cost of the suction gas system and its rival, the steam engine. A leading firm of flaxmillers Messrs. Lind & O'Connor, of Shannon, had two mills running close together. In one was a 10 b.h.p. steam engine, and in the other they installed a 40-b.h.p. Campbell gas engine and plant. Both the coal for the steam engine and the coke for the gas plant had to be railed from Wellington, so the contestants started quite fairly. The cost of fuel and attendance for the steam engine amounted to £1 12s. per day. The fuel consumed by the gas plant averaged about 400lbs. per day, and the cost of attendance was estimated at 2/6. As a ton of coke lasted nearly six days of nine hours at £1 13s., the cost of the gas plant was barely 8/6, showing a saving over the steam plant of £1 3s. 6d. per day, it was enough to make the latter blush.

A valuable comparison of the cost of running a gas engine with town gas and suction gas was made with another installation at the Southern Cross Biscuit Co.'s flour mill, at Wanganui. It will enable millers, at any rate, to accurately comprehend the work done if we give a list of the machinery driven. This consists of —

5 sets of double rolls.
2 rotary scalpers.
1 double-ended centrifugal.
2 purifiers.
2 separating sieves.
6 centrifugals.
2 wheat-cleaning machines.
1 pair of stones.
16 sets of elevators.
1 sack hoist, and a considerable length of shafting.

The output amounts to about four sacks per hour without the stones. The engine and plant are of 35 b.h.p. and they have some reserve of power above what is required for the work. Town gas was also laid on to the engine shed with a view to being used if there was any necessity to enrich the suction gas to push the engine to higher power, and this fact, it is stated, has been used by unprincipled people as the basis for their statements that the plant had been a failure. Nothing, however, could have given greater satisfaction than this plant. For a day or two, as an experiment, the engine was run entirely on town gas, and at 5/- per 1000ft., the cost of running amounted to over 3/- per hour; if working on suction gas the outlay for nine hours is very little more. Taking into account the whole amount of coke required to start the fire in the morning, and to keep the plant at full work during nine hours the consumption averages 40lbs. per hour, or a total cost of 3/6 per day.

This, it should also be noted covers the total consumption. Some reports of trials ignore the amounts of fuel used to get the generators into condition to give out full power. The fuel consumed is computed only from the starting of the engine. On the same basis it has been ascertained that the 35 h.p. grinding its four sacks per hour, only requires 32lbs. of coke, or a money cost of about 1d. per sack. These facts require no hammering into sensible heads. Economy in the working of power gas plants is now established and the large Campbell engines are splendid specimens of British engineering work in this respect.

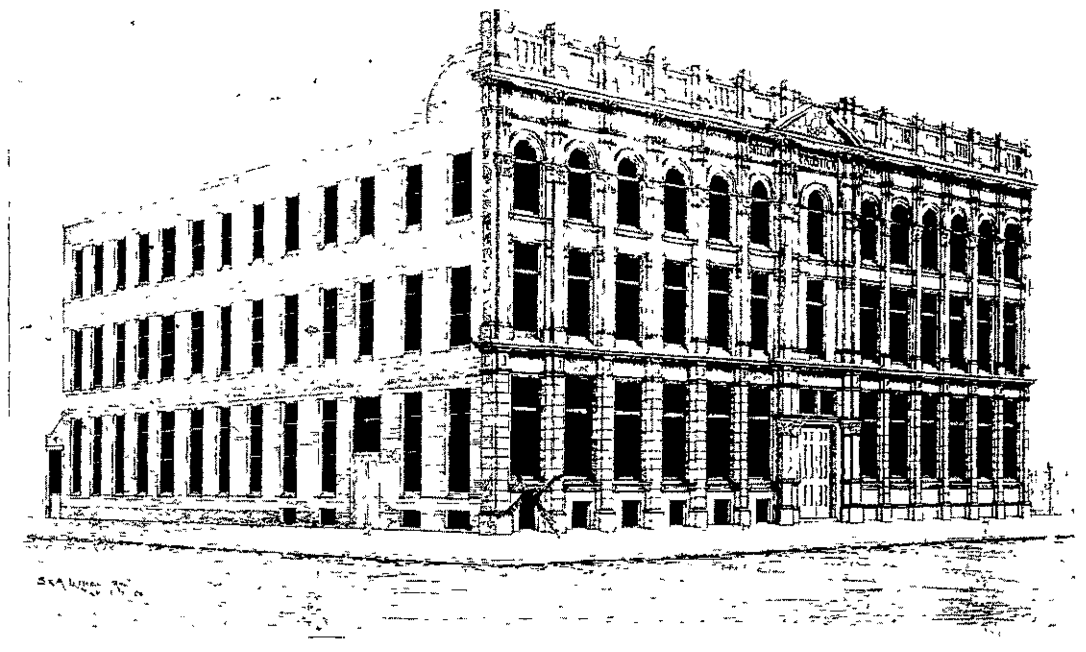
NOTICE TO ADVERTISERS.

Change Advertisements for next issue should reach "Progress" Office not later than the 10th inst., otherwise they will have to be held over.

"Advertising is to Business what Steam is to Machinery — The Grand Propelling Power."— *Macaulay.*

AMAZING ASTRONOMICAL PROBLEMS

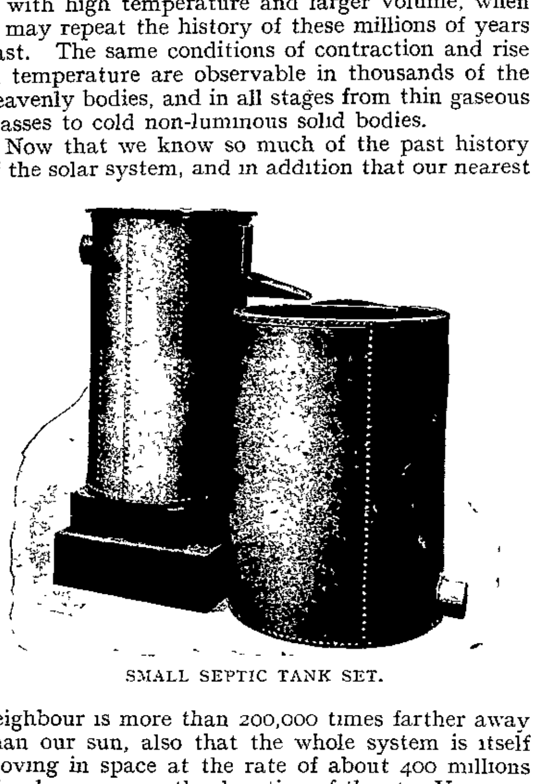
WE are well assured now, says a writer in a science journal, that the earth as a part of the solar system has had a long history. That all these bodies have reached their present conditions and relations by a process of growth taking millions of years. The same factors that have been active in the past are still operative, producing changes in magnitude, in distances, in temperature and the like. The moon once a corporate part of the earth, has left it through tidal action, and will move still farther away for something like fifty millions of years, after which it will return.



MESSRS. SKELTON, FROSTICK AND CO.'S NEW FACTORY, WAREHOUSE AND OFFICES, HEREFORD STREET, CHRISTCHURCH. [*S. & A. Luttrell, Architects.*

The sun is a mass of gas, which, by its contraction through gravitation has become exceedingly hot, and is radiating its energy away at a definite and known rate. As it is limited in size and amount of material, one may without difficulty calculate that the supply of heat from it will last about ten millions of years. It will cease to shine and become cold unless something like a catastrophe shall re-endow it with high temperature and larger volume, when it may repeat the history of these millions of years past. The same conditions of contraction and rise in temperature are observable in thousands of the heavenly bodies, and in all stages from thin gaseous masses to cold non-luminous solid bodies.

Now that we know so much of the past history of the solar system, and in addition that our nearest



SMALL SEPTIC TANK SET.

neighbour is more than 200,000 times farther away than our sun, also that the whole system is itself moving in space at the rate of about 400 millions of miles a year in the direction of the star Vega, we yet need to know whether this motion is a drift or part of an orbit. At present no one knows. The directions and rates of motion of a number of stars have been very well determined, but such measures are not numerous enough to enable us to say whether there is more order in the movements of stars than there is among the molecules of a gas, where molecular collisions are constantly taking place.

SUDDEN BLAZING OF A NEW STAR.

Such phenomena as that of the new star which suddenly blazed out in Perseus are now explained only by assuming stellar collisions wherein the masses are so large and have such velocity that impact at once reduces them to incandescent gas. This means the possibility of such disaster to the solar system, but it is a present comfort to know that if we were to collide with our nearest neighbour at the present rate, 12 miles a second, it will take nearly 50,000 years to reach it.

We have now about a hundred million stars in sight, and astronomers have been surprised that a greater number of the more remote ones are not to be seen. The actual number of stars in our universe is much smaller than had been supposed, and instead of there being an in nite number in an infinite space the present outlook is that there is a boundary to the visible universe; but this remains to be determined, and this problem is engaging attention in several of the great observatories.

We all want to know what kind of a universe we live in and the series of events that take place in it. In older times there were supposed to be but seven members of the solar system. The nineteenth century discovered more than five hundred. Eros was discovered only six or eight years ago, while additional moons to both Jupiter and Saturn were seen for the first time within ten years. It is not probable that all have been discovered. Search is yet being made for other planets.

Though limited, one can get some idea of the magnitude of the universe when it appears that some of the remote stars are so far away as to require something like a million years for their light to reach us, though light travels at the rate of 186,000 miles a second—a distance so great that it would take billions of years to reach them at the rate that we now are moving in space, namely, 400 millions of miles a year. Space seems illimitable, time is long, and if matter be indestructible yet the solar system as we know it will have gone through all the phases of growth, maturity, old age and death, long enough before the general aspect of the heavens will have been greatly changed from what they are to-day. This is astronomical work of importance awaiting research.

PLANETS INHABITED.

We desire to know much more concerning the individual planets. Everybody asks, "Are the planets inhabited?" and no favourable answer has yet been given. If one means by the question, inhabited by such beings as we are structurally, then one can say that if one of us was transported to any of the planets we could not live there a minute. One does not need to assume such likeness, especially since we know something of the past history of man and animals on the earth, adapted to it in form, size structure, habits and intelligence all correlated.

To assume intelligence of our type is hardly allowable any more than to assume structures like ours. Vertebrate skeletons are not necessarily the only form in which intelligence of high type may abide. The implements and skill of the astronomers are yet to determine what can be learned about this question. Taking what we know about the development of life on earth it would seem to be insanely improbable that among the million of millions of huge bodies in the universe, all apparently made of the same kinds of matter and subject to the same laws, that the earth is the only one among them all to have life and mind developed upon it. But at present we do not know that it may not be true. Let the twentieth century find out.