observers will carefully study the golden circlet in order to find if the comparative darkness of some portions of the rings is not caused by the sky showing through the openings where the satellites are more sparsely congregated, instead of being breaks in the rings, and whether the dusky ring is not partially transparent.

No effort will be spared, no human aid will be unused, no favorable night will be lost, in the attempt to discover the weighty secrets our brilliant brother has hitherto kept hidden from mortal vision. If a few extra satellites chance to be picked up, while his face and rings are being scanned, immortal fame will redound to the fortunate discoverers. This year, then, and the year to come are to be specially devoted to Saturnian investigation, a study of exceeding delicacy, requiring exceptional visual power and the long practice that makes perfect. For objects viewed at a distance of 900,000,000 miles demand the highest exercise of the highest powers with which humanity is endowed.

We have proof that the present favorable conditions for observing Saturn are being diligently improved. The Messrs. Henry, of the Paris Observatory, have recently made observations on the mysterious rings under atmospheric conditions that were exceptionally favorable. They make the startling announcement that, outside of the known rings, there exists a small bright ring on the outer border of the outer ring, the width being nearly equal to the division in the ring. Now if this new ring is a reality, other astronomers will not fail to see it, and the opinion will not fail to be confirmed that important changes are taking place in the rings, especially in the outer one. There is a curious analogy between the solar system and the Saturnian system. The sun has eight planets and a ring of asteroids revolving around him. Saturn in like manner is surrounded by eight moons and a ring of minute bodies corresponding to

the asteroids. Some time in the future the reason for the correspondence may be discovered.

The right ascension of Saturn on the 1st is 5 h. 30 m.; his declination is 21° 51' north; and his diameter is 16.8".

Saturn rises on the 1st not far from half past 11 o'clock in the evening; on the 30th he rises at half past 9 o'clock.

VENUS

is morning star, and seems as yet to show no symptoms of the falling off in brilliancy and size to which she must as surely succumb as the less glorious members of the family. She continues to travel westward, lengthening out the invisible chain that binds her to the sun until the 21st, when a change comes. On that day, at 7 o'clock in the morning, she reaches her greatest western elongation, being then 46° 6' west of the sun. Here she reverses her course, approaching the sun with slower step than she receded from him, and gradually growing less brilliant as she draws near the central fire that will quench her lesser light.

One cannot help regretting that the bright planet must lose her luster, especially after the superb aspect she took on during the month of August, when she seemed to illumine the eastern heavens like a young moon as she hung tremulous on the rosy waves of light that proclaimed the near approach of the sun.

The right ascension of Venus on the 1st is 7 h. 45 m.; her declination is 17° 11' north; and her diameter is 30.4".

Venus rises on the 1st about 2 o'clock in the morning; on the 30th she rises about a quarter after 2 o'clock.

JUPITER

is morning star. Though the latest comer among the planets that usher in the day, he is far enough from the sun to be easily visible, rising now an hour and a half before the great luminary, and two hours after Venus, who looms above the eastern horizon at 2 o'clock. One of the delightful observations of the month will be to watch the approach of the king and queen of the stars as they draw near each other on the celestial road. On the 19th Jupiter is only an hour behind Venus, and, at the end of the month, he follows so closely in her steps that only the short time of 15 minutes separates them. Observers who command the eastern horizon, and will take the trouble to rouse from their slumber in the small hours of the morning, will behold one of the finest exhibitions our brother planets can get up.

The brightest gem of the sun's family appears suddenly above the eastern hills, shining with dazzling brilliancy on the dark background of the sky, the prince of planets follows in quick pursuit, and the first magnitude star Regulus in near proximity completes the starry picture.

The right ascension of Jupiter on the 1st is 9 h. 34 m.; his declination is 15° 10' north; and his diameter is 30".

Jupiter rises on the 1st about 4 o'clock in the morning; on the 30th he rises about half past 2 o'clock.

URANUS

is evening star until the 20th, when he becomes morning star. On the 20th, at 10 o'clock in the evening, he is in conjunction with the sun. The four great planets are then on the sun's western side, and are all shining as morning stars. Neptune and Saturn have passed quadrature, and are more than half way advanced toward opposition. Jupiter is on the way to quadrature, and Uranus is just commencing his course for the same goal.

The right ascension of Uranus on the 1st is 11 h. 51 m.; his declination is 1° 40' north; and his diameter is 3.5".

Uranus sets on the 1st about a quarter after 7 o'clock in the evening; on the 30th he rises about a quarter after 5 o'clock in the morning.

MERCURY

is evening star until the 19th, when he joins the ranks of the morning stars. On the 19th, at 10 o'clock in the morning, he is in inferior conjunction with the sun, passing to his western side, and increasing the number of morning stars to five in the following order of distance from the sun: Neptune heads the list and is succeeded by Saturn, Venus, Jupiter, and Mercury.

The right ascension of Mercury on the 1st is 12 h. 11 m.; his declination is 5° south; and his diameter is 8.6".

Mercury sets on the 1st soon after 7 o'clock in the evening; on the 30th he rises about half past 4 o'clock in the morning.

NEPTUNE

is morning star and the leader of the shining brotherhood. He is of little importance now in his distant quarters, but we have faith that some time in the future he will point the way to a world or worlds lying beyond his sphere. Meantime his ethereal path must be closely watched, lest any unusual perturbations escape detection.

The right ascension of Neptune on the 1st is 3 h. 25 m.; his declination is 16° 54' north; and his diameter is 2.6".

Neptune rises on the 1st about half past 9 o'clock in the evening; on the 30th he rises at a quarter before 8 o'clock.

MARS

is evening star, the sole representative of that role through the whole month. He is moving slowly toward conjunction, but we must wait till 1886 for another opposition, when the ruddy planet will take on a more imposing aspect.

The right ascension of Mars on the 1st is 13 h. 23 m.; his declination is 8° 46' south; and his diameter is 4.8".

Mars sets on the 1st soon after 8 o'clock in the evening; on the 30th he sets at 7 o'clock.

THE MOON.

The September moon falls on the 5th at 4 minutes before

6 o'clock in the morning, standard time. On the 10th, the moon is in conjunction with Neptune; on the 12th, with Saturn; on the 15th, with Venus; on the 16th, with Jupiter; on the 19th, with Mercury and Uranus; and on the 22d, with Mars. No planet is occulted by the moon in September in any part of the globe, but some favored mortals may see her pass over the star Aldebaran on the 10th, and we shall see her in his vicinity.

THE HARVEST MOON.

An interesting lunar phenomenon will occur when, after the full, the moon rises for four consecutive evenings with an average interval of 35 minutes between the time of rising. We may not think with the agriculturists of old that, by a merciful interposition of Providence, the day is thus apparently prolonged to help the husbandman in his labor. But we may be equally grateful for the charm of the landscape when floods of silvery moonlight quickly succeed the short September twilight, and show the artistic touch of our satellite in producing effects of light and shade that no human pencil can reproduce in its perfection of stillness, softness, and serenity, so deliciously harmonizing with nature's great harvest festival.

Krakatoa.

At the meeting of the Meteorological Society of Mauritius on May 22, several interesting communications were made with regard to this eruption; among others, a letter from a M. Lecompte, dated at Diego Garcia (latitude 7° 20' south, longitude 72° 35' east of Greenwich) on April 24, describing how at breakfast, on the morning of August 27, they had heard detonations, low but violent, and, attributing them to a vessel in distress, had run, and had sent men, to different points of the shore of the island, who were unable to see anything to cause such sounds; also how the captain and mate of the *Eva Joshua*, just leaving *Pointe de l'Est* to anchor at *Pointe Marianne* (these places are supposed from the account to be near *Diego Garcia*), had heard the same detonations, and sent men to the mastheads, without seeing anything. These, with the previous reports from Rodriguez, showed that in three distinct cases the sounds of the *Krakatoa* explosions were plainly heard at distances of at least twenty-two hundred miles, and, in the case of Rodriguez, of nearly three thousand.

In *Nature*, May 1, it was stated by Herr R. D. M. Verbeek that these sounds were heard in Ceylon, Burmah, Manila, New Guinea, and at Perth, on the west coast of Australia, and, in fact, at all places within a radius of about 30°, or two thousand miles. But these later reports from Rodriguez and *Diego Garcia* show that across the waters of the Indian Ocean, with no land intervening, they were carried distinctly to much greater distances.

The still more remarkable atmospheric gravity waves which traveled round and round the globe in all directions from the Straits of Sunda, and which were fortunately registered on the self-recording pressure gauge of the large gasometer at *Batavia*, close by *Krakatoa*, were also registered on the barograms at Mauritius; and here there were distinctly recorded four successive transits of the waves from east to west, and three from west to east, the same as shown by Gen. Strachey to have occurred at some of the European stations. But, what is still more remarkable, there is a faint trace of a fifth transit of the waves from east to west on the morning of September 2, *i. e.*, more than six days after the explosions, and when the waves had traveled more than four times round the earth, or about a hundred and two thousand miles.

Overwork in German Schools.

After forty-two years' experience it is now virtually conceded in Germany that physical exercise is not a sufficient antidote to brain pressure, but that where the evil exists, the remedy must be sought in the removal of the cause.

Official action with reference to over-pressure has been taken in Prussia, Saxony, Württemberg, Baden, Hesse, and Alsace-Lorraine.

The commission appointed by the stadtholder of Alsace-Lorraine recommended that the number of study-hours should be restricted to twenty-six a week for the lowest classes of the gymnasia, and to twenty-eight and thirty-two for the higher; that the hours of home study should be eight, twelve, and eighteen a week, progressing from the lowest class to the highest; and that six hours a week should be devoted to general physical exercise, including swimming, open air sports, skating, and excursions. While the existing conditions will be somewhat ameliorated by these decrees, they do not seem to have brought about a final solution of the difficulty. Last year a petition upon the subject, signed by eminent teachers, physicians, and other citizens, was addressed to the Prussian Chamber of Deputies. After setting forth the deplorable effects of the excessive strain upon the nervous system of scholars, it appealed to the patriotism of the deputies to put an end to the abuse, which, the petition asserts, "threatens little by little to reduce the cultivated classes of society to a state of moral weakness that shall render them incapable of great and manly resolution."

An inventory of the estate of the late Cyrus McCormick, the inventor of the harvester, has been filed in the Probate Court of Cook County, Ill. The total is not far from twenty million dollars. The executors of this colossal trust furnished a bond for thirty millions.

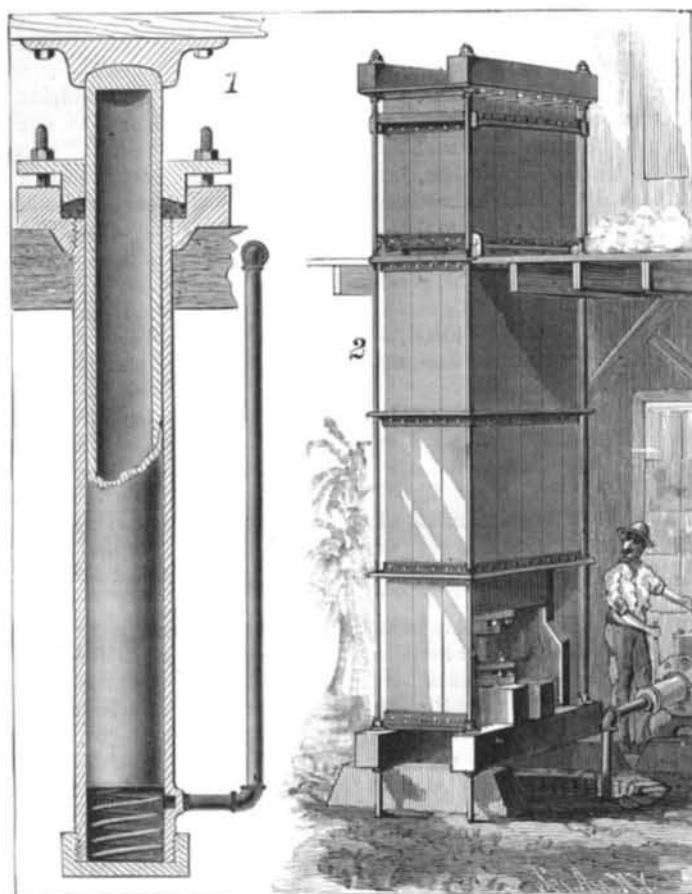
A Forty Thousand Dollar Horse.

Mr. Wm. H. Vanderbilt has lately sold the famous trotting horse Maud S. to Mr. Robert Bonner, editor of the N. Y. Ledger, for the sum of forty thousand dollars. An offer of one hundred thousand dollars from professional turfmen was previously refused by Mr. Vanderbilt, as he preferred to have the animal go into the hands of a private individual.

Maud S. is believed to be the fastest trotter in the world. Her best mile record is 2 min. 9 1/4 sec. At 4 years of age she trotted a mile in 2:17 1/2, and Mr. Vanderbilt then bought her for \$21,000. She is a beautiful chestnut colored mare, long neck, satin skin, brown eyes.

COTTON BALING PRESS.

In the annexed engraving Fig. 1 is a sectional elevation of the hydraulic apparatus, and Fig. 2 is a perspective view of a cotton baling press recently patented by Mr. C. Baumgarten, of Schulenburg, Texas. The manner of constructing the press proper is clearly shown in the cut. In the hydraulic portion of the press is a tube of suitable size and length, which is hermetically closed at its lower end by a cap, screwed on, and upon whose upper end is screwed a strong collar having an annular recess in the upper side around the hole, into which the upper end of the tube screws. This collar is formed with holes to receive stud bolts by which the gland is held down on a ring of elastic packing. In this tube is fitted a second tube, for a piston, which is



BAUMGARTEN'S COTTON BALING PRESS.

closed at the ends by plugs welded in, and on the head is seated a metal cup having a socket to connect with the piston by simply resting on it, and the follower is attached to the cap by bolts. To check the piston and prevent damage in case it should accidentally fall too rapidly, and to prevent the piston falling below and closing the water pipe, there is a strong coiled spring arranged beneath it. At the lower end of the outer tube is connected a pipe through which water is forced in to raise the piston. This pipe is provided with a conveniently located check valve, and is connected with a pump for forcing in the liquid. The cylinder may be placed in a pit with the collar at the surface of the ground, so that the follower and case may be arranged low down on the ground floor when it is desirable to do so.

The Railways of the United States.

The introduction to the 17th annual number of Poor's Manual, just published, comprises the following interesting and valuable review for 1883:

The accompanying statements show a mileage at the close of the calendar year 1883 of 121,592 miles, 6,753 having been constructed within the year. The total length of completed road at the close of the companies' fiscal years was 120,552 miles. The average mileage operated during the year was 110,414. The amount of share capital issued by the several companies up to the close of their respective fiscal years was \$3,708,060,583, an increase from the previous year of \$207,024,759. The funded debts of the several companies amounted to \$3,455,040,383, an increase from the previous year of \$219,497,060. Their floating or unfunded debts amounted to \$332,370,345, an increase of \$61,199,383 from the previous year. The total increase of share capital and of funded and floating debts from the previous year equaled \$477,721,202. The total amount of all liabilities at the close of 1883 was \$7,495,471,311. The total per mile for completed mileage was \$62,176. The total of stock and liabilities for 1882 was \$7,016,750,109; per mile, \$61,303. The

total for 1881 was \$6,278,565,052; the amount per mile, \$60,645. The total for 1890 was \$5,402,038,257; per mile, \$58,624. The total for 1879 was \$4,872,017,517; per mile, \$57,730.

It is to be observed that although, since 1879, the actual cost of construction per mile has steadily diminished, very few expensive lines having been built, and during the last half of that period the cost of all construction material being unusually low, the apparent cost as represented by share capital and debt has steadily increased. The increase of cost in the four years since 1879, as represented by share capital and debt, equals \$4,446 per mile, and for the whole number of miles, 120,552, constructed a total of \$535,974,192.

The gross earnings of all the roads for their several fiscal years of 1883 were \$823,772,924, an increase from the previous year of \$53,563,025.

Of the gross receipts \$215,287,824 were received from passengers, \$549,756,695 from freight, and \$58,728,405 from miscellaneous sources. The net earnings for the year were \$336,911,884, an increase of \$21,461,082 from the previous year. The amount of interest paid was \$173,139,064, an increase of \$18,843,684 from the previous year. The amount of dividends paid was \$102,052,548, an increase of \$21,114 from the previous year. The percentage in 1883 of gross earnings to investment was 10.99 per cent; in 1882, 11.74; in 1881, 11.18; in 1880, 11.36; in 1879, 10.80. The percentage of net earnings to investment in 1883 was 4.49 per cent; in 1882, 4.81; in 1881, 4.56; 1880, 5.04; and in 1879, 4.40 per cent. The earnings per mile of all the railroads operated for 1883 were, gross, \$7,461; net, \$3,051; in 1882, gross, \$7,377; net, \$3,005; in 1881, gross, \$7,548; net, \$3,078; in 1880, gross, \$7,475; net, \$3,318; in 1879, gross, \$6,652; net, \$2,761.

Grand Canon of the Colorado.

At the last meeting of the Academy of Sciences, San Francisco, Prof. Davidson spoke of his recent visit to the Grand Canon of the Colorado at a point 160 miles east of the Needles, on the Atlantic and Pacific Railroad, which required only 2 1/2 hours' time, and an expense of \$10 for horses and guide and 75 cents a meal. He saw vertical walls 2,700 feet high, 6,200 feet above sea level, where the Colorado River was 190 feet deep, and cannot imagine anything grander than the effect of sunset shining on these walls, only 10° from vertical, composed of different colored rocks, red sandstone, and the black overhanging rocks. The temperature was 136° Fahrenheit.

PAPER AND CARD CUTTER.

The top plate on which the paper is placed is supported at the ends by two-leg, braced frames. Held longitudinally above the plate is a clamping bar that is held in position by screws which pass through fixed nuts on the ends of the top plate, and which are provided at their lower ends with crank handles. Formed in each side edge of the bar is a groove, in which slide tongues formed on a cutter head resting on the upper surface of the bar. Mounted in upwardly projecting lugs on the cutter head is a shaft on each end of which is a handle. Projecting downward from the shaft is an arm carrying a cutter blade, the inner edge of which rests

against the side edge of a projection on the clamping bar. As soon as the handles are released, the cutter is swung upward by a spiral spring mounted upon the shaft between the lugs, as clearly shown in the sectional view, Fig. 2. Part of the top of the table is divided into small squares by which to gauge the paper to be cut.

The material to be cut is held firmly by the clamp bar, which is pressed on the paper by the screws. The operator seizes the handles of the shaft, and turns them so as to bring the blade down when the cutter is pushed from him; the blade, sliding along the guide edge, cuts off that part of the paper projecting beyond the edge.

This invention has been patented by Mr. J. E. Tylee, and additional particulars may be obtained from Messrs. Tylee & Clarke, of Ashland, Neb.

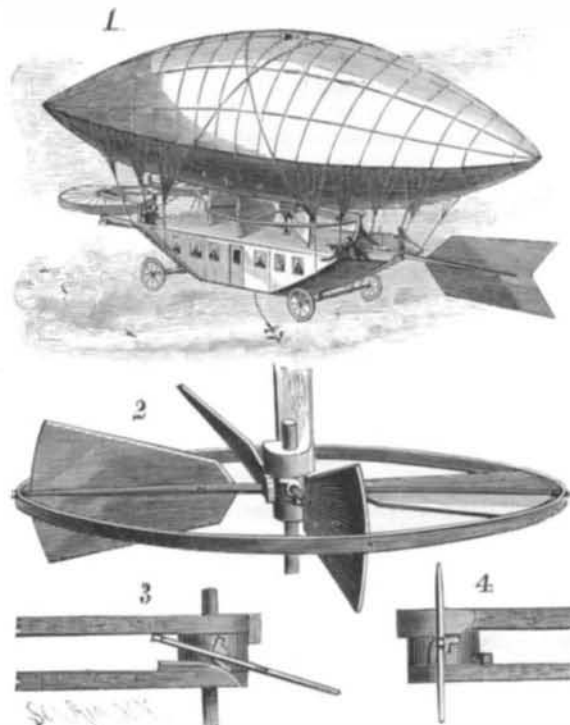
American and English Colonies in Russia.

It is not generally known that there is an American town in the realms of the Czar, yet such is a fact, it being near Moreton Bay, Kamtschatka. The colony has been formed, gradually, by immigrants attracted by the establishment of important lumbering operations, including saw mills, by an American company, and the town itself, according to the *Zacht*, has so far been practically ignored. It is not down upon any known map, does not appear in the cadastral register, nor on any tax list. The consequence is that the inhabitants thereof pay no kind of tax, and, until recently at least, have remained independent of local authorities.

Another colony, of English origin, of later establishment, but analogous origin, exists near Archangel, on the White Sea, where are important saw mills managed by capitalists of North Britain.

AN AERIAL PROPELLER.

The accompanying engraving represents an aerial propeller recently patented by Mr. M. H. Depue, of Homer, Ill. The propeller, Fig. 2, has a rim and hub in which are journaled radial blades; each journal of each blade being provided with two transverse arms in the same plane. The main



DEPUE'S AERIAL PROPELLER.

rudder for guiding and controlling the machine is shown in the right side of the perspective view. Upon each side, at the other end of the balloon, is a rimular rudder used to raise and lower the machine when balanced in the air, thereby avoiding the necessity of throwing out ballast or letting out gas. The under part of the balloon, next to the car, is made straight, thereby giving the propeller more power, and the car a better shape for the other attachments. When the car descends, it alights upon small wheels, which prevent scraping and sliding on the ground. Figs. 3 and 4 show the hub of the wheel and the frame and a single paddle or blade in different positions.

Real Disinfectants.

Professor De Chaumont, in a lecture at the Health Exhibition on cholera and its prevention, exposed the untrustworthiness of many so-called disinfectants. The belief in a few of these disinfectants has come to be almost a superstition, and it has been too much played upon by some sanitary authorities, and even medical officers of health, who in times of smallpox have covered all available hoardings in the parish with posters vaunting the epidemic virtues of disinfectants. Professor De Chaumont said: "In regard to



TYLEE'S PAPER AND CARD CUTTER.

disinfectants, there is but one true disinfectant, viz., fire. The majority of so-called disinfectants are simply deodorants. The idea that tobacco smoke or the odor of camphor is destructive of contagion is still extensively held, though it is simply absurd. A true disinfectant is a substance that will kill the germ or living particle in which the contagious principle resides, or through which it is conveyed."