Correspondence.

The New Brooks Comet.

To the Editor of the Scientific American:

On Saturday evening, Dec. 26th, it was my privilege to discover a new comet, low down in the western heavens. It was also independently observed on the following night by Barnard at Nashville. At the time of my discovery it was about five degrees nearly southward of the star Altair in the Eagle. It is quite a bright telescopic comet, of considerable diameter, with a very prominent nucleus. The discovery was verified by an observation at Harvard College Observatory on the 28th inst.

This is the second comet it has been my good fortune to discover during the present year, the date of the former discovery being August 31, 1885.

WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y., Dec. 29, 1885.

Dangerously Connected Boilers.

To the Editor of the Scientific American:

You mention a case of the "unexpected" in the SCIENTIFIC AMERICAN of Nov. 28, as follows: "Two steam boilers were set side by side, and connected together at bottom and top, and partly filled with water; when fire was made under them, the water would shift from one to the other." The cause was the *friction* of the steam in passing through the *small steam connection* from the hottest boiler, which pressure pressed the water out of it into the other. I have seen two cases of this kind, and both were remedied by making the connections six inches in diameter instead of two and a half inches on two boilers forty-two inches by sixteen feet long. This shows what appears mysterious to one party is plain to another when seen from the practical side.

J. H. B.

Dayton, O., Nov. 30, 1885.

Railway Cross Ties.

To the Editor of the Scientific American:

I have been interested in reading the communication of F. B. Hough in your paper of November 21, in relation to railway cross ties. I also noticed an item from P. Barry, suggesting metallic ties as an imperishable substitute, also suggesting legislation to protect the American forests.

Permit me to say that, after much track walking and observation of condition of wooden cross ties in various stages of decay, the principal cause of their short life is not natural decay, but is decay hastened by frequent laceration and breaking of the wood fiber by the rail spike. The breakage is in every instance from the surface, which is unsheltered from weather and subjected to constant strain from passing trains. Now, experiments in stone and iron ties have been very unsatisfactory; in fact, their impracticability is admitted, for reasons evident to railroad men. The wood tie is at present the "sine qua non."

If any device can be put in use which will make more lasting the service of the wood tie, a great benefit will be conferred upon the public. My observation leads me to estimate that a rail chair which will prevent the mutilation of the tie referred to, and at same time avoid the strain and wave motion imparted to rails by passing trains, will add to the average life of the wood tie nearly 100 per cent, and would at same time decrease the cost of track maintenance—both objects very much to be desired by railway companies.

GEO. H. FORD.

Columbus, O., Dec. 26, 1885.

Right and Left Handed.

To the Editor of the Scientific American:

On page 323 of SCIENTIFIC AMERICAN, of Nov. 21, 1885, appears an explanation of what makes a man right or left handed. I am a locomotive engineer. I fired a locomotive four years before being promoted, and have had probably fifty different men to fire for me in the last ten years. With but one exception they all stood, as I did, on the left side of the tender, taking hold of the top of the scoop shovel with the right hand, the left hand being down near the blade. Those men, excepting the one already mentioned, hold the knife, while eating, with the right hand; they write with the right hand, shake with the right hand, light their pipes and cigars with the right hand, and, like myself, can't understand how it is that they shovel coal and hook their fires *left handed.* Out of the first five hundred men one may meet while out walking, not more than thirty will use their left hands for all ordinary one-handed operations. All the others, and some of those thirty, will shovel, hook, hoe, plane, drive nails, etc., with the right hand, yet, according to the explanation given, they are left handed. It is curious that all men who are really right handed should be said to shovel left handed, and it will take some more elucidation to convince myself and many others that such is the case. In shoveling as I do, and as ninety out of every hundred men that I have seen shovel, the right hand gives the thrust that fills the shovel, guides it in discharging the load, and is always the last hand to let go when done with it; and the short of it is that it is provoking to be called left handed when the right is used for nearly everything.

CHAS. W. NOEL.

Baltimore, Md., Dec. 28, 1885.

The Channelways of New York Harbor.

To the Editor of the Scientific American:

I have read, in your issue of January 2, 1886, the editorial article headed "Improve the Channelways," and I regret to be compelled to notice misleading inaccuracies contained therein. In the first place, the Congressional act which appropriated $200,000 for the improvement of Gedney's Channel, New York Harbor, was silent in regard to the way in which the money should be applied. No system or plan of improvement was suggested or dictated. The proposals, issued in accordance with law, invited feasible plans from responsible contractors. Many proposals were received, and that one which contemplated the use of the hydraulic plow, and which was strongly urged, personally and through the press, by the representatives of some of the steamship companies, was accepted with the view of testing it to the satisfaction of those companies or their representatives, *and with their money*, though the Government had little faith in the efficacy of the project.

It was an experimental plan, and it was thought best, in deference to the expressed wishes of the ship owners, to give it a trial, so as to get rid of it, after failure, once and for all, and to clear the way for other and more assured plans. It *was* tried, under favorable circumstances, and the result proved unsatisfactory to the projectors, as their contract was canceled, and no payment was made to them for the expenses they had incurred.

A second contract has since been made, with another contractor, which provides for the removal *bodily* of the obstructing material, for which payment will be made per cubic yard dredged and removed to a dumping ground in sixteen fathoms of water. The material is heavy shingle, and can be removed, by natural agencies, only after the construction of extended artificial works of contraction. Such works will require large outlays of money, covering long periods of time, if precedents are to govern the future annual appropriations for works of improvement. It was, therefore, deemed most judicious, in the interest of navigation, to apply at once the present appropriation toward the deepening of Gedney's Channel by dredging, in the hope that, when the larger material had been removed from the bar, in that way the currents would reasonably well maintain the improved depth until Congress provided by additional appropriations for the construction of permanent works which would give and maintain increased depths, equal to the most liberal demands of commerce. Up to the present time, *not a single dollar has been paid to any contractor for any work done or attempted to be done under the appropriation for improving Gedney's Channel.*

My personal and careful examination of the material composing the bar enables me to state with great positiveness that no evidences of any city dumping have been found in Gedney's Channel, though I do not doubt that unlawful dumpings of garbage are frequently made upon the adjacent shoals.

There is no ground whatever for the statement, so often repeated, that the depth in Gedney's Channel has been rapidly shoaling during the past ten years. On the contrary, my survey of the Lower Bay in 1884 shows that the existing depth over the bar has never been exceeded at any time in the known history of the harbor, though it cannot be denied that it is inadequate to the wants of the modern iron vessel, whose draught is three feet greater than that of the average vessel of ten or more years ago. There has been no decline in the main channel—it has rather improved in depth; and the complaint of shoal water is made only because the *draught of vessels has been increased.* Over a year ago I put myself on record by recommending that the depth on the bar at low tide should be increased to 30 feet. I still advocate the necessity for that improved depth, not, however, because the channels are shoaling, but because the large ocean carriers demand more water than the average vessel of to-day. If Congress is to be asked to relieve this harbor from the tribute of delays and discomforts now imposed upon it by insufficient depths on the bar, it is not right to misstate the conditions on which the request is made.

G. L. GILLESPIE, *U. S. Engineers.*

Amblystoma vs. Axolotl.

To the Editor of the Scientific American:

I notice in your issue of December 19 some remarks upon the axolotl, and read them with interest. Allow me to make a few remarks upon this subject, which, though they are none of them new, may be of interest in that they reflect the observations of some of our well known authorities upon this same curious subject—the change of axolotl into amblystoma.

Now, a curious feature in the case is this: the axolotl stands at one end of the order *Urodela*, or *salamanders*, and the amblystoma at the other. The question here arises, As one must necessarily be higher in the scale of being than the other (at least according to the evolutionists), which is the most highly developed?

We are informed by Tenney that "the Siredons have always been regarded with great interest, because they represent, even in their adult form, one of the transient stages of the higher Urodelan batrachians. But, of late, they have become still more interesting from the fact that Professor O. C. Marsh (see *American Journal of Science and Arts*, November, 1868) has discovered that under some circumstances the *Siredon lichenoides, Baird*, wholly abandons the Siredon form, and becomes a genuine *Amblystoma mavortium, Baird.* He adds that "two specimens, most favored in regard to light and warmth, passed apparently through the entire transformation in about twenty days. Others, less favored, took at least twice that time."

Packard tells us that "the most interesting of all the salamanders is the *Amblystoma mavortium*, whose larva is called axolotl, and was originally described as a perennibranchiate amphibian under the name of *Siredon lichenoides, Baird.*"

Many other cases could be cited where the idea prevails that the one is simply a larval stage of the other. Now we have a most curious anomaly, should we accept the hypothesis of axolotl being the true larval stage, of amblystoma the true form and parent, that of the adult form and the larval form living together side by side, the one in the water and the other on land, and going through with complete transformations, yet at the same time breeding and reproducing each his kind independent of the other, and perhaps—some at least—never transforming at all. Where will you find, in the vertebrate kingdom at least, another example of climatic or other suppression of a larval form into a perfect and apparently complete animal, reproducing its kind in security and apparently preference? The most familiar example of development from embryo resembling a perfect animal to the true animal itself is that of the tadpole becoming the frog. Yet the various stages of the tadpole are not permanent, but progressive, and in a few months progress into complete young frogs, which, in the ordinary species, require three years in which to develop before breeding, and in "the tree frog" four years before it begins to reproduce. Packard, who evidently considers this axolotl a true larval form of amblystoma, remarks of the former: "In the axolotl there is a premature development of the reproductive organs." Should these organs show in any way an imperfect or only a partial development, we would have indeed strong evidence that this animal was a true larval stage. Now, the difference in structure between axolotl and amblystoma is perhaps fully as wide as between the tadpole and the frog. Yet in the latter case we know that the one is a larva of the other, and in its larval stage does not propagate. If, now, I am wrong, will somebody correct me? But do any of the vertebrate animals propagate or reproduce, in their larval stage, in as perfect a manner as the axolotl? I fail to recall any such. Should there be no other example of the kind, this larval theory would be alone, and even more extraordinary than the reversion of type theory which has been applied to this case by non-evolutionists: that the axolotl in its restricted location and extent was simply a reversion of the older and earlier geological form of amblystoma. Now, let some one reverse the order, and turn the amblystoma into an axolotl. Is it impossible?

W. A. STEARNS.

Amherst, Mass.

Russian Peat Fuel.

In Russia, on the Northern Railway, the locomotives, hitherto burning wood or coal, are being adapted for peat burning, and the saving is estimated by the directors at fully 50 per cent. The principal market for the fuel is in the Moscow district, where it is becoming increasingly popular at the numerous manufactories to be found there. In many places the peat is cut by hand machines, but these, although cheap and easy to work, have the drawback that the peat cannot be worked below 8 feet, whereas the peat-cutting machines worked by steam power penetrate 20 feet, and reach the lower, denser layers of peat, which, owing to their superior quality, fetch a higher price in the market. Most of the machines in use are manufactured by Maltseff and Shliekhausen, at Moscow, and Shreeve, at Riazan. The newer ones, which contain numerous improvements, turn out 33,000 or 40,000 bricks a day. At present there is reported to be a great want of a peat-cutting machine workable by horses, that would take the place between the ordinary hand cutting machines and those worked by steam. The latter cost about $4,000. There is a demand for a simpler machine, that could be worked by a team of horses. Here is a chance for inventors. Large deposits of peat exist in this country, and many years ago they were considerably worked. But it was found that coal was supplied cheaper than the peat beds could be worked, and hence peat fuel is not at present much used.

A NOVEL CLOCK.

We take pleasure in presenting to our readers the following description of a differential clock, invented and designed by Mr. H. Conant, of Pawtucket, R. I., and built for him by Messrs. Tiffany & Co., of this

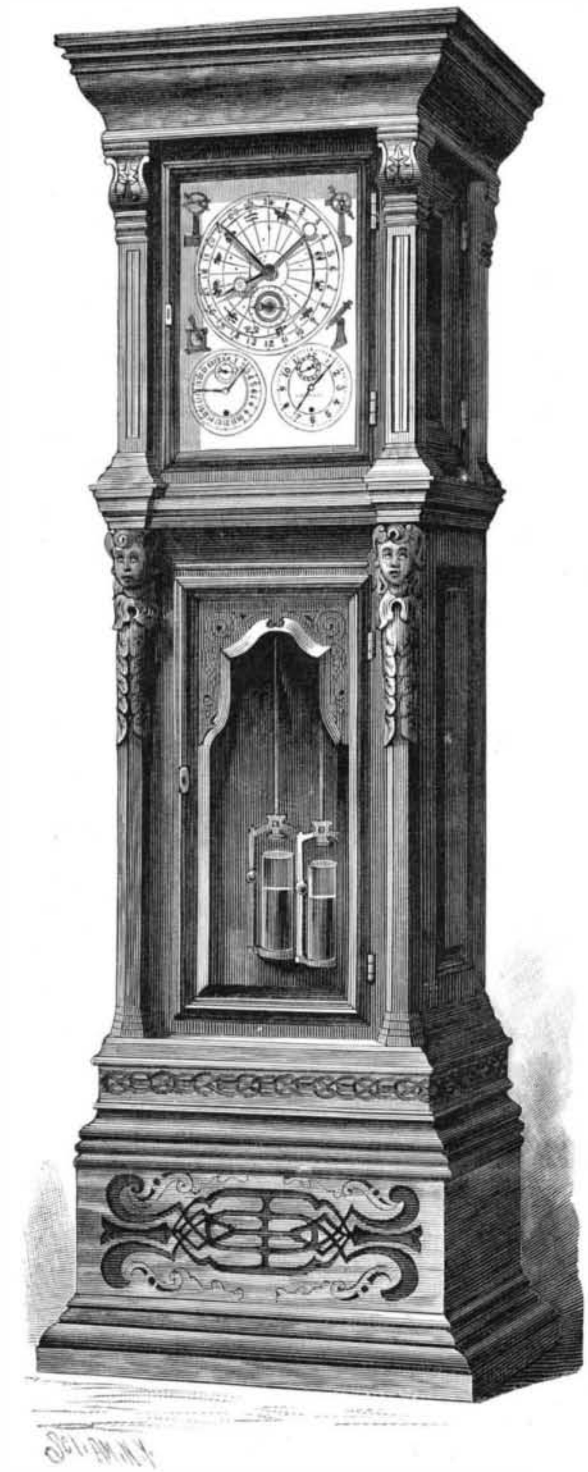

Fig. 1.—THE CONANT DIFFERENTIAL CLOCK.

city, in their best manner. Fig. 1 is a perspective view of the clock; Fig. 2 is an enlarged view of the dials; Fig. 3 is a front elevation of the works with the dials removed; and Fig. 4 is a side view of the diagonal shafts, *a* and *b*, and the differential motion; similar letters refer to the same parts in the different engravings.

There are two principal motions that belong to our

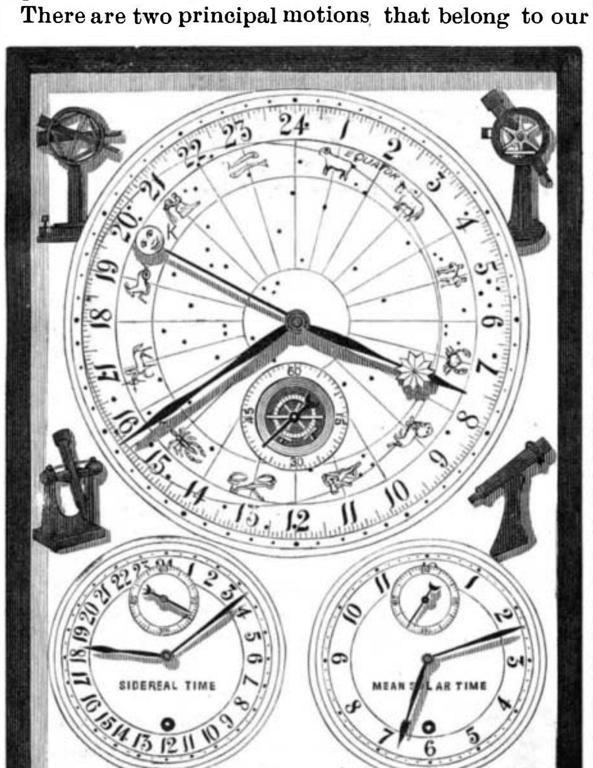

Fig. 2.—ENLARGED VIEW OF THE DIALS.

planet—one of rotation upon its axis, called its diurnal motion, producing succession of day and night, and another, that of its orbit, or revolution round the sun, called its annual motion, which causes the four seasons of the year. The exact time occupied by its first, the diurnal, rotation is 23 hours 56 minutes and 4·09 seconds, this being a sidereal day, so called, because in that time the stars appear to complete one revolution round the earth. But as, while the earth is rotating on its own axis, it is also traveling forward in its orbit around the sun, it therefore has to turn a little more each day—about one three hundred and sixty-fifth part of its circumference, which amounts to 3 minutes 56 seconds of time—before a given meridian is again under the sun; in other words, it will require 24 hours on an average through the year for the sun to pass from one meridian of a place to the same meridian again. If this difference in time of the two revolutions be multiplied by 365, which is the number of times a meridian has been brought to the sun during the year, the result would be one sidereal day; consequently, the earth in reality turns on its axis 366 times each year.

Now, if a clock were constructed with two works or movements, and, of course, each movement with its own pendulum and weight, one regulated to mark mean solar time and the other to mark sidereal time, it is evident that, as the one would continually gain at the rate of about 3 minutes 56 seconds a day on the other, the time indicated on the two dials would correspond but once in a year; and if this difference in time of the two dials could be automatically recorded on a third dial, it would mark the space which, in consequence of the earth's motion, the sun appears to describe among the stars. This great circle of the sun's apparent yearly motion is divided into twenty-four meridians, and is called right ascension, that measure in the heavens which is the same to the astronomer as longitude is to the navigator. These meridians are not reckoned in degrees, but in hours, minutes, and seconds of time; thus 15 deg. would answer to 1 hour, 1 deg. to 4 minutes, ½ deg. to 2 minutes, and ¼ deg. to 1 minute.

The clock herewith illustrated accomplishes this object by a most simple and ingenious arrangement of the parts.

Firmly secured on a solid base of metal are two regulators, each having a one-second mercurial pendulum. One of the pendulums is regulated to mean solar time and the other to sidereal time, the dial of the latter being divided into 24 hours and that of the former into 12 hours. The escape wheel shaft of each clock is long enough to reach out through the dial plate, and on the outer part is fitted, with a slight friction, a sleeve. On the inner ends of these sleeves are the beveled wheels, *c d*, of 90 teeth each, and their outer ends carry pointers indicating seconds on the dial plates. Engaging with these wheels are beveled pinions, of 30 teeth each, mounted on the lower ends of the long shafts, *a b*, which are carried up at an angle of about 45 deg. and connected with a differential motion (Fig. 4) controlling the works and hands of a larger dial placed above the two others. This peculiar motion is constructed of a light and accurately turned arbor or shaft, *h*, on which is fastened at right angles a crosspiece, on one end of which is mounted the wheel, *g*. On the shaft, *h*, and engaging with the wheel, *g*, are two larger wheels, *e f*, of 90 teeth each; these wheels are cut on both sides, as clearly shown in Fig. 4. Engaging with these wheels are wheels of 60 teeth each, fastened on the upper ends of the shafts, *a b*. It will be seen that both clocks are directly connected with the differential motion, and also that as long as the wheels, *e f*, which turn in opposite directions, are driven at the same speed, the wheel, *g*, will simply roll on its pivot without altering its position or that of the shaft, *h*. But assuming that the wheel, *f*, revolves twice around while the wheel, *e*, revolves once, then the wheel, *g*, will necessarily follow *f*, and in proportion to the speed of the two wheels, *e f*; but as these wheels move in opposite directions, it consequently follows that one-half the difference in the rates is lost, or instead of making a complete revolution—the difference between 1 and 2—it has only recorded half a revolution.

Now, to compensate for this error—in other words, to regain the half revolution lost—the wheels on the upper ends of the shafts, *a b*, have 60 teeth each, and the pinions at the lower ends have 30 teeth each; and as the driving wheels, *c d*, having 90 teeth each, are connected through the pinions, shafts *a b*, and upper wheels with the wheels, *e f*, also of 90 teeth,

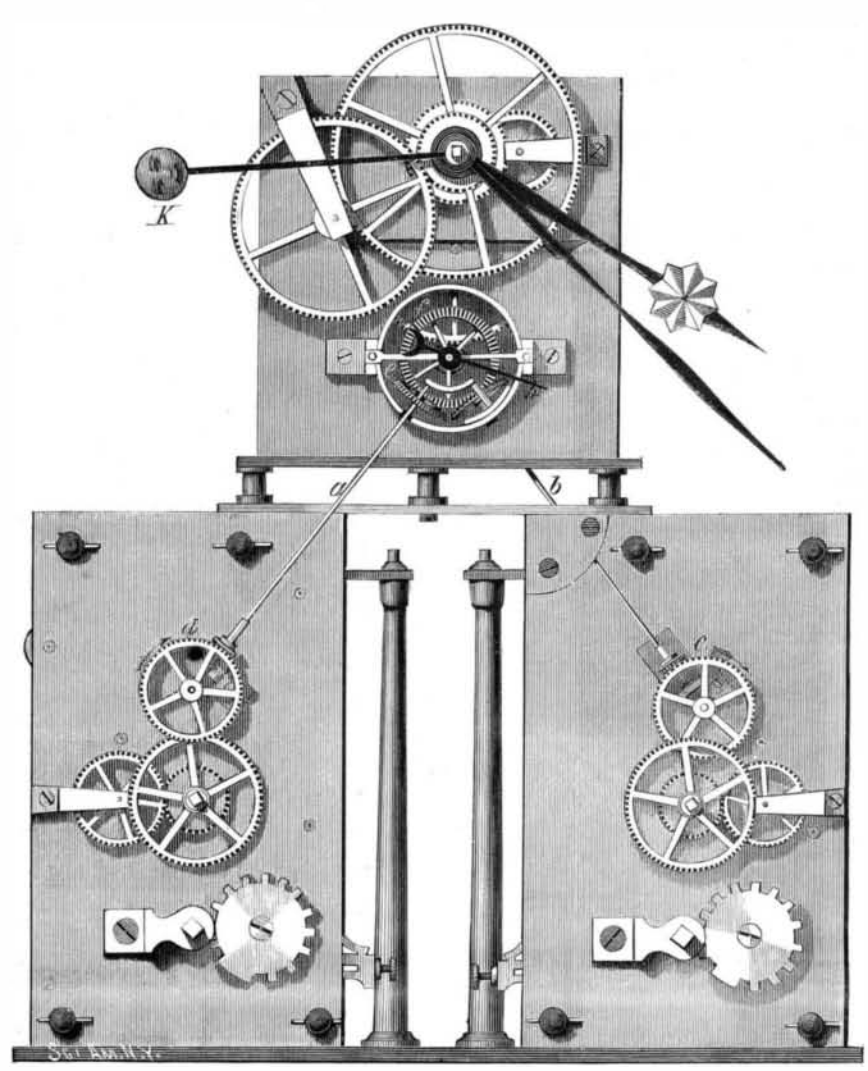

Fig. 3.—VIEW OF WORKS WITH DIALS REMOVED.

it is evident that the wheels, *e f*, revolve twice while the wheels, *c d*, revolve once. By thus proportioning the gears, the exact difference in the speeds of the wheels *c d*, is transmitted to the shaft, *h*, and is recorded by the pointer or hand.

Now, as the clock marking sidereal time gains at the rate of about 4 minutes in 24 hours, or 10 seconds in 1 hour, and as 10 seconds is one-sixth of a minute, it will take 6 hours to complete one revolution of the hand on the differential motion, which is the period of 1 minute in right ascension; 15 days 6 hours is 1 hour, and 1 year is 24 hours in the same measure. The hour hand on the large dial therefore represents the sun's apparent yearly motion among the stars.

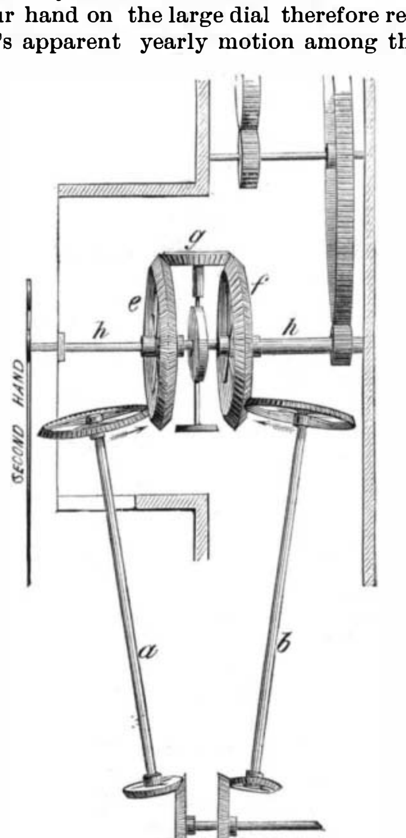

Fig. 4.—SIDE VIEW OF THE DIFFERENTIAL MOTION.