THE

# ENGLISH MECHANIC

## AND MIRROR OF SCIENCE AND ART:

A RECORD OF

Engineering, Building, Inventions, Manufactures, Industrial Progress, Electricity, Photography, Chemistry, Astronomy, &c.

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## VOLUME V.

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## THE ROYAL ASTRONOMICAL SOCIETY.

Sir,—To answer the questions of "Arcturus," in detail, would involve a literal copying of several of the Bye-laws of the Royal Astronomical Society; and this at a length which would necessitate the occupancy of very much more of your space than I feel justified in asking you to accord to a subject of little popular interest. I may therefore tell your correspondent, shortly, that the object of the Society is declared to be "The Encouragement and Promotion of Astronomy;" that any candidate for the fellowship, must be proposed in a form containing his "Christian and surname, rank, profession, and usual place of residence; and which form must be subscribed by, at least, three Fellows, one of whom must certify his personal knowledge of the candidate;" the election is by ballot, two months after such proposal; the entrance fee is two guineas, and the annual subscription two guineas also; which annual subscription, however, may be compounded for by a single payment of twenty guineas.

Should the particulars which I have given be insufficient, and should "Arcturus" be resident in, or near London, and would visit the Apartments of the Society at Somerset House, I am sure that he would be furnished with all possible information by our most courteous and obliging Assistant Secretary Mr. John Williams.

A FELLOW OF THE ROYAL ASTRONOMICAL SOCIETY.

## THE CHEAPEST AND BEST ASTRONOMICAL TELESCOPE.

Sir,—In case any of your readers should have failed to grind a truly achromatic object glass, after much perseverance and toil, I would advise them to try their hands at a reflecting instrument, the Lemairean (*i.e.*, Herschelian) principle.

The advantages are these:—There is no colouring to correct; no spherical aberration to compensate, no nice adjustment of the four, if not, six curves (as taste may lead the amateur to adopt), but merely a simple single surface, easily worked to the segment of a sphere. The radius of curvature to be equal to thirty-two diameters of the speculum: the focal length will therefore be sixteen diameters; or, in other words a speculum of three inches, will have a focal length of four feet.

There is only a single reflected image, which is to be viewed through the usual eyepiece of an astronomical telescope: and therefore, if there is a defect, it has not to be sought out in the prism or plane mirror of a Newtonian, but simply and solely in the single surface above-named. If speculum-metal is employed, any brass founder will cast the metal from a pattern, and if glass is made use of, it may be silvered by the process described in Mr. Browning's pamphlet (110, Minories).

The image being magnified, after its first reflection, is bright, and I have the testimony of a gentleman at Cambridge, who comparing one with an achromatic of equal aperture belonging to him, gave his word in favour of the reflector.

I have not asked permission of the writer whose suggestions led me to construct telescopes of this kind; but I am sure his good feeling will pardon my making them public, before applying to him. If I can be of assistance to any of your readers I shall be happy to help them. I may add that the speculum is placed in its tube, so that the image is thrown up at the distance of 2½in. from a line drawn parallel to the edge of it, that the eyepiece should point directly to the centre of it, and that the angle formed between the incident and reflected rays is about 5 degrees. R. G.

## THE PLANET VULCAN.

Sir,—Having observed the letter of "A Fellow of the Royal Astronomical Society" in your impression of the 4th January last, giving the history of the planet Vulcan, I beg to state that on or about March 6, 1864, I also, with an achromatic of between 3 and 4ft., saw a little after 8 o'clock in the morning, not one, but two round dark spots, partially transit (about 2-3rd of the chord of an arc of 90) the southern limb of the solar disc in little more than an hour. And that although both when first observed were inclined to each other, and a good distance apart, yet the larger very perceptibly neared the other, and in a short time was almost in line of opposition with it as they were about passing off the solar limb, which I did not see, a cloud having obscured the vision.

From that time I have always felt perfectly satisfied that I probably had seen two planetary bodies never before viewed by any other, and my heart felt big at the thought, but I felt also I was nobody, and who would credit my *ipse dixit*? I had never heard of any other observer having seen such bodies but Lescarbault. But the circumstance, nevertheless, had the effect of making me exercise my mind more on a subject I had formerly thought much of—namely, whether Bode's law of the planetary distances could have any reality in fact, or might it not be altogether empirical; and now I am certain of the reality of that law as the law of the order of the system; and that its root being known, it will be found perfect in the entirety of the whole system, and help to clear up many obscure matters.

These bodies already referred to were undoubtedly moving within the orbit of the earth—nay, within the orbit of Venus, and probably one or both within the orbit of Mercury; but of this, time will explain. Meanwhile permit me to make the following remarks, &c., as to the reliability of Bode's law:—

Undoubtedly that law is the law of the order of the planetary distances at least; but the hitherto empirical conception and expression of it give not the least clue to its explanation or root, which, when discovered, will yet show that however just the hypothesis of such a law was—that its usual expression is very faulty and incorrect.

Placing, let us say, the distance of Venus inversely to the distance of the earth, we shall find that the ratio of their distances is 1·389; and also assuming the earth's distance to represent 10, and Mercury's distance accordingly 3·728, we shall readily find that Vulcan's distance will in the same proportion represent 1·389, and he is undoubtedly the nearest possible planet to the sun; and his distance without doubt seems to be the surface of the sun's first power, or the root of his force as relative to the planetary distances—the root of Bode's law in short. And assuming it to be so, it will easily be seen that the planets take up their respective beats according to the advancing powers of this root. Thus, if Vulcan ride, as it were, on the spherical surface of the root of the solar planetary distance force which is expressed in these numbers, 1·389, then—

| | | | |
|---|---|---|---|
| Root or 1st power | | 1·389 | = Vulcan's distance. |
| 2nd | ,, | 1·9315 | orbits of supposed existing planetary bodies. |
| 3rd | ,, | 2·683 | |
| 4th | ,, | 3·728 | Mercury's distance. |
| 5th | ,, | 5·18 | orbit of supposed planetary bodies. |
| 6th | ,, | 7·198 | Venus's distance. |
| 7th | ,, | 10· | Earth's ,, |
| 4th$^2$—8th | ,, | 13·9 | Mars' ,, |
| 9th | ,, | 19·31 | |
| 5th$^2$—10th | ,, | 26·83 | Planetoid's ,, |
| 11th | ,, | | |
| 6th$^2$—12th | ,, | 81·81 | Jupiter's ,, |
| 13th | ,, | | |
| 7th$^2$—14th | ,, | 100· | Saturn's ,, |
| 18th | ,, | | |
| 8th$^2$—16th | ,, | 193·18 | Uranus's ,, |
| 17th | ,, | | |
| 9th$^2$—18th | ,, | 372·9 | Neptune's ,, |

R. S. BROWN.

## ROTARY ENGINE CONSTRUCTION.

Sir,—As no discussion has appeared up to the present, on "Blatch's rotary engine," I take the liberty of laying before you a few remarks thereon.

1st. A rotary engine, to gain any advantage over a reciprocating engine, should have a constant pressure of steam acting against the resistance to be overcome.

2nd. It should, to be a commercial success, take as much, or more effective work out of steam, as the reciprocating does.

Now, Blatch's engine does not fulfil the first condition, for the force there, is applied, not constantly, but intermittently, and with as many intermissions as in the ordinary arrangement: for, the weight having to be raised from the bottom to the top of the cylinder every half revolution, the force is necessarily intermittent.

The second condition is certainly not fulfilled by Blatch's arrangement, for the force or power of steam lies as well in its expansion as in its pressure, while the pressure only is utilised in Blatch's engine.

Let us suppose that the weight in Blatch's cylinder is at the bottom, the cylinder being vertical: then to transfer the weight to the top a full cylinder of steam is required, and at full working pressure; the pressure must be kept up till ½ revolution is accomplished, or the weight would fall; and, though for the next ½ revolution it may be allowed to escape or expand, its expansion is of no value in producing useful work; a whole cylinder full of steam has been at once removed; from the boiler, and all the effective space having been filled at the beginning of the ½ revolution, there is not room for useful expansion.

In conclusion, Sir, I think that scarcely any one would design a crab or crane, for the crank handle of which should be substituted a bar with a sliding weight, which the men would have to shift from one end to the other at each ½ revolutoin. A. B. MILNE, C. E.

## THE NEW VOLUME.

Sir,—As this week's number of your very valuable and interesting paper commences the new volume, and as I have only just become a subscriber, and am so much delighted with the work, that I cannot resist writing to advise that this is a good time for all who, like myself, have not possessed themselves of the early numbers, to immediately become subscribers. I shall feel it a pleasing duty to recommend your paper to all my friends, and to induce the bookseller in this town to keep a good supply; as a work like the ENGLISH MECHANIC AND MIRROR OF SCIENCE, ought to be in the hands of *every person*; as it contains matter that is not only interesting and instructive; but also of *pecuniary* advantage to its readers. I trust soon to hear that its circulation is 100,000. AN ADMIRER.

## INDIA-RUBBER CEMENT.

Sir,—In January last the following cement was recommended in your journal:—

"A really good cement, insoluable in boiling water, and for many purposes may be made by dissolving equal quantities of india-rubber and shellac and naptha."

When I came to make this cement as per these instructions, I found that the india-rubber must be dissolved in coal naptha, and the shellac in wood naptha. When the two articles were thus dissolved I found that they would not mix. I went to a considerable expense, and was greatly disappointed with the result. Perhaps the correspondent who gave you the receipt will be kind enough to throw the necessary light on the subject, and oblige— GEO. LISTER.

## SAVING LIFE FROM SHIPWRECK.

Sir,—It is with considerable surprise that I have read in the ENGLISH MECHANIC (extracted from the *Engineer*) the article on "Projectiles for Saving Lives from Shipwreck," by a Mr. Thomas Gray, clerk to the Board of Trade, professedly written for the benefit and instruction of future inventors, in which he makes so many erroneous statements that I trust you will in common justice to myself and others, afford me a sufficient space in you much-valued publication to correct the errors into which he has so unaccountably fallen.

The illuminated shot was not invented by Colonel Boxer, but by Manby. See 48th report Royal Humane Society, 1821.

The "Heaving Stick" was invented by Mr. Wilcox, a collector H. M. Customs, and Mr. Gray should in justice have named the "officers of the Board of Trade who assisted in perfecting" so complicated a machine as two pounds of lead secured to two feet of cane.

"Filling" a sky-rocket and then boring cut the composition would be a dangerous and most bungling mode of procedure.

"A Mr. John Dennett was not employed in making war rockets," but in 1812 or 1813 he invented or discovered a method of making a rocket similar in effect to the then much-talked-of congreve rocket, but made no attempt to introduce it for destructive purposes until some years after he had adapted it to the saving lives from shipwreck; to which end his first public experiments were made in 1822, and the rockets, one of which saved the crew and passenger of the *Bainbridge*, 19 persons, after nine attempts to reach the ship with the mortar had failed, were supplied as early as 1826, and not in 1832, as Mr. Gray wishes to show.

No Dennett's rockets were ever made of the weight of "twenty-three pounds," or containing "nine pounds of composition," the ordinary 9lb. rocket contains 4lbs., and a double rocket twice as much. The pole is common to all, whether "similar to the old skyrocket" or not, if fixing the pole in the centre makes it dissimilar, it is the only advantage gained by that arrangement.

The long ranges given to Carte's congreve rocket by Mr. Gray were obtained with the small lines supplied and adapted by himself (Carte), whilst those given to Dennett are with one of twice the weight they were ever designed or intended to carry, and that, the boasted Italian hemp is not the best material for lines I shall presently endeavour to show.

There is neither "difficulty in igniting" the double rocket or danger of its separating, if the coupling and leadering is fairly and properly performed. If such danger existed it could have been effectually remedied by passing an iron bolt through their heads and securing it by key or nut; but the chance of such improvement was not given to the inventor.

The "two rockets in one case" was not invented by Boxer, but by Captain Ryder, of one of the Imperial arsenals of Russia, by whom it was called the diaphragm rocket, and communicated (perhaps indirectly) to Col. Boxer.

Mr. Gray cooly decides on the advantages of the Ryder principle, but the question is easier to cook than fairly to decide, which can only be done by carefully conducted experiments, carried on by competent persons, employing the same weight in each projectile; and if under any circumstances he can prove that an effect is to be increased by the division of power, he will shed a new and brilliant light upon the mechanical world, and we shall probably hear of steamers making quicker passages by working one engine during one-half the voyage and the other the other half; his astounding proof, "that on the ignition of the second rocket its effect is noticeable on the line" is of no value whatever, for if it were not so the second rocket would be useless, and both must come to the ground.

If he refers to the minutes of the experiments made at Shoeburyness between the Dennett, Ryder, and Boxer rockets in June, 1864, he will probably find that the following results were obtained:—

| | Elevation. | Range. | |
|---|---|---|---|
| Dennett's double ... | 35° | 398 | 28 right |
| Ryder Boxer ......... | 35° | 356 | 56 left |
| Dennet .................. | 35° | 390 | 32 left |
| Ryder Boxer............ | 35° | 302 | 39 left |
| * Dennett's broke line ! | | | |
| Dennett (single)...... | 30° | 215 | in line of mark |
| Ryder Boxer Double | 30° | 358 | |
| Average range Dennett's | | 394 | deflection 20 |
| ,, ,, Ryder Boxer | | 358 | ,, 33, 68 |

"Colonel Delvigne, of the French army," is a gunmaker of Paris. His "rifled mortar" is a rifled howitzer. The copper line was outside and not inside the shot. the "coiling," or rather the reeling the line was not the "reverse way of the rifling," or the inside of the coil could not escape without fouling, nor could it be said to foul until his tiny line (log line) was bent to the great Manby-Boxer shot, which having no spin, fouled and broke away. Nevertheless, his contrivance evinced much ingenuity, but the line was too small, the howitzer too heavy, and the range too short to be of practical service.

Mr. Gray shows that Trengrouse used a "small line." It would have certainly been impossible to use a large one with an eight ounce rocket, but his bold and unqualified assertion that "a large one can never be used with success if fired from ball, reel, or coil," requires strong and tangible proof, and if Mr. Gray can prove that he has found any hemp or other fibre stronger than silk, that is, weight for length, and not two pounds of one to one of the other, he is a fortunate individual, and by making it known, if it can be obtained at a "cheap rate," he might confer a benefit not only on himself but the public generally.

The Italian lines weigh 46lbs to 200 fathoms, some even more, and have been tested at Woolwich against Dennett's New Zealand of 28lbs. to 250 fathoms, and sapiently pronounced to be the strongest, as well they might be; and on their adoption it was evidently supposed that the rocket was to make as long a range with them as with the smaller and lighter ones, and much fault was found that the

* Want of power in rocket or surplus strength in pole line?

rockets did not range as far as formerly. This occurred just at the time that they had actually been improved in point of power. It was only by accident that the true cause was discovered, but those practical men who adopted them ought to have been able at once to explain the cause of the decreased ranges. Nevertheless, these lines have been broken by the 9lb. rocket on the first fire. On the other hand, the New Zealand line of 28lbs. was put on board H.M.S.S. *Driver* in August, 1841, was used several times, and remained on board until March, 1847, and was then constantly used in experiments until 1859, having been fired 104 times without once breaking, or having "india-rubber washers" "to take away the jerk in the starting of the rocket," which, according to Mr. Gray's showing, must be unnecessary appendages, as he states that "the rocket starts slowly at first"—whence the jerk at starting?

On the condemnation of the line above mentioned another of the same weight was used in all weathers 75 times without breaking. Mr. Gray quotes 30 times as something extraordinary. If these facts do not show the superiority of New Zealand, actual experiments are useless, and the sooner some of those which are, and have been, costing the country hundreds of thousands year after year are brought to an end the better.

With those lines the double rockets will range 500 yards; that they must attain a higher velocity and are less likely to be deflected by the wind than the Ryder Boxer rocket, which travels slower but burns longer, is apparent from the results before referred to at Shoeburyness.

If the Board of Trade or their servants are to condemn any or every invention, or appliance for a single mishap arising from a bungle proper, a bungle common, or accidental circumstance, as they have done in the case of the double rocket, simply because a person was hit on the leg, they might as well lighten their labours by putting their veto upon all ships, railroads, firearms, engines, machines, and tools down to knives, razors, scissors, and needles, because people are or have been hurt therewith.

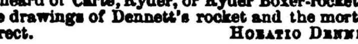
Mr. Gray awards to Manby the invention of the whip and jackstay. These have probably been used almost as long as ships and ropes have existed, at all events far too long to trace the originator. If he refers to the accounts of the following wrecks he will perceive many lives were saved by rope communication, and in that of the *Cumberland* is a very good aqua-tint of the wreck, plainly showing both jackstay and whip. H.M.S. *Phœnix*, Cuba, 1780; *Repulse*, coast of France, 1803; *Venerable*, Paignton, 1804; *Severn*, Gronville, 1804; and *Cumberland*, Rocket Antigua, 1804.

It was not until about 1808 that Manby brought out the mortar as nearly as possible as Bull left it, for which he obtained Parliamentary grants for some £6,000 or £7,000. Dennett, on the other hand, spent a fortune in perfecting his rockets and apparatus, and as soon as the value of it was fully proved he is deprived of the supply piecemeal of his apparatus and finally cast adrift. Now as *coup de grace* Mr. Gray takes upon himself the ungracious task of decrying an invention which has quietly done the work of saving the lives of many hundreds of our fellow-creatures, in most instances where no other aid could have been rendered, and but for which it is only probable that nothing would have been heard of Carte, Ryder, or Ryder Boxer-rockets.

The drawings of Dennett's rocket and the mortar are incorrect. HORATIO DENNETT.

## TO MAKE A REFLECTOR.

Sir,—To make a reflector the following articles ar necessary:—A pair of iron flasks; 8in. square and 2in. deep, and as cast iron is cheap and the flasks will have corrosive mixtures in them occasionally; let them be made ½in. thick on the four sides of each, and let the model or wooden pattern of them be made a little narrower, that the iron moulder may have less trouble in casting them. Next, a bushel of earth sand or other fine sand will do; dry it thoroughly, even burn it if you like; then sift it in a fine sieve; then saturate it with sal ammoniac and water made pretty strong—say, 2lbs. of sal ammoniac, or muriate of ammonia, as it is called, to a gallon of water—then place it all in a box and keep it carefully, for it now becomes valuable. Then provide a quantity of fine hoop-iron; wind it up as you would a ribbon, and when you have got it nearly to fit in your lower flask get an iron ring that will fit the periphery thereof welded. Fix your iron-hooping ribbon inside to keep it from unwinding. We will then suppose that you mean to cast a reflector 7in. in diameter, and of 6ft. focal length. Get a stiff fir pole, 12ft. long; let it be shod at one end with a piece of steel, as in figure, so that when it is used the steel

Pole.  Steel.

may rest against the right-hand poppet of your lathe; if your lathe is not long enough, fix a post at the right length to your left-hand and true to the mandril point of your lathe; on the left part of the pole, towards your mandril, fix on a collar of brass or iron with a female screw that is likely to fit one of your chucks, or a male screw, *vice versa;* then cast a metallic disk, all zinc if you like, of 8in. in the longest diameter and 7in. in its shortest ditto; it requires to fit firmly on the left-hand of your pole. Put your rest on the lathe, take the pole in your hands, move it backwards and forwards on the rest, the left-hand of it being on the point of your left-hand poppet head, and by this means you will describe a part of the periphery of the circle on your zinc or brass, or it may be a mixture of two parts lead to one of tin or more, of which amalgam the disk may be made of, and on which you must grind your speculum when cast.

Put a cutting tool of some sort on a circular piece of wood fixed on your mandril; set your lathe going, and let it cut the disk to the proper circular shape. Then turn the pattern of wood that represents your future speculum as near as you can to fit the disk of metal before mentioned. Use seasoned wood that it may not warp.

The best proportions of metal are composed of copper 1,264 parts, 589 tin. This is the proportion that the Earl of Rosse used for his 6ft. speculum at Parsons Town, in Ireland, and I always use the same proportions, with a part or two of metallic arsenic, which is not absolutely necessary (but I have thought the speculum rather whiter and harder, although more time is required in grinding). There is a great difference in tin. I had some banca tin some years ago which I used thus:—32 parts of old copper, 2 arsenic, and nearly 14 banca tin. A 6in. one I have now by me is quite as good and bright as ever, its focal distance is 4ft., it is ½in. thick.

Let your pattern of the speculum be about ¾in. thick. Having melted the copper, and tin in separate vessels, mix them together and take the crucible out of the fire and powder some sal ammoniac over it, and it will be quite clear; then pour it into your mould.

Take the circular ribbon of hoop-iron and fit it smartly on your metallic disk, then lay it flat on the table and run the sand on, the pattern being on the table; then the wooden pattern; and, lastly, the sand. When done, turn it over carefully, and lay the empty flask, which is supposed to fit; dust the sand where it appears round the edges of the iron ribbon with sifted blacksmith clinkers, and then ram up the upper flask, having left a circular piece of wood for a runner at one of the corners of your flask. Place the pattern on the table, the ribbon of iron wire next, lastly the sand; then turn it once and run the sand till full; then place it in an oven until it is perfectly dry. While it is still warm and perfectly dry pour in your metal, shut the cover on your air furnace, place the flasks containing the speculum on the hot place, and cover up the flask with charcoal red hot, 4in. or 5in. thick, and do not touch it or move it till thoroughly cold.

T. W. RICHARDSON.

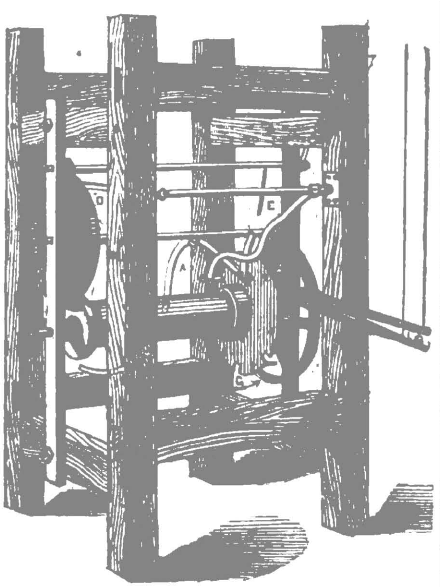
## TURRET CLOCK QUARTER JACKS.

Sir,—I have lately fitted our old church clock with what are commonly called "quarter jacks," in a simple and cheap manner, and as their working is quite satisfactory, perhaps some of your readers may like to have the plan explained, the cost being only about a sixth part of the usual expense. I send two photographs of the machinery.

The quarters are struck on two bells, at the quarter past the hours, the half past, and the quarter to. There is no necessity for the fourth quarter to be struck, the hour bell is quite sufficient. Therefore, during the hours twelve strokes fall on the bells, and it is necessary for the wheels to be stopped at the proper intervals. I wanted the first great wheel to make one turn to six of its pinion, and to 36 of the pinion on the fan spindle.

Fortunately, I was able to purchase five geared, cast-iron wheels, with the number of teeth I wanted, at Buck's, Newgate-street; one wheel and pinion, No. 10 pitch, with 120 and 20 teeth; and one wheel and pinion, No. 12 pitch, with the same.

When the lever A is pressed down by a pin in the great wheel of the going part, a pin in its other end lifts up



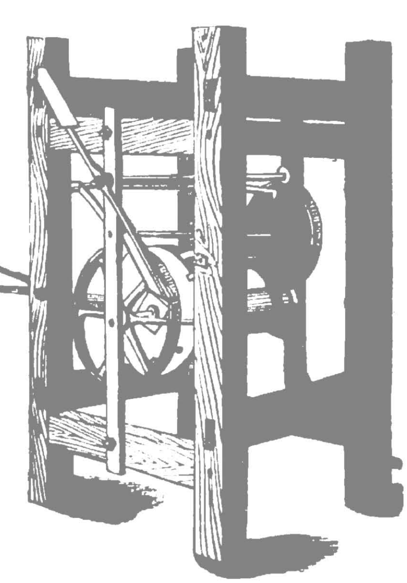

the arm B out of its notch in the locking plate C. The stop D, called, I believe, the nag's head, being on the same spindle as B, is at the same time raised, and mounts on to a plate going partly round the edges of the wheel F. The fly E, after making nearly a turn, is checked by a pin in the lever A, and the train can not go on until the lever A, is freed from the going part of the clock at the quarter. The inner end of the lever A then drops, and the wheels continue to revolve until the arm B, falls into a notch in the locking plate C, allowing the nag's head D, to drop, so that the end of the plate on the wheel F comes square against it.

Those of your readers who know how the striking part of a turret clock is managed, will see that this is only a modification of it; but I claim for the plan simplicity and cheapness. The whole cost has been but £5 8s.; £30 is the usual—and the expenditure has been almost entirely for labour in the village. Our smith has a rough old lathe, in which the wheels were bored and the spindle pivots turned: the rest was work that any blacksmith could perform.

On the locking plate C, there are six pins, which, as they mount upwards, lift the short ends of the lever G, and work the bell hammers. The two levers are on the same pivot, but their short ends are unequal in length, so that one falls off the pin before the other. They are so adjusted that the interval between each chime is twice that between the strokes of the chimes.

I need not explain how the hammers are made to strike on the bells, for the arrangements would, of course, vary according to circumstances.

I wish now to ask for some information. The clock itself is nearly two hundred years old, and the wheels are much worn; but, by turning some of them, and shifting pinions, so as to bring a fresh part of the tooth into gear, they work as well as ever they did. But the



escapement is bad. It is the old recoil, with iron scape wheel and anchor. As long as the oil is kept fresh and fluid, the clock keeps good time; but anything that decreases the force of the clock, causes it to gain very considerably, though Mr. Denison, in his work on clocks says distinctly, the reverse is the case. Would putting a brass scape wheel, and suspending the pendulum by a very fine spring, remedy the defect? Can any of your readers tell me?

Like many old ones, the clock has only an hour hand, so that it is impossible to tell the time by the dial with any exactness. I am, therefore, going to put a minute hand to it. It will be a very simple business, only two wheels will be required, to be when in gear, four inches from centre to centre, and one to have double the teeth of the other. I have already obtained them from Buck's. The hour-hand shaft, it should be mentioned, goes direct from the clock to the dial. I shall send you the result of my experiments, Mr. Editor, and probably a sketch to make the matter clear. S. MADDISON.

## RAILWAY BRAKE.

Sir,—The brake represented in No. 103 by your correspondent "J. Mallett," would not, I think, meet with general adoption, for the following reasons—viz., The springs would not be strong enough to lift off the brake after its being so tightly jammed between the wheels.

Then again the wire rope extended from one end of the train to the other, would not allow the trucks to be separated.

These objections, I think, are sufficient to condemn the brake. A. E. O.

## ENGINEERING EDUCATION.

Sir,—In looking over some recent numbers of your interesting periodical, I perceived an article on "Engineering Education."

I fully agree with your views on the subject, and deeply regret to see such a system of education pursued in England.

I think that it can only be obstinacy on the part of the English engineer, not to take some advice from the French mode of Engineering instruction.

As some of your readers may not be acquainted with the French system, I beg to claim a small space to give a general sketch of the subject.

The first thing that a youth does after leaving school is not to be apprenticed (it is only those destined to be