THE HEAVENS FOR OCTOBER.

BY WILLIAM R. BROOKS, M.A., F.R.A.S.

THE SUN.

The right ascension of the sun on October 1 is 12 h. 32 m. 14 s. and its declination south 3 deg. 28 m. 51 s. On October 31 the right ascension of the sun is 14 h. 14 m. 45 s.; and its declination south 14 deg. 22 m. 4 s.

MERCURY.

Mercury is morning star, and is in perihelion on October 5.

On October 7, at 9 hours, Mercury reaches its greatest elongation west of the sun, 18 deg. 2 m. This would be a favorable time to see Mercury with the naked eye, as well as to observe it with the telescope. On the date of its greatest elongation from the sun Mercury will be about 2½ deg. north of the celestial equator. On October 12 Mercury crosses the celestial equator, moving south.

On the morning of October 6, at 3 o'clock, there will be an interesting and quite close conjunction of Mercury and Jupiter, when Mercury will be only 12 m. of arc north of the giant planet.

This will also afford a splendid opportunity to identify Mercury. On that occasion we shall have the interesting spectacle of the smallest and largest planets of the solar system in the same telescopic field of view.

On October 25, at 7 h. 35 m., Mercury will be in conjunction with the moon, when the planet will be 6 deg. 57 m. north of the moon.

The right ascension of Mercury on the fifteenth day of the month is 12 h. 35 m. 32 s. and its declination south is 1 deg. 39 m. 27 s.

VENUS.

Venus is morning star, and is still a very beautiful object in the early dawn. It comes to perihelion, or that part of its orbit which is nearest the sun, on October 15 at 1 hour.

On October 19, at 4 hours, Venus is in conjunction with Jupiter, when Venus will be 28 minutes of arc north of Jupiter. While the conjunction may not be seen, the two planets will be found quite near to each other on the mornings before and after the conjunction.

On October 23, at 11 h. 16 m., Venus is in conjunction with the moon, when the planet is 6 deg. 39 m. north of the moon.

On the first of the month Venus rises at 3 h. 14 m., and crosses the meridian at 9 h. 50 m. A. M.

On the last of the month Venus rises at 4 h. 20 m. and is on the meridian at 10 h. 8 m. A. M.

The right ascension of Venus on the fifteenth day of the month is 11 h. 41 m. 18 s. and its declination north 3 deg. 35 m. 51 s.

MARS.

Mars is in the evening sky throughout the month, but too near the sun to be visible.

Its position on the fifteenth day of the month is right ascension 14 h. 5 m. 47 s. and its declination south 12 deg. 35 m. 0 s.

JUPITER.

Jupiter is morning star. The interesting conjunction of this planet with Mercury on the morning of October 6 has been referred to in the section on Mercury.

On October 23, at 3 h. 36 m., Jupiter is in conjunction with the moon, when the planet is 5 deg. 55 m. north of the moon.

On the first of the month Jupiter rises at 4 h. 50 m., and crosses the meridian at 11 o'clock A. M. On the last of the month Jupiter rises at 3 h. 15 m., and crosses the meridian at 9 h. 20 m. A. M.

The right ascension of Jupiter on the fifteenth day of the month is 11 h. 52 m. 45 s. and its declination north 1 deg. 57 m. 52 s.

SATURN.

Saturn is evening star, and may still be observed just as soon as it is dusk, low down in the southwestern sky during the first part of the month. Saturn is in conjunction with the moon on October 27 at 3 h. 31 m., with the planet 6 deg. 14 m. north of the moon.

On the first of the month Saturn crosses the meridian at 2 h. 59 m. and sets at 7 h. 55 m. P. M.

On the last day of the month Saturn crosses the meridian at 1 h. 15 m. and sets at 6 h. 5 m. P. M.

The right ascension of Saturn on the fifteenth day of the month is 15 h. 47 m. 27 s. and its declination south 18 deg. 8 m 2 s.

URANUS AND NEPTUNE.

Uranus is still in the vicinity of Saturn, although Saturn is now moving to the eastward of its celestial neighbor.

The right ascension of Uranus on October 16 is 15 h. 39 m. 48 s. and its declination south 19 deg. 21 m. 42 s.

Neptune is in the morning sky. Its position hardly changes throughout the month; for October 16 its right ascension is 5 h. 27 m. 21 s. and its declination north 21 deg. 51 m. 16 s.

ALGOL.

Minima of the variable star Algol will occur as follows, in Greenwich mean time:

	Hours.	Minutes.
October 6	6	27
" 12	9	5
" 17	17	43
" 23	11	21
" 29	4	58

Alternate minima are given above; others can be found by using the period 2 days 20 hours 49 minutes.

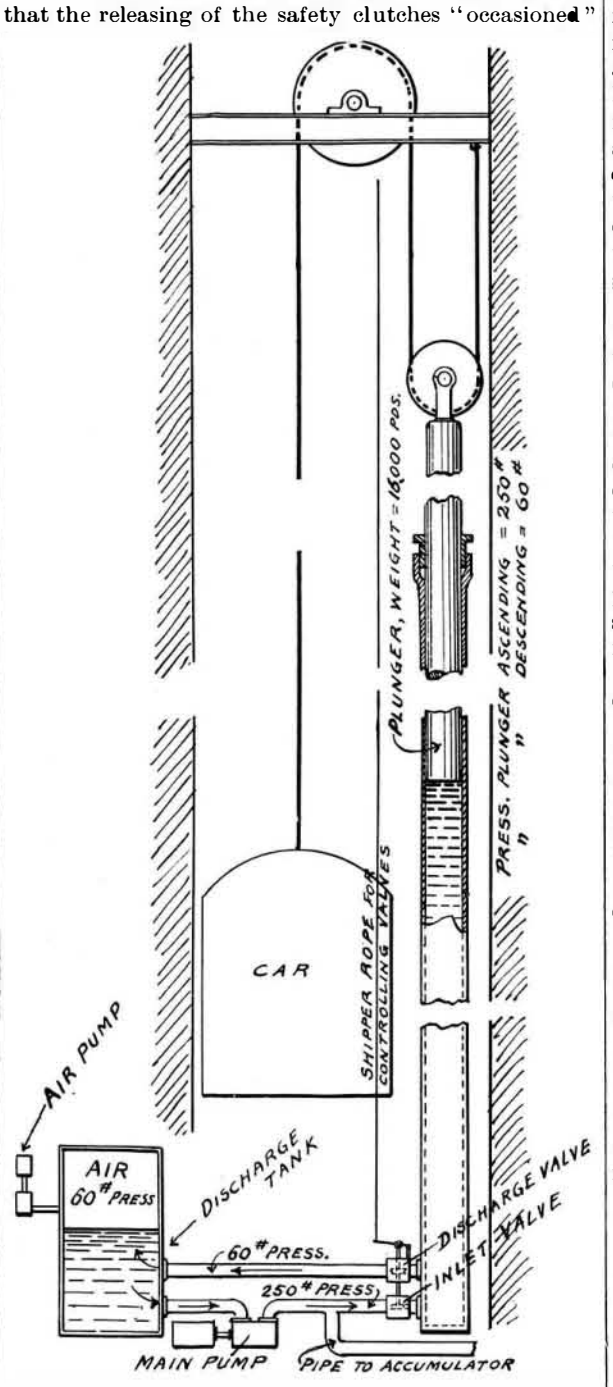
The mean place of Algol for 1897 is right ascension 3 h. 1 m. 28 s., declination north 40 deg. 33 m. 31 s.

Smith Observatory, Geneva, N. Y., September 20, 1897.

THE ELEVATOR ACCIDENT AT THE TRACT SOCIETY BUILDING, NEW YORK.

After a somewhat lengthy investigation of the elevator accident at the Tract Society building, New York (details and illustrations of which were given in our last issue), the coroner's jury found that the accident was "occasioned" by the release of the safety clutches (which, it will be remembered, had been automatically set a short time before the accident); and while they found that no one was criminally responsible for the accident, they recommended that high speed elevators should be at all times in charge of a competent engineer. The latter recommendation was prompted by evidence which showed that "no one who understood the system was in charge at the time."

It will be noticed that the jury was careful to state that the releasing of the safety clutches "occasioned"



SKETCH DIAGRAM OF HYDRAULIC ELEVATOR IN TRACT SOCIETY BUILDING.

the accident, thus leaving the actual first cause of the disaster open to discussion. For, while the finding of the jury was perhaps the only one that could be given on the evidence presented, it leaves untouched the vital question as to what it was that caused the fall of the plunger and the sudden shooting of the car to the top of the shaft. There is every reason to suppose that the disarrangement in the elevator which caused the first rapid ascent of the car, causing it to be stopped by the clutches at the first floor, was the same disarrangement that rushed the car to the top of the shaft the moment the clutches were released. What this disarrangement was is a question which the expert testimony at the inquest seemed very carefully to avoid. At the same time it is a question in which the public is profoundly interested, and upon which it has a right to be well informed. It was stated by one of the witnesses that any attempted explanation would be purely hypothetical; but it frequently happens that the data upon which a hypothesis is founded are so abundant and convincing as to give the conclusion the appearance of a positive certainty.

The accompanying sketch diagram, which, it will be understood, is not drawn to scale, shows the general features of the hydraulic system in use at the Tract Society building. The car is raised by the dead weight of a massive plunger, working in a cylinder 132 feet high, which extends half way up the shaft. When the car is at the bottom of the shaft, the plunger is at the top of its stroke and vice versa. The plunger weighs 16,000 pounds and is many times heavier than the car. It is raised by a hydraulic pressure of 250 pounds to the square inch. The water is admitted by an inlet valve, worked by the "shipper" rope, which passes through the car. The discharge valve is attached to the same stem as the inlet valve and is operated simultaneously by the shipper. The discharge water is not allowed to run to waste, but is led into a closed discharge tank, in which an air pressure of 60 pounds to the square inch is maintained continuously.

It will thus be seen that the plunger in descending is retarded by a column of water which is forced up against it by air pressure in a tank with which it communicates. The feed for the pressure pumps is drawn from the same tank, as shown in the diagram. This arrangement economizes the water, which is thus circulated over and over again throughout the whole system; it keeps the cylinder sealed against the air; and by giving a pressure of 60 pounds on the suction it reduces the actual head pressure against which the steam pistons have to work from 250 to 190 pounds to the square inch. The system is ingenious and economical. We are informed by the chief engineer that during an eight hour Sunday test, in which all the six elevators were kept running continuously, the consumption of coal was 350 pounds per hour and the consumption of water was 28 pounds per horse power hour—a very good performance for this class of work.

It will be seen that the plunger is always resting upon a column of water, the pressure at the base of the column being 250 pounds when it is ascending and 60 pounds during the descent. It is evident that as long as the 60 pounds pressure is evenly maintained the plunger will force out the water and descend at an even speed, but should the pressure in the tank diminish from any cause, the plunger will fall proportionately faster. Should the pressure in the tank fall below a point sufficient to maintain the column of water in the cylinder at the level of the bottom of the plunger, and should the plunger meanwhile be held stationary by some means, the water would fall away from the plunger, leaving a clear space beneath it.

The engineer testified at the inquest that the discharge tank had been leaking for some time, the leak being in the upper joint of the tank, above the water. This was shown by the fact that the air pressure was continually falling, necessitating the use of the air pump. On the day in question the pressure had fallen at one time as low as 20 pounds to the square inch. Turning to the facts of the accident, we find that the car started from the bottom floor and was clutched (because of too great speed) at the first floor. At the moment the clutches acted, the exhaust valve was open and the plunger was descending above the normal speed. That the speed was above the normal is stong circumstantial evidence that the tank pressure was low. Let us suppose that it was, and that it had fallen to the 20 pounds pressure noticed earlier in the day by the engineer. It took from twenty minutes to half an hour to release the clutches, and during this time the water in the cylinder would fall to a level corresponding to the 20 pounds tank pressure, leaving the 16,000 pound plunger hung in mid air, held by the clutches of the car. The instant the ill-fated engineer released the clutches the massive plunger would drop in the cylinder, whirling the car to the top of the shaft with a speed just twice its own. That the car shot up with frightful rapidity is proved by the testimony of an eye-witness, and if the car shot up, the plunger must have fallen with at least half the speed. That the plunger fell is proof that the cylinder was all or partially empty, and if the water was not in the cylinder, the pressure must have been lacking in the tank.

This, it seems to us, is the only possible explanation of the accident. It was the unforeseen coincidence of a clutched car, an open discharge valve and a low pressure that brought about the disaster.

It will occur to any practical engineer that whether this theory be right or not, the safety of this system would be materially increased by placing the air pump in automatic connection with the discharge tank, so that if the pressure should fall, the pump would be started. The elevator system is a good one, being both fast and economical, and the plant, as a whole, is well built. With the slight change we have suggested, it would be proof against another such disaster as was "occasioned" by the releasing of the clutches by the night engineer at a time when the elevator mechanism was out of order.

EXPERIMENTS are being made at Portsmouth, England, with cordite as ammunition for quick-firing guns, for the purpose of determining the visibility of the flash at night and how far it would guide an enemy's fire. Cordite is said to give a much smaller flash than powder.