

The lines are made of square section iron screwed to the baseboards. In the picture, as you will see, are two sets of points which I made myself. This railway is $2\frac{1}{2}$ -in. gauge, and I hope at some future date to complete it. It is laid in a spare room, which I use as a workroom.

Fig. 4 photograph shows four small models, made with $\frac{1}{4}$ -in. bore cylinders. Two are vertical engines, and two are horizontal. They are also made from castings bought. The horizontal engines cost 1s. 9d. per set, and the vertical 2s. 9d. per set. The price included a good deal of work done to them. The cylinders were bored, and steamways cut, leaving very little to be done. These were bought as the result of seeing the offer in an advertisement in the *M.E.*, and when the advertisement appears again, I am going to have another set. The engines have made splendid models, and run at great speed from only a small boiler.

Fig. 5, the last photograph, shows the latest complete model. As you will see, it is a traction engine, but can be used as a stationary engine by running out of gear. The gearing is done by wheels taken from an old clock, and it will run upon a table if only blown into. The boiler, beside usual fittings, has a back pressure valve. It has a tube fitted right through to the smokebox, and this tube is fitted with nine cross tubes, making a splendid circulation in boiler. It is to be driven by a lamp, which will burn methylated spirit vapour. A similar lamp was described in the *M.E.*, Vol. V.,

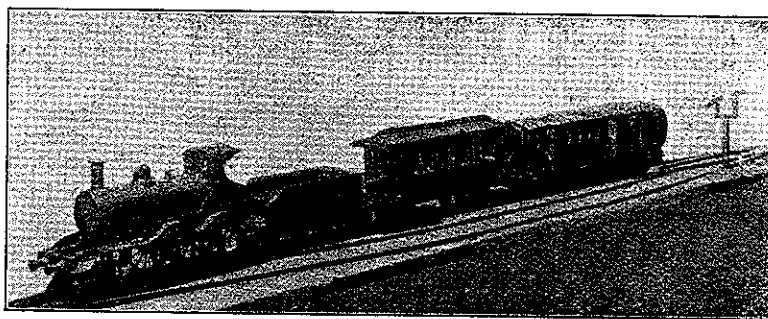


FIG. 3.—ANOTHER OF MR. W. G. SMITH'S MODELS.

No. 61, p. 235. The engines I have made have no fine finish, but will work, and have afforded much amusement and instruction to myself and those who have seen them. The boys at school subscribed, bought a set of castings, and made a small engine, which is now in the science apparatus cupboard.

With the exception of the large locomotive, and the small launch engine, all the models are fitted with slip eccentric reversing gear, as there is not so much loss of power, due to friction, as when link motion is fitted.

Radium.*

An Interview with Mr. Leonard Levy.

As an instance of the exceptional public interest taken in the wonders of radium in general, and in our recent book on this subject in particular, we quote the following extract from an

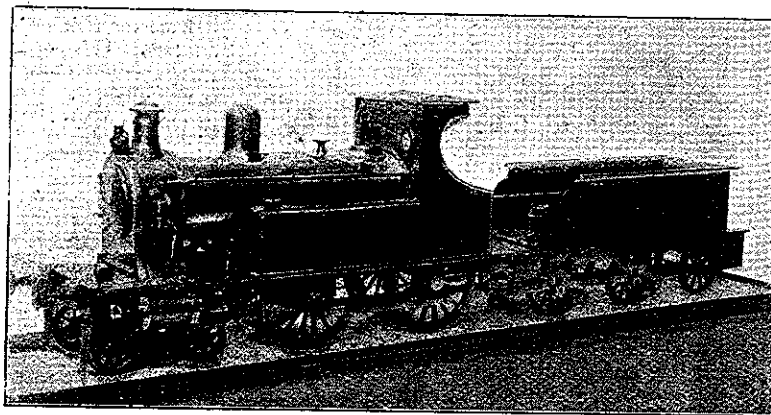


FIG. 2.—MR. W. G. SMITH'S MODEL LOCOMOTIVE.

interview with Mr. Leonard Levy, one of the authors of this instructive volume. The interview occupied a prominent position in the *Daily Mail*, and extended to a column in length.

It is a narrow, grey room on the top floor of a suburban house. Down below one sees a small garden, and opposite the windows of the street beyond. The floor is without a carpet, the walls are tin-tacked, and hung with tools and appliances. In front of the window is a carpenter's bench strewn with a hundred dusty odds and ends; by the wall opposite the door stands a solid lathe.

The spirit of this tiny box-room is the spirit of the workshop. There is little there except wood and iron.

The master of this room is a schoolboy of eighteen. In appearance he is a small, keen-looking youth, with close, dark hair growing low on the forehead, small, deep-set, dark eyes looking out under straight brows, and thin lips which keep close to the teeth. He has broad shoulders, and walks with his head stooping forward, the eyes searching ahead of him. He strikes you as a boy who was never in doubt about the object of life. He plays football and shoots at Bisley, he is merry in his talk, and finds a relish in the open air, but he is always conscious of the meaning and purpose of life—work, and the getting of knowledge. He has never "played the fool."

* *Radium and other Radio-active Elements.* By L. A. Levy and H. G. Willis. London: Percival Marshall & Co. Price 2s. 6d. net. Post free, 2s. 9d.

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This boy is one Leonard Levy, and he has recently written, in conjunction with Herbert Willis, another able young man, a book on radium, which has earned the encouraging and congratulatory sympathy of men of science. On the title-page of the book the author is described as "First in First-Class Honours in Physics at London Int. B.Sc., Neil Arnott

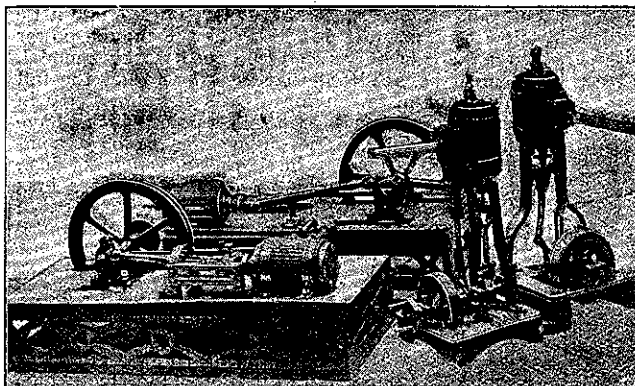


FIG. 4.—MODEL HORIZONTAL AND VERTICAL ENGINE.

Exhibitioner and Medallist." He is still at University College, and he hopes to go to Cambridge in the autumn.

And this little suburban box-room, with its scientific appliances, its mechanism of carpentry, and all the scattered litter of experiments and construction is the place where he is working, like a hundred other young Londoners, for the future of science. It is his laboratory and workshop, his library and play-room. Here he brings the works of men and science, leans his elbow on the carpenter's bench, rests his forehead against his hand, and follows the printed page with keen eyes till he has got the theory well into his mind, and then he turns to test-tubes and electroscope to put it to the test and see it for himself.

One does not often stop to think how frequently the odd room of our suburban monotonous houses is the starting-point for the genius and power of the next generation. The streets are so full of aimless youths and meandering girls that one sees the houses as empty shells where humanity eats and sleeps, and longs always to be out in the merry, lighted streets. But in many houses the box-room under the slates of our metropolis is the Watch-Tower of youthful Teufelsdröckhs who live laborious days with how much greater joy and happiness to themselves than the idlers find in the streets.

These schoolboys, when "unborn chins are razorable," will be the pioneers of intellectual evolution, the Lodges and Crookeses, the Wallaces and Thomsons and Ramsays of another era. They toil while others rest, they work while others sleep. Fame does not tempt them, wealth does not constrain them—they have but one inspiration, one

impelling force, the desire to find out nature's mechanism.

The other day, as I talked with Leonard Levy in this box-room, I asked him whether in his own experience the taste for science had increased among schoolboys. "Oh, yes," he answered, "tremendously. Fewer and fewer boys every year, I think, get what they want out of classics. Science is now made so interesting for us. In my own case, for instance, if I had begun with formulæ and a black-board, I doubt if I should have gone on. But experiments are a different matter. Take an ordinary healthy boy into a laboratory and treat him to a really good 'explosion,' and he can't help wanting to go on. It's natural—don't you think?—for a boy to like an explosion."

In his own case, however, the spirit manifested itself before formulæ could paralyse and kill. He had made a camera at ten, a Wimshurst machine at fourteen, and railway engines from infancy. He has long been an expert at colour photography, and in these days of radium he makes his own spinthariscopes and his own electroscope. This last device is typical of the furniture of the box-room.

It is a medicine bottle, with melted candle-wax for stopper and a brass knob off a lady's muffchain for charging with electricity!

The future of physical science is the occupation of this schoolboy's life. He is not curious about psychological research, and he does not believe that the field of physical science can ever be exhausted. He wants to find useful things for humanity in, th.

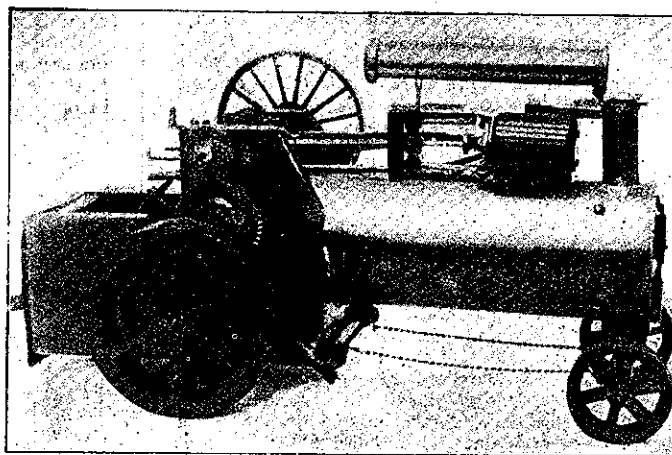


FIG. 5.—MR. W. G. SMITH'S MODEL TRACTION ENGINE.

visible and tangible globe. "There must be a tremendous lot of discoveries waiting for us," he said; "things, I mean, that will make life pleasanter and happier."

"Have you begun to dream of the things you will discover?" I asked him.

He laughed and shook his head. "I haven't had a moment to dream," he answered. "Science has discovered so many things that I have to work precious hard at present to find out what is known

already! It is only when one begins to read hard that one discovers how enormous is our knowledge and how splendid the work of the past. Willis and I only wrote our little book on radium to make public and popular experiments which were inaccessible for the ordinary man."

"You need not be afraid of jealousies in science."

"No, that is one of the encouragements," he replied. "The great men of to-day are always ready and always eager to welcome any really useful and definite discovery in science, and unless

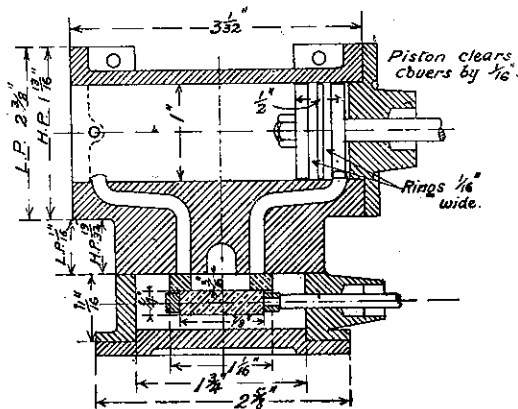


FIG. 2.—SECTION OF CYLINDER AND STEAM CHEST.

you can discover something that is really definite and useful it doesn't matter if they do ignore you."

"You feel confident of the future?"

He is charmingly diffident and naturally modest, so he laughed and shook his head. "All I feel is that I am happy in the work, and that it interests me more than anything else. A future of science is all I ask."

Such is the spirit of many schoolboys throughout England, and in spite of Parliament's indifference they win through, and maintain our reputation in the world.

THERE is a well-known story which has to do with the value set upon technical education in the labour market. A householder whose system of electric bells suddenly failed called in an electrician to put the matter right. The latter, after a brief inspection, discovered a loose wire which had become detached from one of the terminals, and, having replaced it, the bells were found to be in working order again. The householder, a non-technical individual, who had watched the proceedings with great interest, remarked upon the simplicity of the fault, and complimented the electrician on his skill in detecting the source of trouble. Shortly afterwards he received a bill to the amount of half a crown for putting electric bells in order, whereat he grew angry, and taxed the electrician with extortion. "Why," said he, "for so simple a matter you should have charged a few pence, or, at the outside, a shilling." "So I did," replied the expert; "in detail the account should read: To repairing electric bells, sixpence. To knowing how, two shillings."—*Electricity*.

A Design for Model Horizontal Steam Engine.

By G. HUTCHINSON.

IN designing the engine under consideration, I aimed at one of fair appearance, which should be easy to construct, and requiring but little time to make. It was also to have enough power to make it useful as well as a good working model. It must be admitted that in order to get the full power out of an engine of this size simplicity in the working parts is essential—a point which I have considered fully. The engine was to be a compound, with H.P.C. 1 in. bore, and L.P.C. 1½ ins., the cylinders having a common stroke of 2 ins., such an engine being adopted to produce a model of fair power, representing a modern horizontal engine of perhaps 60 or 70 h.p.

It will be noticed that the cranks are outside the bearings, thus dispensing with the double-webbed crank, which is the great stumbling-block to the amateur in the construction of a model steam engine. This method also enables the builder to make a crankshaft from a plain piece of round steel which requires no collars or reducing at the journals to prevent side play, as the webs almost rub against the brasses of the bearings, and prevent any such movement.

Before leaving the cranks for the present, I wish to point out their relative positions as being 180 degs.; this is done in order to procure a certain amount of balance for the engine. If they were placed at 90 degs., some means of balancing must be adopted, as the connecting-rods are long and somewhat heavy so that if the engine is left unbalanced, steady running would probably be interfered with.

Before I begin to describe the construction, let me say a few words about the bed; it can be seen that the bearings and place for guide bars are cast in one piece; in fact, I need not describe it now,

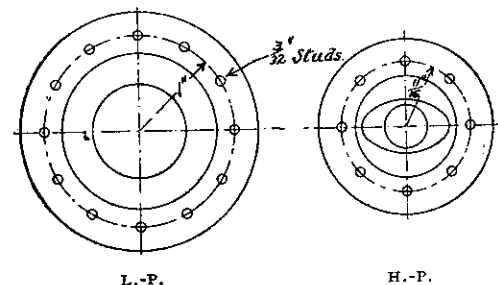


FIG. 3.—CYLINDER COVERS.

as a glance at the drawings explains what it is like, and we shall have more about it later; but I just want to say that it gives the model a "bit of appearance," but let us hope that it does not prevent the beginner from trying his hand at the construction of the engine, as its massive form might lead one to suppose it to be difficult to make. Now consider for a moment what it really is, and no other conclusion can be drawn but that it is very simple, and it also simplifies the whole engine, because a wooden pattern is all that is required from the builder; then when the casting is obtained, the