Scientific American

NEW YORK, JANUARY 19, 1850.

What was to be; What is, and What is not.

It is the fortune, or misfortune, of every age, we cannot tell which, to be the witness of great events that never transpire. On the twenty-third day of April, 1843, this world was certain to come to an end, according to the views of some visionaries, but we congratulate our fellow-men that our globe stood the test of that earthquake of excitement, and she is still walking round on her path of beauty, fresh as the day when she commenced her celestial course, when all "the morning stars sang together for joy." It seems, almost always, to follow as a counterbalance to the real, that we should frequently be beguiled by the fallacious. In the field of invention and discovery, we behold the same ups and downs that so often astonish, delude, and gratify, in other departments of things that belong to life. The great Boyle was always on the point of discovering perpetual motion, and since his day the world has been often astonished with such kind of machines, but they are as if they were not. A few years ago, a plan was got up to convey packages to any distance through air-tight tubes, exhausted by air pumps. This discovery was to revolutionize the carrying express trade—but it is no more. This is a plan, which no one can jeer at, for if it would operate, its advantages would be immense.

In the line of navigating the aerial ocean, above us, how many triumphant lucky inventors, have arisen, some to delude themselves, and some to delude others. Were it possible to accomplish the object with security and economy, no one would doubt its importance, nor would there be a single dispute about its advantages and benefits; but at the present moment, we must say that there is "no hope."

During the past two years, in London especially, and from there to the ends of the world, nothing was heard of from time to time, but the great "Electric Light." A Frenchman discovered one kind, an Englishman another, and a Scotchman another, all—all, were to make short work of gas companies with their bagatelle of retorts, pipes, fume and expenses. At one time the price of stocks fell considerably, and there was no little panic in the gas market. It has turned out after all, that the electric was the lighter gas, and the old kind still maintains its gravity and position, while the jeersofits younger opponents have been converted into an expiring moan for its lost consequence. Thus it is that we are ever on the rounds of the ladder—now up and now down, but for all that, there is a steady advancement to the top of the building. The most shrewd and discerning are often deceived, with the plausibility of some inventions, and neither genius nor acquirements, keep people from committing blunders. Newton made a blunder in his theory of seven distinct colors—Franklin was in error in explaining the theory of electricity—Davy made many mistakes, and so did Watt. We need not think that we have arrived at perfection in this age, or that we have not our failings as well as those who have lived before us. We look forward in one sense "to see the same scenes which our fathers have seen, and to tell the same tales which our fathers have told." The wisdom which we can gather from the past, is that of experience—to avoid the errors we have seen others commit, and forget not the good which we have seen accomplished. But there are some who only look on the dark background of the picture and see no beauty in the contrast of light and shade. Some are continually ridiculing new inventions. The steam engine, the steamboat, and many other good inventions, had then supreme judges of wiseacres, who wagged their heads in portentous dignity at the folly and credulity of man. When Fulton's steamboat stopped for a short time, owing to some defect in her machinery, there can be no doubt, but many shook their heads and said "just as we said—all folly." While this is true respecting one class of men, we are sorry to say, there are many evidently worthless projects often brought before the public, wilfully to delude. The deluders find it very easy to take refuge behind the names and shadows of departed worth, and many throw out hints of their martyrdom, to false public opinion.—It is very difficult to give advice respecting new inventions, so far as it relates to a perfectly new application. All that can be done, is the exercise of the judgment coupled with sound knowledge of the subject. In giving advice, or expressing an opinion, we always are sincere, and we have ever found that truth and sincerity are never far separated. No one should despise a thing because it is new or opposed to preconceived notions, and no one should be two ready to jump at conclusions, however plausible they may appear, without a full and careful examination of the subject in all its bearings.

Properties of the Crank.

[Concluded from page 125.]

Few intelligent engineers are aware of the wide-spread and unlearned opinions respecting the properties of the crank. There is scarcely a week passes over our heads without some contrivance being presented to us, either in the shape of a rotary engine, or some device "to save," as the inventors say, "the power lost by the crank." We have often been deeply grieved at the time and money spent by some on such contrivances, and have always endeavored to turn inventive minds in the right direction. There are many ingenious men who cannot be turned from their settled opinions, and from the abstract philosophy of the principle of the crank, it is easier to produce an argument against than for it, to the unscientific. This is the reason why so many controversies have arisen about its qualities, and such controversies may be expected again.—The opponents of the crank, never state the question correctly, and this is the case with the author of the articles to which we referred in our last. He says that the crank has stood in the way of improvements on the steam engine for fifty years. This is doing great injustice to many ingenious men that we might name, both at home and abroad, who have done much to improve the steam engine. But let us state one authenticated fact. In 1798, the best of Watt's Cornwall engines did a duty of 40,000,000; that is, one bushel of coals raised that amount one foot high. In 1840 the Cornwall engines did a duty of 84,000,000. This was a duty of more than double that done by an engine which Watt thought was perfect.

Those who speak against the crank, say that there is more than one half of the power of the engine lost by it. They have formed their ideas from wrong views of its operation and combination. They say, "the crank is a rigid inflexible lever, firmly fixed and secured to the main shaft, operated upon, through the intervention of an equally rigid and inflexible connecting rod, which at one end is attached to the piston, rod, the latter of which has a rectilineal and reciprocating motion."

Now this is not true, for by the above description, the crank would not move at all, for the very reason that those mechanical contrivances which connect the crank to the rods, are not stated. These are joints which enable the connecting levers to work beautifully on centre pins. In the language of M. Arago, there is a certain articulated parallelogram, and at each ascent and descent of the piston, its angles open and close with sweetness: I had almost said, with the grace which charms you see in the gestures of a consummate actor. Follow with your eye alternately the progress of its successive changes, and you will find them subject to the most curious geometrical conditions. You will see that of the four angles of the *jointed* parallelograms, three describe circular arches, but the fourth, which moves the piston rod, moves nearly in a straight line. The immense *utility* of this result strikes mechanics with less force than the means by which Watt attained it."

If mechanics could see the utility of this, they would not wrangle against it, but it is because they do not look upon the *modus operandi* of the engine, that so many of them pursue an *ignus fatus*, in search of substitutes. Nay, the articles to which we refer, bring a railing accusation against the advocates of the crank, and say, when they give the sequent of the power and effect, to prove that no power is lost, "oh, that is a mere description of the *modus operandi*." It is for want of looking at the steam engine in a dynamical light, that many make so grave mistakes about it. Some of them treat it, like the author in question, as if it were to be judged in its nature, like the combination of levers in the construction of a bridge, as if it were altogether a question of statistics. They say that a crank four feet long has a leverage of less than two feet, and the way they prove it is this, "There are two points in the crank circle where there is admitted to be no leverage, and there are two points in the crank circle where it has full leverage, therefore as the half of 4 is 2, and the crank 4 feet, the average leverage must be 2." So far so good, but by the same system of reasoning, we could prove that all the power together would be absorbed in the crank. For example, "There are two negative and two positive points in the crank circle, then as the negative balances the positive, all power exerted by the positive is nullified by the negative This is as good reasoning as the anti-crankites use. If we do not take the *modus operandi* of the steam engine into consideration, we have no business to go round the circle described by the crank at all. It is positively necessary that every proposition should be right, or the working of it will not be correct. It is well known how bitter the dispute was between the British and German philosophers in the 17th century, about the forces of moving bodies; Newton and Leibnitz—the greatest philosophers of that day, disputed about a thing in which they were both right, but stated the question differently: so it is with many about leverage. What is a lever? Nothing at all but a piece of wood or iron, apart from its *modus operandi*. The shepherd's crook becomes a lever when he uses it for a spring pole to vault over the roaring torrent, but afterwards it is his simple crook still. A crank without taking the operation of the engine into consideration, is but a crook of iron, and at best is but a peculiar handle on the main shaft. It has been proposed to apply a pulley as a substitute for a crank. In two instances this was attempted years ago, as described in the Engineer's Journal. As might be expected they were poor substitutes. In turning an axle by hand, that is to convert reciprocating into circular motion in a natural way, we never think of applying the power by a rope to the periphery of the shaft. No, we put a crank on it; and when we use a wheel we put the handle on it inside of its rim, and make it a crank. Does any person suppose that there is a loss of power here? Not one. If we wanted to change a rotary motion into a reciprocating one, such as to use a water wheel, to pump a mine, would any person of common observation, suppose that power was lost by putting a crank on the wheel shaft, and attaching it to the pump rod, by a connecting rod? Not one. This is the most simple and best way to do it.

Mr. J. Frost, of Brooklyn, has constructed a neat machine to demonstrate by practical experiment that no power is lost by the crank. It consists of three pulleys, the middle one fixed on a concentric spindle, and the other two placed eccentrically opposite one another on spindles attached to the middle one. On the periphery of the middle one, at one side, is suspended, by a cord, a weight of two pounds, and on the peripheries of the eccentric pulleys, by cords; on the one side opposite the weight of the middle pulley, is a pound weight on each; now it makes no matter how much the pulleys may be revolved, in whatever position the eccentric pulley (crank) may be to the concentric one, the two single pound weights, independent of position, balance the two pound weight.

Mr. E. Chaffee, of New Brunswick, in a letter, solves the problem in favor of the crank, in as simple, but in a different manner, and we have a letter from an *Engineer* in Brooklyn, (we wish we could publish it, and would only we have had so many articles lately on abstract subjects) which, viewing the steam engine in a dynamical light, the true way, leaves not a grain of sand for the opponents of the crank to stand on. His letter is mathematically sure and demonstrative. We have another letter from Mr. C. Grinnel, of Marion, Ala., which we will publish next week, and thus end this controversy, for a long time at least. In it he compares the crank and rod to the human arm, and this is the light in which we view it, and we must not talk of it as a combination of rigid levers. The operation of the crank is not to be viewed like the impact of balls upon a billiard table. It is very erroneous to suppose that oblique action, independent of friction, destroys power in a machine. If this were true, we might, if there were no friction, make a machine generate power—a thing impossible.

The average leverage of a crank four feet long, is 30 6-11 inches, with an excess of velocity over the piston of 17 5-11 inches, which makes 4 feet, thus harmonizing all the equivalents. By the law of virtual velocities, one pound moving through a space of 10 inches, will lift a weight of 10 pounds through a space of one inch, therefore in estimating the value of power in the crank, we must take the power and velocity into our calculations. A crank of 4 feet is the radius of a circle of 25 1-7 feet and during the time the piston moves 16 feet, the crank moves through a space of 25 1-7 feet, more than one-third greater velocity.—Now, instead of having an excess of velocity, the anti-crankites should have transfixed it at the dead power points. The formula for finding the average leverage of the crank, is to take the proportional parts of the space moved over by the piston, and its excess during one revolution out of the crank; therefore 4 feet piston moved 16 feet, excess of motion 9 1-7 feet, 16 feet is 112-7, and 9 1-7 is 64-7, crank is 48 inches, therefore divide 48 inches into two parts, proportioned to 112-7 and 64-7, and we have 30 6-11 for the 16 feet and 17 5-11 for the 9 1-7 feet, thus harmonizing the velocity and power in a most simple manner, without the flaw of a fraction; and we have beautiful collateral proof of the correctness of this formula, for if we calculate the circle described by a crank of 30 6-11 inches, it will be found to be 16 feet exactly—"the centre of power." The excess of velocity in the crank over the piston, is so happy a contrivance to regulate motion, that we cannot compare it to anything better than a compensation pendulum. If we take a cylinder 8 feet long, and try to make it describe a circle with a full stroke up and down, we will make it describe 25 1-7 feet, the same as the crank. To do this, transfix it with a pin and make it perform one revolution, and what have we but the circle of the crank. With the velocity of the crank, we cannot have the full leverage, for if that were the case, we would gain more than one-third of the power every revolution, but in the way we have examined it, all harmonizes according to the laws of Mechanical Science.

The writer in the Tribune to which we referred, makes the loss by the crank, 62 per cent. This shows us how very far abstract fallacy leads people from direct truth, for in Wales, where the power of the engines, are registered by Dynometers, they give out 90 per cent., and no difference is perceived between the crank engines and those which have no crank. Could these engines give out that power, if there was a loss by the crank? No. It has always puzzled us to find out the pocket or hamper, where the crank stowed away the power communicated to it, by the theory of the pulleyites. It must be a curious place.

We know of no mechanical contrivance so mathematically beautiful in every respect, to convert the reciprocatory motion of the piston into circular motion, as the simple crank. Its invention was a divine thought. The geometrical engineer can detect its properties at a glance, and this was the reason why the great Watt laid aside his beautiful Sun and Planet motion, for something more beautiful still—the "Incomparable Crank."

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