this or any foreign country before the invention or discovery thereof or more than two years prior to the application, and not in public use or on sale in the United States more than two years prior to the application."

Rule 29.—The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States unless the application on which the foreign patent was granted was filed more than seven months prior to the filing of the application in this country, in which case no patent shall be granted in this country.

Rule 31 (last paragraph).—" The application must be completed and prepared for examination within one year after the filing of the petition."

Sections 39 and 46.—Rule 2 governs the preparation of the forms of the petition, oath, etc.

Rule 63 states the order in which applications in the Patent Office shall be examined.

Rule 75 brings out the fact that an application may be rejected provided a patent or printed description of the invention has been published more than two years prior to the date upon which the application was filed in this country.

Rule 77 specifies that neglect to prosecute an application within a period of one year will be held as an abandonment of the same.

Rule 98, Section 9.—"Interference will not be declared between an original application filed subsequently to December 1, 1897, and a patent issued more than two years prior to the filing of such application, or an application for a reissue of said patent."

New Rules 166, 168, 171 and 198 touch upon technical rules of practice which need not be mentioned in these columns. The attention of foreign inventors should be particularly called to the new law, as the operation of this law is so much less liberal to foreigners than the present practice that it will be necessary for them to take precautions lest the time within which the United States application must be filed should lapse and the chance of procuring a United States patent thereby be lost.

### A GREAT FIRE IN LONDON.

The greatest fire which has visited London for more than two centuries started at 12:55 o'clock on the afternoon of November 19, in the heart of the City, within a short distance of the place where the great fire of 1666 had its origin. It raged for five hours, destroying one hundred and fifty warehouses and a few dwelling houses, involving a loss which is variously estimated from five to twenty million dollars. An area of about seven acres, including about eight streets, was swept over by the flames. The cause of the fire is supposed to have been an explosion of gas. Practically the entire fire-fighting force of London was summoned to the scene, and the streets were soon blocked with goods which were being removed from the warehouses. The historical church of St. Giles, which was the scene of the burial of Milton and of the marriage of Cromwell, was saved. The fire was under control at nine o'clock in the evening. The fire apparatus was handicapped by wagons full of goods which blockaded the streets.

The disaster is likely to raise a spirited discussion as to the methods of conducting the London fire department.

It is very probable that the accounts of the fire which have been cabled are erroneous as regards the length of time which elapsed before the first engine reached the scene of the conflagration, but there is no doubt that the London fire alarm system is totally inadequate. We understand that it has only about one-tenth as much telegraph service as New York for communicating fire alarms.

The fundamental difference between the fire departments of London and New York is briefly as follows : The theory of the London firemen is that, when an alarm is sounded, one fire engine company will be sufficient to extinguish it ; so, when an alarm is given at a fire box, the commander of the station rings a bell which summons the firemen throughout the house, and the driver, whose official title is " coachman," takes the horses from the stable in the rear and hitches them to the engine. This engine then proceeds to the fire. Arriving at the scene of the conflagration, if the officer finds that the fire is a serious one, he sends the "coachman" or one of the firemen back to the fire house to telephone to the other stations for reinforcements. As may readily be judged, this results in serious delay, in which valuable time is lost, and time is everything at the beginning of a fire. As each fire engine house has to be telephoned to separately, some little time is likely to elapse before a proper force is mobilized at the scene of the fire. In New York the theory of fire fighting is entirely different. Here the idea is that every alarm of fire is likely to be serious, and in a few seconds after the alarm has been sounded one of the engines summoned is sure to be on the scene of the fire. After the alarm has been given, the operator at the fire headquarters at once sends out the number of the box to thirty engine houses, and the first tap on the key would result in sending 120 horses from their stalls. By the time that the number of the box had been given, the thirty companies would be ready, and three en-

gines, two hook and ladder companies, the insurance patrol and two battalion chiefs would be on their way. The officer in charge of the first company to arrive would, if he judged that the fire appeared to be serious, go to the nearest box and send in another alarm and have eleven more companies at the fire. With a system like that which we have outlined there is little wonder that, while there are more fires in New York than in London, the losses by fire are greater in the latter city. The average fire loss in London in a year is $6,000,000, whereas the average loss from fires in the city of New York has been so steadily reduced in late years that it only amounts to about $3,500,000. The average loss by fire in New York was last year about $800, whereas the average loss from fires in London is $1,200. The outfit of the London fire brigade consists of 68 engines of various styles, 100 hand engines and 135 fire escape or truck companies. New York has 66 fire engines, 69 hose carriages, 28 hook and ladder trucks, and 5 water towers, exclusive of the fire boats. Of course, the area and density of population of London is far greater than that of New York City proper. New York also has splendid fire boats constructed with reference to prompt service, while London's five fire boats are floats upon which fire engines are located. They are towed to the scene of the fire by tugs.

Most of the London steam fire engines are small, weighing on the average about 3,200 pounds, against our engines, which weigh about 10,000 pounds. It will be readily seen that this means a large decrease in steam capacity. The hose is also smaller than that which we use, and in London there is not an adequate supply of water. The London fire department uses on an average 20,000,000 gallons of water a year. Last year the city of New York used for its fire service 45,000,000 gallons, about one-third being taken from the rivers. The London fire brigade is also hampered by lack of facilities for transporting the apparatus to the fire. In 1895 London had only 137 horses, and in many emergencies horses had to be hired to transport the apparatus. Of course, this interfered greatly with the celerity with which the apparatus should be brought to the scene of the fire.

London has about 700 firemen, while New York has about 1,300 in actual service, of all grades. London pays its firemen $516 a year, while New York pays $1,000, $1,200 and $1,400 a year, according to the length of service, while the officers receive salaries in proportion. The total expenditure for maintenance and outlay of all kinds for the London fire department in the year ending March 30, 1893, was $750,000. This also includes what was disbursed for pensions. The cost of maintenance of the New York fire department for about the same period was $2,305,645, without the payments which were made for pensions.

The stinted allowance which is given to the London Fire Brigade has always been detrimental to the improvement and strength of their department, but it is likely that the last serious fire will enable the brigade to obtain a fairly adequate appropriation for the work which they have to do. It is to be hoped that the system of sending in the alarms will be changed to that in vogue in America. It is the first law of modern fire fighting to mobilize the largest number of engines in the quickest time in the smallest space, and fire engineers are now arranging hydrants in many cities so that thirty engines can be placed around a single block.

Mr. Charles T. Hill, in the New York Sun, gives an example of the speed with which fire companies are mobilized in New York. An alarm was received at 11:41 A. M. and the third alarm at 11:45 A. M., four minutes later. In that four minutes five horses were hitched and proceeded to the fire. The officer in charge saw the magnitude of the blaze, hastened to a box and sent in a third alarm signal. This was received at fire headquarters and sent from there to all the companies throughout the city. The fire, which was in Platt Street, was in an oil warehouse. It was one of the narrowest streets—comparable to the streets in London—in a building full of oil and combustible materials, surrounded by buildings filled with stock of like nature, forming the ideal combination for a big conflagration; yet, so well was the fire handled, that the "relief signal" was sent over the wires at 1:24 o'clock P. M., notifying the rest of the department that the fire was under control. In less than two hours a threatening fire was found and conquered, and only a fraction of the entire working force of the department was engaged.

### THE HEAVENS FOR DECEMBER.

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

THE SUN.

The right ascension of the sun on December 1 is 16 h. 32 m. 43 s. and its declination south 21 deg. 56 m. 16 s. On December 31 the sun's right ascension is 18 h. 45 m. 5 s. and its declination south 23 deg. 2 m. 55 s. On December 21 it reaches its most southern declination, 23 deg. 27 m. 13 s., and on that date, at 8 hours, the sun enters Capricornus and winter begins.

MERCURY.

Mercury is evening star, and is at its greatest heliocentric latitude south on December 8, at 9 hours. On

December 20, Mercury will be at its greatest elongation eastward from the sun, 20 deg. 3 m., and this, consequently, will be the best time to look for this shy little planet. Its southern declination is, however, unfavorable. On December 24, at 11 h. 41 m., Mercury will be in quite close conjunction with the moon, when the planet will be 24 minutes of arc south of the moon.

On December 27, at 11 hours, Mercury will be at its ascending node, and three hours later the planet will be apparently stationary.

The right ascension of Mercury on the fifteenth day of the month is 18 h. 58 m. 18 s. and its declination south 24 deg. 53 m. 55 s.

VENUS.

Venus is morning star. It will be in conjunction with Mars on December 8, at 9 hours, when Venus will be 47 minutes of arc north of Mars. On December 12, at 3 hours, Venus will be in conjunction with Saturn, when Venus will be 56 minutes of arc south of Saturn. Venus and the moon will be in conjunction on December 22, at 5 hours, when the planet will be 3 deg. 40 m. north of the moon. On December 30, at 6 hours, Venus will be in conjunction with Mars, when Venus will be 40 minutes of arc north of Mars.

On the first of the month Venus rises at 5 h. 36 m. and crosses the meridian at 10 h. 35 m. A. M.

On the last day of the month Venus rises at 6 h. 48 m. and crosses the meridian at 11 h. 16 m. A. M.

The right ascension of Venus on the fifteenth of the month is 16 h. 35 m. 21 s. and its declination south 21 deg. 22 m. 15 s.

MARS.

Mars is in the morning sky, and having passed conjunction with the sun in November, is slowly emerging from the sun's overpowering radiance. On December 22, at 11 h. 34 m., Mars is in conjunction with the moon, with the planet 2 deg. 26 m. north of the moon. The conjunction of Mars and Venus has just been referred to in the section on Venus. On the first of the month Mars rises at 6 h. 56 m. and crosses the meridian at 11 h. 37 m. A. M. On the last day of the month Mars rises at 6 h. 44 m. and crosses the meridian at 11 h. 14 m. A. M.

The right ascension of Mars on the fifteenth day of the month is 17 h. 2 m. 48 s., declination south 23 deg. 15 m. 5 s.

JUPITER.

Jupiter is morning star, and becoming quite well placed for telescopic observation, coming as it does into quadrature with the sun on December 30, at 2 hours. At that time it will be 90 deg. west of the sun.

Its position will continue to improve as it moves over 90 deg. more of its stupendous pathway, and it comes into opposition with the sun. We shall resume our notes on the phenomena of the satellites of Jupiter next month.

On December 18, at 2 h. 22 m., Jupiter will be in conjunction with the moon, when the planet will be 6 deg. 50 m. north of the moon.

On the first of the month Jupiter rises at 1 h. 46 m. and crosses the meridian at 7 h. 42 m. A. M. On the last day of the month Jupiter rises at 11 h. 47 m. and crosses the meridian at 5 h. 52 m. the following morning.

The right ascension of Jupiter on the fifteenth day of the month is 12 h. 31 m. 17 s. and its declination south 2 deg. 1 m. 8 s.

SATURN.

Saturn is morning star. Its conjunction with Venus, on December 12, has been referred to in the section on Venus. Saturn is in conjunction with the moon on December 21, at 11 h. 27 m., when Saturn will be 5 deg. 47 m. north of the moon.

Saturn rises on the first of the month only a few minutes before the sun, having passed conjunction but a few days before. On the last of the month it rises at 4 h. 56 m. and crosses the meridian at 9 h. 43 m. A. M.

The right ascension of Saturn on the fifteenth day of the month is 16 h. 16 m. 24 s. and its declination south 19 deg. 34 m. 36 s.

URANUS AND NEPTUNE.

Uranus and Neptune are also classed as morning stars at the opening of the month.

The former is just emerging from the sun's rays, but Neptune is in opposition to the sun on December 12, at 3 hours, and changes to evening star. It is well placed, therefore, for telescopic observation.

The right ascension of Neptune on the fifteenth day of the month is 5 h. 21 m. 25 s.; declination north 21 deg. 45 m. 17 s.

ALGOL.

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

| Day. | Hour. | Minute. |
| --- | --- | --- |
| December 2 | 14 | 45 |
| 8 | 8 | 23 |
| 14 | 2 | 1 |
| 19 | 19 | 39 |
| 25 | 13 | 16 |
| 31 | 6 | 54 |

Alternate minima only are given. Others can be found by using the period 2 days 20 h. 49 m.

Smith Observatory, Geneva, N. Y., November, 1897.