

room. A kitchen-maid had been left in temporary charge of the place. She was leaning across the bar so as to bring her eyes within range of the open door. At their appearance she began vigorously to polish a glass with her apron. Over her head hung the picture. The face was that of the host, round, rubicund, overflowing with good nature, his head surmounted by a gilded crown, a crimson robe, edged with ermine, covering his shoulders, and in his hand, not a scepter, but a brimming, foaming glass of ale.

"Old King Cole!" exclaimed Katey.

"But it is much more like Mr. Sheppard than the one in the parlor," said Minna.

There was the grinding of heavy feet upon the piazza outside, and the girls retreated hastily. The hostess was just entering the little parlor from the other door. "I thought, perhaps, you would prefer to take your tea by yourselves," she said. "You will have more time to dress," she

added to Minna. "So you may come out now."

"That will be nice; thank you," said Minna. "I don't mind, of course; I have been here so many times," she went on as Mrs. Sheppard hastened away, leaving them to follow more leisurely. "And then I know the family. But you are not accustomed to be stared at."

"And are you?" Katey was amused at the girl's frank manner of speech.

Minna laughed. "O, yes; I have sung and traveled about from one place to another ever since I can remember. You don't mind if the sticks and stones in the street stare at you?"

"No; but one does not credit them with eyes."

"Nor do people seem to have eyes after a time. You don't think anything about it. You don't care for them at all;" and then Minna led the way to the dining-room.

(To be continued.)

THE TACHYPOMP.

A MATHEMATICAL DEMONSTRATION.

THERE was nothing mysterious about Professor Surd's dislike for me. I was the only poor mathematician in an exceptionally mathematical class. The old gentleman sought the lecture-room every morning with eagerness, and left reluctantly. For was it not a thing of joy to find seventy young men who, individually and collectively, preferred x to XX ; who had rather differentiate than dissipate; and for whom the limbs of the heavenly bodies had more attractions than those of earthly stars upon the spectacular stage?

So affairs went on swimmingly between the Professor of Mathematics and the Junior Class at Polyp University. In every man of the seventy the sage saw the logarithm of a possible La Place, of a Sturm, or of a Newton. It was a delightful task for him to lead them through the pleasant valleys of conic sections, and beside the still waters of the integral calculus. Figuratively speaking, his problem was not a hard one. He had only to manipulate, and eliminate, and to raise to a higher power, and the triumphant result of examination day was assured.

But I was a disturbing element, a perplexing unknown quantity, which had somehow crept into the work, and which seriously threatened to impair the accuracy of his calculations. It was a touching sight to behold the venerable mathematician as he pleaded with me not so utterly to disregard precedent in the use of cotangents; or as he urged, with eyes almost tearful, that ordinates were dangerous things to trifle with. All in vain. More theorems went on to my cuff than into my head. Never did chalk do so much work to so little purpose. And, therefore, it came that Furnace Second was reduced to zero in Professor Surd's estimation. He looked upon me with all the horror which an unalgebraic nature could inspire. I have seen the Professor walk around an entire square rather than meet the man who had no mathematics in his soul.

For Furnace Second were no invitations to Professor Surd's house. Seventy of the class supped in delegations around the periphery of the Professor's tea-table. The seventy-first knew nothing of the charms of that perfect ellipse, with its twin bunches

of fuchsias and geraniums in gorgeous precision at the two foci.

This, unfortunately enough, was no trifling deprivation. Not that I longed especially for segments of Mrs. Surd's justly celebrated lemon pies; not that the spheroidal damsons of her excellent preserving had any marked allurements; not even that I yearned to hear the Professor's jocose table-talk about binomials, and chatty illustrations of abstruse paradoxes. The explanation is far different. Professor Surd had a daughter. Twenty years before, he made a proposition of marriage to the present Mrs. S. He added a little Corollary to his proposition not long after. The Corollary was a girl.

Abscissa Surd was as perfectly symmetrical as Giotto's circle, and as pure, withal, as the mathematics her father taught. It was just when spring was coming to extract the roots of frozen-up vegetation that I fell in love with the Corollary. That she herself was not indifferent I soon had reason to regard as a self-evident truth.

The sagacious reader will already recognize nearly all the elements necessary to a well-ordered plot. We have introduced a heroine, inferred a hero, and constructed a hostile parent after the most approved model. A movement for the story, a *Deus ex machina*, is alone lacking. With considerable satisfaction I can promise a perfect novelty in this line, a *Deus ex machina* never before offered to the public.

It would be discounting ordinary intelligence to say that I sought with unwearying assiduity to figure my way into the stern father's good-will; that never did dullard apply himself to mathematics more patiently than I; that never did faithfulness achieve such meager reward. Then I engaged a private tutor. His instructions met with no better success.

My tutor's name was Jean Marie Rivarol. He was a unique Alsatian—though Gallic in name, thoroughly Teuton in nature; by birth, a Frenchman, by education, a German. His age was thirty; his profession, omniscience; the wolf at his door, poverty; the skeleton in his closet, a consuming, but unrequited passion. The most recondite principles of practical science were his toys; the deepest intricacies of abstract science, his diversions. Problems which were fore-ordained mysteries to me were to him as clear as Tahoe water. Perhaps this very fact will explain our lack of success in the relation of tutor and pupil; perhaps the

failure is alone due to my own unmitigated stupidity. Rivarol had hung about the skirts of the University for several years; supplying his few wants by writing for scientific journals, or by giving assistance to students who, like myself, were characterized by a plethora of purse and a paucity of ideas; cooking, studying and sleeping in his attic lodgings; and prosecuting queer experiments all by himself.

We were not long discovering that even this eccentric genius could not transplant brains into my deficient skull. I gave over the struggle in despair. An unhappy year dragged its slow length around. A gloomy year it was, brightened only by occasional interviews with Abscissa, the Abbie of my thoughts and dreams.

Commencement day was coming on apace. I was soon to go forth, with the rest of my class, to astonish and delight a waiting world. The Professor seemed to avoid me more than ever. Nothing but the conventionalities, I think, kept him from shaping his treatment of me on the basis of unconcealed disgust.

At last, in the very recklessness of despair, I resolved to see him, plead with him, threaten him if need be, and risk all my fortunes on one desperate chance. I wrote him a somewhat defiant letter, stating my aspirations, and, as I flattered myself, shrewdly giving him a week to get over the first shock of horrified surprise. Then I was to call and learn my fate.

During the week of suspense I nearly worried myself into a fever. It was first crazy hope, and then saner despair. On Friday evening, when I presented myself at the Professor's door, I was such a haggard, sleepy, dragged-out specter, that even Miss Jocasta, the harsh-favored maiden sister of the Surd's, admitted me with commiserate regard, and suggested penny-royal tea.

Professor Surd was at a faculty meeting. Would I wait?

Yes, till all was blue, if need be. Miss Abbie?

Abscissa had gone to Wheelborough to visit a school-friend. The aged maiden hoped I would make myself comfortable, and departed to the unknown haunts which knew Jocasta's daily walk.

Comfortable! But I settled myself in a great uneasy chair and waited, with the contradictory spirit common to such junctures, dreading every step lest it should herald the man whom, of all men, I wished to see.

I had been there at least an hour, and was growing right drowsy.

At length Professor Surd came in. He sat down in the dusk opposite me, and I thought his eyes glinted with malignant pleasure as he said, abruptly:—

“So, young man, you think you are a fit husband for my girl?”

I stammered some inanity about making up in affection what I lacked in merit; about my expectations, family and the like. He quickly interrupted me.

“You misapprehend me, sir. Your nature is destitute of those mathematical perceptions and acquirements which are the only sure foundations of character. You have no mathematics in you. You are fit for treason, stratagems, and spoils.—Shakespeare. Your narrow intellect cannot understand and appreciate a generous mind. There is all the difference between you and a Surd, if I may say it, which intervenes between an infinitesimal and an infinite. Why, I will even venture to say that you do not comprehend the Problem of the Couriers!”

I admitted that the Problem of the Couriers should be classed rather without my list of accomplishments than within it. I regretted this fault very deeply, and suggested amendment. I faintly hoped that my fortune would be such—

“Money!” he impatiently exclaimed. “Do you seek to bribe a Roman Senator with a penny whistle? Why, boy, do you parade your paltry wealth, which, expressed in mills, will not cover ten decimal places, before the eyes of a man who measures the planets in their orbits, and close crowds infinity itself?”

I hastily disclaimed any intention of obtruding my foolish dollars, and he went on:

“Your letter surprised me not a little. I thought *you* would be the last person in the world to presume to an alliance here. But having a regard for you personally,”—and again I saw malice twinkle in his small eyes,—“and still more regard for Abscissa’s happiness, I have decided that you shall have her—upon conditions. Upon conditions,” he repeated, with a half smothered sneer.

“What are they?” cried I, eagerly enough. “Only name them.”

“Well, sir,” he continued, and the deliberation of his speech seemed the very refinement of cruelty, “you have only to prove yourself worthy an alliance with a mathematical family. You have only to

accomplish a task which I shall presently give you. Your eyes ask me what it is. I will tell you. Distinguish yourself in that noble branch of abstract science in which, you cannot but acknowledge, you are at present sadly deficient. I will place Abscissa’s hand in yours whenever you shall come before me and square the circle to my satisfaction. No! That is too easy a condition. I should cheat myself. Say perpetual motion. How do you like that? Do you think it lies within the range of your mental capabilities? You don’t smile. Perhaps your talents don’t run in the way of perpetual motion. Several people have found that theirs didn’t. I’ll give you another chance. We were speaking of the Problem of the Couriers, and I think you expressed a desire to know more of that ingenious question. You shall have the opportunity. Sit down some day, when you have nothing else to do, and discover the principle of infinite speed. I mean the law of motion which shall accomplish an infinitely great distance in an infinitely short time. You may mix in a little practical mechanics, if you choose. Invent some method of taking the tardy Courier over his road at the rate of sixty miles a minute. Demonstrate me this discovery (when you have made it!) mathematically, and approximate it practically, and Abscissa is yours. Until you can, I will thank you to trouble neither myself nor her.”

I could stand his mocking no longer. I stumbled mechanically out of the room, and out of the house. I even forgot my hat and gloves. For an hour I walked in the moonlight. Gradually I succeeded to a more hopeful frame of mind. This was due to my ignorance of mathematics. Had I understood the real meaning of what he asked, I should have been utterly despondent.

Perhaps this problem of sixty miles a minute was not so impossible after all. At any rate I could attempt, though I might not succeed. And Rivarol came to my mind. I would ask him. I would enlist his knowledge to accompany my own devoted perseverance. I sought his lodgings at once.

The man of science lived in the fourth story, back. I had never been in his room before. When I entered, he was in the act of filling a beer mug from a carboy labeled *Aqua fortis*.

“Seat you,” he said. “No, not in that chair. That is my Petty Cash Adjuster.”

But he was a second too late. I had carelessly thrown myself into a chair of seductive appearance. To my utter amazement it reached out two skeleton arms and clutched me with a grasp against which I struggled in vain. Then a skull stretched itself over my shoulder and grinned with ghastly familiarity close to my face.

Rivarol came to my aid with many apologies. He touched a spring somewhere and the Petty Cash Adjuster relaxed its horrid hold. I placed myself gingerly in a plain cane-bottomed rocking-chair, which Rivarol assured me was a safe location.

"That seat," he said, "is an arrangement upon which I much felicitate myself. I made it at Heidelberg. It has saved me a vast deal of small annoyance. I consign to its embraces the friends who bore, and the visitors who exasperate, me. But it is never so useful as when terrifying some tradesman with an insignificant account. Hence the pet name which I have facetiously given it. They are invariably too glad to purchase release at the price of a bill receipted. Do you well apprehend the idea?"

While the Alsatian diluted his glass of *Aqua fortis*, shook into it an infusion of bitters, and tossed off the bumper with apparent relish, I had time to look around the strange apartment.

The four corners of the room were occupied respectively by a turning-lathe, a Rhumkorff Coil, a small steam-engine and an orrery in stately motion. Tables, shelves, chairs and floor supported an odd aggregation of tools, retorts, chemicals, gas-receivers, philosophical instruments, boots, flasks, paper-collar boxes, books diminutive and books of preposterous size. There were plaster busts of Aristotle, Archimedes and Compté, while a great drowsy owl was blinking away, perched on the benign brow of Martin Farquhar Tupper. "He always roosts there when he proposes to slumber," explained my tutor. "You are a bird of no ordinary mind. *Schlafen Sie wohl.*"

Through a closet door, half open, I could see a human-like form covered with a sheet. Rivarol caught my glance.

"That," said he, "will be my masterpiece. It is a Microcosm, an Android, as yet only partially complete. And why not? Albertus Magnus constructed an image perfect to talk metaphysics and confute the schools. So did Sylvester II; so did Robertus Greathead. Roger Bacon

made a brazen head that held discourses. But the first named of these came to destruction. Thomas Aquinas got wrathful at some of its syllogisms and smashed its head. The idea is reasonable enough. Mental action will yet be reduced to laws as definite as those which govern the physical. Why should not I accomplish a mannikin which shall preach as original discourses as the Rev. Dr. Allchin, or talk poetry as mechanically as Paul Anapest? My Android can already work problems in vulgar fractions and compose sonnets. I hope to teach it the Positive Philosophy."

Out of the bewildering confusion of his effects Rivarol produced two pipes and filled them. He handed one to me.

"And here," he said, "I live and am tolerably comfortable. When my coat wears out at the elbows I seek the tailor and am measured for another. When I am hungry I promenade myself to the butcher's and bring home a pound or so of steak, which I cook very nicely in three seconds by this oxy-hydrogen flame. Thirsty, perhaps, I send for a carboy of *Aqua fortis*. But I have it charged, all charged. My spirit is above any small pecuniary transaction. I loathe your dirty greenbacks and never handle what they call scrip."

"But are you never pestered with bills?" I asked. "Don't the creditors worry your life out?"

"Creditors!" gasped Rivarol. "I have learned no such word in your very admirable language. He who will allow his soul to be vexed by creditors is a relic of an imperfect civilization. Of what use is science if it cannot avail a man who has accounts current? Listen. The moment you or any one else enters the outside door this little electric bell sounds me warning. Every successive step on Mrs. Grimler's staircase is a spy and informer vigilant for my benefit. The first step is trod upon. That trusty first step immediately telegraphs your weight. Nothing could be simpler. It is exactly like any platform scale. The weight is registered up here upon this dial. The second step records the size of my visitor's feet. The third his height, the fourth his complexion, and so on. By the time he reaches the top of the first flight I have a pretty accurate description of him right here at my elbow, and quite a margin of time for deliberation and action. Do you follow me? It is plain enough. Only the A B C of my science."

"I see all that," I said, "but I don't see how it helps you any. The knowledge that a creditor is coming won't pay his bill. You can't escape unless you jump out of the window."

Rivarol laughed softly. "I will tell you. You shall see what becomes of any poor devil who goes to demand money of me—a man of science. Ha! ha! It pleases me. I was seven weeks perfecting my Dun Suppressor. Did you know,"—he whispered exultingly,—“did you know that there is a hole through the earth's center? Physicists have long suspected it; I was the first to find it. You have read how Rhuuyghens, the Dutch navigator, discovered in Kerguelen's Land an abysmal pit which fourteen hundred fathoms of plumb-line failed to sound. Herr Tom, that hole has no bottom! It runs from one surface of the earth to the antipodal surface. It is diametric. But where is the antipodal spot? You stand upon it. I learned this by the merest chance. I was deep-digging in Mrs. Grimler's cellar, to bury a poor cat I had sacrificed in a galvanic experiment, when the earth under my spade crumbled, caved in, and wonder-stricken I stood upon the brink of a yawning shaft. I dropped a coal-hod in. It went down, down, down, bounding and rebounding. In two hours and a quarter that coal-hod came up again. I caught it and restored it to the angry Grimler. Just think a minute. The coal-hod went down, faster and faster, till it reached the center of the earth. There it would stop, were it not for acquired momentum. Beyond the center its journey was relatively upward, toward the opposite surface of the globe. So, losing velocity, it went slower and slower till it reached that surface. Here it came to rest for a second and then fell back again, eight thousand odd miles, into my hands. Had I not interfered with it, it would have repeated its journey, time after time, each trip of shorter extent, like the diminishing oscillations of a pendulum, till it finally came to eternal rest at the center of the sphere. I am not slow to give a practical application to any such grand discovery. My Dun Suppressor was born of it. A trap, just outside my chamber door: a spring in here: a creditor on the trap:—need I say more?"

"But isn't it a trifle inhuman?" I mildly suggested. "Plunging an unhappy being into a perpetual journey to and from Kerguelen's Land, without a moment's warning."

"I give them a chance. When they come up the first time I wait at the mouth of the shaft with a rope in hand. If they are reasonable and will come to terms, I fling them the line. If they perish, 'tis their own fault. Only," he added, with a melancholy smile, "the center is getting so plugged up with creditors that I am afraid there soon will be no choice whatever for 'em."

By this time I had conceived a high opinion of my tutor's ability. If anybody could send me waltzing through space at an infinite speed, Rivarol could do it. I filled my pipe and told him the story. He heard with grave and patient attention. Then, for full half an hour, he whiffed away in silence. Finally he spoke.

"The ancient cipher has over-reached himself. He has given you a choice of two problems, both of which he deems insoluble. Neither of them is insoluble. The only gleam of intelligence Old Cotangent showed was when he said that squaring the circle was too easy. He was right. It would have given you your *Liebchen* in five minutes. I squared the circle before I discarded pantalets. I will show you the work,—but it would be a digression, and you are in no mood for digressions. Our first chance, therefore, lies in perpetual motion. Now, my good friend, I will frankly tell you that, although I have compassed this interesting problem, I do not choose to use it in your behalf. I too, Herr Tom, have a heart. The loveliest of her sex frowns upon me. Her somewhat mature charms are not for Jean Marie Rivarol. She has cruelly said that her years demand of me filial rather than connubial regard. Is love a matter of years or of eternity? This question did I put to the cold, yet lovely, Jocasta."

"Jocasta Surd!" I remarked in surprise, "Abscissa's aunt!"

"The same," he said, sadly. "I will not attempt to conceal that upon the maiden Jocasta my maiden heart has been bestowed. Give me your hand, my nephew in affliction as in affection!"

Rivarol dashed away a not discreditable tear, and resumed:—

"My only hope lies in this discovery of perpetual motion. It will give me the fame, the wealth. Can Jocasta refuse these? If she can, there is only the trap-door and—Kerguelen's Land!"

I bashfully asked to see the perpetual-

motion machine. My uncle in affliction shook his head.

"At another time," he said. "Suffice it at present to say, that it is something upon the principle of a woman's tongue. But you see now why we must turn in your case to the alternative condition,—infinite speed. There are several ways in which this may be accomplished, theoretically. By the lever, for instance. Imagine a lever with a very long and a very short arm. Apply power to the shorter arm which will move it with great velocity. The end of the long arm will move much faster. Now keep shortening the short arm and lengthening the long one, and as you approach infinity in their difference of length, you approach infinity in the speed of the long arm. It would be difficult to demonstrate this practically to the Professor. We must seek another solution. Jean Marie will meditate. Come to me in a fortnight. Good night. But stop! Have you the money,—*das Geld?*"

"Much more than I need."

"Good! Let us strike hands. Gold and Knowledge; Science and Love. What may not such a partnership achieve? We go to conquer thee, Abscissa. *Vorwärts!*"

When, at the end of a fortnight, I sought Rivarol's chamber, I passed with some little trepidation over the terminus of the Air Line to Kerguellen's Land, and evaded the extended arms of the Petty Cash Adjuster. Rivarol drew a mug of ale for me, and filled himself ere tort of his own peculiar beverage.

"Come," he said at length. "Let us drink success to the TACHYPOMP."

"The TACHYPOMP?"

"Yes. Why not?" *Tachu*, quickly, and *pempo*, *pepompa*, to send. May it send you quickly to your wedding-day. Abscissa is yours. It is done. When shall we start for the prairies?"

"Where is it?" I asked, looking in vain around the room for any contrivance which might seem calculated to advance matrimonial prospects.

"It is here," and he gave his forehead a significant tap. Then he held forth didactically.

"There is force enough in existence to yield us a speed of sixty miles a minute, or even more. All we need is the knowledge how to combine and apply it. The wise man will not attempt to make some great force yield some great speed. He will keep adding the little force to the little

force, making each little force yield its little speed, until an aggregate of little forces shall be a great force, yielding an aggregate of little speeds, a great speed. The difficulty is not in aggregating the forces; it lies in the corresponding aggregation of the speeds. One musket-ball will go, say a mile. It is not hard to increase the force of muskets to a thousand, yet the thousand musket balls will go no farther, and no faster, than the one. You see, then, where our trouble lies. We cannot readily add speed to speed, as we add force to force. My discovery is simply the utilization of a principle which extorts an increment of speed from each increment of power. But this is the metaphysics of physics. Let us be practical or nothing.

"When you have walked forward, on a moving train, from the rear car, toward the engine, did you ever think what you were really doing?"

"Why, yes, I have generally been going to the smoking-car to have a cigar."

"Tut, tut,—not that! I mean did it ever occur to you on such an occasion, that absolutely you were moving faster than the train? The train passes the telegraph poles at the rate of thirty miles an hour, say. You walk towards the smoking-car at the rate of four miles an hour. Then *you* pass the telegraph poles at the rate of thirty-four miles. Your absolute speed is the speed of the engine, plus the speed of your own locomotion. Do you follow me?"

I began to get an inkling of his meaning, and told him so.

"Very well. Let us advance a step. Your addition to the speed of the engine is trivial, and the space in which you can exercise it, limited. Now suppose two stations, A and B, two miles distant by the track. Imagine a train of platform cars, the last car resting at station A. The train is a mile long, say. The engine is therefore within a mile of station B. Say the train can move a mile in ten minutes. The last car, having two miles to go, would reach B in twenty minutes, but the engine, a mile ahead, would get there in ten. You jump on the last car, at A, in a prodigious hurry to reach Abscissa, who is at B. If you stay on the last car it will be twenty long minutes before you see her. But the engine reaches B and the fair lady in ten. You will be a stupid reasoner, and an indifferent lover, if you don't put for the engine over those platform cars, as fast as your legs will carry you. You can run a mile,

the length of the train, in ten minutes. Therefore, you reach Abscissa when the engine does, or in ten minutes,—ten minutes sooner than if you had lazily sat down upon the rear car, and talked politics with the brakeman. You have diminished the time by one-half. You have added your speed to that of the locomotive to some purpose. *Nicht wahr?* ”

I saw it perfectly; much plainer, perhaps, for his putting in the clause about Abscissa.

He continued:—

“This illustration, though a slow one, leads up to a principle which may be carried to any extent. Our first anxiety will be to spare your legs and wind. Let us suppose that the two miles of track are perfectly straight, and make our train one platform car, a mile long, with parallel rails laid upon its top. Put a little dummy engine on these rails, and let it run to and fro along the platform car, while the platform car is pulled along the ground track. Catch the idea? The dummy takes your place. But it can run its mile much faster. Fancy that our locomotive is strong enough to pull the platform car over the two miles in two minutes. The dummy can attain the same speed. When the engine reaches B in one minute, the dummy, having gone a mile a-top the platform car, reaches B also. We have so combined the speeds of those two engines as to accomplish two miles in one minute. Is this all we can do? Prepare to exercise your imagination.”

I lit my pipe.

“Still two miles of straight track, between A and B. On the track a long platform car, reaching from A to within a quarter of a mile of B. We will now discard ordinary locomotives and adopt as our motive power a series of compact magnetic engines, distributed underneath the platform car, all along its length.”

“I don't understand those magnetic engines.”

“Well, each of them consists of a great iron horseshoe, rendered alternately a magnet and not a magnet by an intermittent current of electricity from a battery, this current in its turn regulated by clock-work. When the horseshoe is in the circuit, it is a magnet, and it pulls its clapper toward it with enormous power. When it is out of the circuit, the next second, it is not a magnet and it lets the clapper go. The clapper, oscillating to and fro, imparts a

rotatory motion to a fly-wheel, which transmits it to the drivers on the rails. Such are our motors. They are no novelty, for trial has proved them practicable.

“With a magnetic engine for every truck of wheels, we can reasonably expect to move our immense car, and to drive it along at a speed, say, of a mile a minute.

“The forward end, having but a quarter of a mile to go, will reach B in fifteen seconds. We will call this platform car number 1. On top of number 1 are laid rails on which another platform car, number 2, a quarter of a mile shorter than number 1, is moved in precisely the same way. Number 2, in its turn, is surmounted by number 3, moving independently of the tiers beneath, and a quarter of a mile shorter than number 2. Number 2 is a mile and a half long; number 3 a mile and a quarter. Above, on successive levels, are number 4, a mile long; number 5 three-quarters of mile; number 6, half a mile; number 7, a quarter of a mile, and number 8, a short passenger car, on top of all.

“Each car moves upon the car beneath it, independently of all the others, at the rate of a mile a minute. Each car has its own magnetic engines. Well, the train being drawn up with the latter end of each car resting against a lofty bumping-post at A, Tom Furnace, the gentlemanly conductor, and Jean Marie Rivarol, engineer, mount by a long ladder to the exalted number 8. The complicated mechanism is set in motion. What happens?

“Number 8 runs a quarter of a mile in fifteen seconds and reaches the end of number 7. Meanwhile number 7 has run a quarter of a mile in the same time and reached the end of number 6; number 6, a quarter of a mile in fifteen seconds, and reached the end of number 5; number 5, the end of number 4; number 4, of number 3; number 3, of number 2; number 2, of number 1. And number 1, in fifteen seconds, has gone its quarter of a mile along the ground track, and has reached station B. All this has been done in fifteen seconds. Wherefore, numbers 1, 2, 3, 4, 5, 6, 7 and 8 come to rest against the bumping-post at B, at precisely the same second. We, in number 8, reach B just when number 1 reaches it. In other words, we accomplish two miles in fifteen seconds. Each of the eight cars, moving at the rate of a mile a minute, has contributed a quarter of a mile to our journey, and has done its work in fifteen seconds. All the eight did their

work at once, during the same fifteen seconds. Consequently we have been whizzed through the air at the somewhat startling speed of seven and a half seconds to the mile. This is the Tachypomp. Does it justify the name?"

Although a little bewildered by the complexity of cars, I apprehended the general principle of the machine. I made a diagram and understood it much better. "You have merely improved on the idea of my moving faster than the train when I was going to the smoking car?"

"Precisely. So far we have kept within the bounds of the practicable. To satisfy the professor you can theorize in something after this fashion: If we double the number of cars, thus decreasing by one-half the distance which each has to go, we shall attain twice the speed. Each of the sixteen cars will have but one-eighth of a mile to go. At the uniform rate we have adopted, the two miles can be done in seven and a half instead of fifteen seconds. With thirty-two cars, and a sixteenth of a mile, or twenty rods difference in their length, we arrive at the speed of a mile in less than two seconds; with sixty-four cars, each traveling but ten rods, a mile under the second. More than sixty miles a minute! If this isn't rapid enough for the professor, tell him to go on, increasing the number of his cars and diminishing the distance each one has to run. If sixty-four cars yield a speed of a mile inside the second, let him fancy a Tachypomp of six hundred and forty cars, and amuse himself calculating the rate of car number 640. Just whisper to him that when he has an infinite number of cars with an infinitesimal difference in their lengths, he will have obtained that infinite speed for which he seems to yearn. Then demand Abscissa."

I wrung my friend's hand in silent and grateful admiration. I could say nothing.

"You have listened to the man of theory," he said proudly. "You shall now behold the practical engineer. We will go to the west of the Mississippi and find some suitably level locality. We will erect thereon a model Tachypomp. We will

summon thereunto the professor, his daughter, and why not his fair sister Jocasta, as well? We will take them a journey which shall much astonish the venerable Surd. He shall place Abscissa's digits in yours and bless you both with an algebraic formula. Jocasta shall contemplate with wonder the genius of Rivarol. But we have much to do. We must ship to St. Joseph the vast amount of material to be employed in the construction of the Tachypomp. We must engage a small army of workmen to effect that construction, for we are to annihilate time and space. Perhaps you had better see your bankers."

I rushed impetuously to the door. There should be no delay.

"Stop! stop! *Um Gottes Willen*, stop!" shrieked Rivarol. "I launched my butcher this morning and I haven't bolted the—"

But it was too late. I was upon the trap. It swung open with a crash, and I was plunged down, down, down! I felt as if I were falling through illimitable space. I remember wondering, as I rushed through the darkness, whether I should reach Kerguelen's Land, or stop at the center. It seemed an eternity. Then my course was suddenly and painfully arrested.

I opened my eyes. Around me were the walls of Professor Surd's study. Under me was a hard, unyielding plane which I knew too well was Professor Surd's study floor. Behind me was the black, slippery hair-cloth chair which had belched me forth, much as the whale served Jonah. In front of me stood Professor Surd himself, looking down with a not unpleasant smile.

"Good evening, Mr. Furnace. Let me help you up. You look tired, sir. No wonder you fell asleep when I kept you so long waiting. Shall I get you a glass of wine? No? By the way, since receiving your letter I find that you are a son of my old friend, Judge Furnace. I have made inquiries, and see no reason why you should not make Abscissa a good husband."

Still I can see no reason why the Tachypomp should not have succeeded. Can you?

