mills for want of coal. Upper Egypt, then, with her never-ceasing sun-power, will invite the European manufacturer to remove his machinery and erect his mills on the firm ground along the sides of the alluvial plain of the Nile, where sufficient power can be obtained to enable him to run more spindles than a hundred Manchesters.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Constructing and Balancing Cylinders.

MESSRS. EDITORS:—Having noticed your answer to correspondents on page 106, August 13, upon the subject of balancing cylinders and pulleys, I prepared a short article for your paper, but unavoidable delays occurred in sending it forward at the time. Next I noticed the communication of Mr. Jacobi, on page 148, September 3, which seemed so clear an explanation that I laid aside what I had intended to send you, and prepared a short reply to your editorial note which followed said article. This was also delayed by absence in attending the late State fairs and trials at Utica until another article from Mr. Jacobi appeared on page 232, October 8th, accompanied with illustrations and explanations which seemed to hit the nail on the head and to drive it home. His theory and practice cannot be misunderstood and with short cylinders must insure uniformly favorable results.

The practice of your Schenectady, N. Y., correspondent, referred to by your editorial notes on same page, although rude, "and upon the cut and try plan" are none the less sure to produce the same ultimate results as far as short cylinders without intermediate heads are concerned.

Your Timberville, Va., correspondent's mode of constructing cylinders, as described in the editorial on same page, by which each end and intermediate head or pulley is balanced separately as they are successively fixed upon the shaft in position, is the only proper mode to be practiced so far as it applies to the end heads or intermediates; but as to balancing the staves or lags for covering, each one separately, it seems to be a useless process—labor lost, and wholly impracticable in the construction of conical cylinders of any length, long or short.

It is only by a velocity test that any cylinder, when completed, can be properly balanced, by the application of weight at the ends or along the cylinder where it is really required, and the greater the length of the cylinder the more important becomes this velocity test and balancing, notwithstanding the statement to the contrary, in your Virginia correspondent's article on page 243, October 15, in which he states "that a long cylinder cannot be perfectly balanced after once constructed."

In regard to balancing millstones alluded to in same article, I will not now reply, but may at a future time.

The communication on page 261, October 22, by your Morrison, Ill., correspondent, is so wide of mechanical, practical, or scientific merits, as not to require any comments, except to characterize it as simply absurd, and carries its own worthlessness with it.

As I have devoted more than thirty years to practical and professional mechanics, and had much experience, and always with successful results with what I have undertaken, I assume that the mode adopted by me in the construction of cylinders of all kinds, large or small, heavy or light, long or short, cylindrical or conical, and for high or low speed, may be of sufficient interest to be inserted in your columns and meet with favor among your correspondents and readers, I therefore send to you for publication this communication.

My chief business has been for many years in constructing thrashing machines for grain and rice, clover seed, and cider mill graters, cotton gins, and condensers, horse-powers, etc. Many of these require cylinders of various kinds as to size and speed, etc.

In constructing a cylinder, I affix each end head, and intermediates (if any), in position upon the shaft, and balance each one separately and successively as they are put on by means of the steel bars and spirit level, by resting the journals themselves upon the bars (but never upon centers, as in a lathe), and am careful to avoid all air currents upon the cylinder during the process.

When ready for the covering, the staves and lags are strongly fixed to the heads and the cylinder completed, and spikes inserted in a manner to withstand fully twice or thrice the speed required in practical operation; the whole cylinder is again placed upon the balancing bars, and allowed to settle itself with its heaviest side down; then by turning the extreme upper portion of the cylinder down to a line horizonal with the axis of the shaft a lump of putty is pressed upon this point and on a level with the shaft, and more or less putty applied until a perfect balance is obtained, so the cylinder will stand in any position at rest.

The putty is then removed and placed in a balance, and two slugs of iron of equal size are selected and placed in the opposite balance, which shall just equal the weight of the putty, or by using a flat piece of thin steel plate, with its edge or corner tacked on to the cylinder at the periphery and at the end on a horizontal line with the shaft; and instead of using putty, slugs of iron in pairs are selected and laid upon the plate until the exact weight to balance is obtained, when they are inserted, one at each end, and upon the light side of the cylinder as near the periphery as practicable. This process may require to be repeated once or twice, but is usually accomplished at the first trial.

If the cylinder or pulley to be balanced is iron, then the slugs must be drilled and bolted or made fast in some safe manner.

This accomplished, the cylinder is removed to a heavy substantial frame, and placed in fixed and strong bearings, and belt motion applied to it by an accelerating clutch coupling to the line shaft or counter shaft of the manufactory. The bearings are so made as to allow of nearly one eighth of an inch play to the journals or may be made to fit closely at pleasure of the operator, and both are required with some cylinders, especially with all long ones.

The object of the strong, heavy frame is to cause the cylinder itself to vibrate in all its unbalanced lines instead of the bearings on which it is mounted.

As the motion is applied to the cylinder gradually, and the speedometer indicates its velocity, the centrifugal force of the unbalanced portions will soon cause the journals to "fly" in the bearings. The band is then shipped off and a piece of chalk is applied at each end of the shaft closely up to the journals, so as to mark the side of the journal or shaft, which mark indicates the heavy side of the cylinder at that point, and by knowing at what velocity this "flying" occurs the operator is enabled, after a few trials, to judge almost accurately the first time the weight of slugs which will be required to balance each end, and he will select two of equal size, whose united weight will be required, and insert one of them at each end of the cylinder upon the side exactly opposite the chalk marks. The band is again applied, and the speed increased probably from three hundred revolutions, with a thrasher cylinder at the first trial, up to one thousand or more revolutions when the journals will again "fly," and the belt is slipped off and chalk applied, and speed ascertained as before.

If the speed of three hundred would "fly" the journal it would probably require two slugs of one pound each at first trial, while at one thousand revolutions, a quarter of an ounce for each slug would be sufficient. This process is repeated until two or three thousand revolutions are attained and the slugs required become so small that one third or less of a twopenny nail is driven in and broken off.

In balancing large cylinders, and especially light ones, the chalk indications are taken at the ends as before described with large bearings, after which the bearings are made tight to prevent any flying at the journals, and motion being applied gradually as before, until the middle portion of the cylinder is observed to describe a larger circle than is due to its true diameter. This is also indicated with chalk by slipping off the band as before.

A careful and observing workman, with a little practice, finds no more difficulty in balancing a long cylinder than a short one, although it may require a few more trials in proportion to its length than a short one. It is this balancing of long cylinders on a heavy substantial frame and fixed bearings which cannot be accomplished with the device of Mr. Jacobi, described on page 232, October 8.

To the perfect "velocity balancing" of our machines are greatly due their success, durability, and efficiency as well as their light consumption of power used in driving them.

Albany, N. Y. HORACE L. EMERY.

The Familistery of Guise.

MESSRS. EDITORS:—One of the most interesting things I saw in Europe was the Familistery of Guise, France. It is a self-supporting school or home of a peculiarly practical and modern type, and although it is the effect of the genius and perseverance of one man, yet it deserves imitation by co-operative societies.

This enterprising genius is M. Godin, a machinist by trade, who followed his profession fifteen years. Being poor, he was only able to develop his plan by degrees, and the left wing of the palace was not entirely completed when the war broke out. His plan is based upon four principles—agriculture, manufacture, education, and enjoyment. For this he selected a curve in the river Oise, on the northern suburb of the city of Guise, in the Department of the Aisne, but owing to difficulty in obtaining land, the agricultural part of M. Godin's ideal is far behind his hopes. The institution is chiefly maintained by its manufactory. This is an industry in stoves and other heating apparatus, and employs ordinarily 1,000 men. A large number of these workmen live in the palace near by, where their families and even they themselves have the free benefit of the educational system. The schools, eating-houses, and theater occupy the building directly in front of the palace, on the opposite side of the street.

The success of the plan of instruction has excited a good deal of notice of late years. There are about 300 children living in the palace who receive their education there, and recently this number has been augmented by children coming from the city. So great has been the prejudice against this institution by the outside world that it not only was discountenanced by Napoleon, but several strong efforts have been made to break it up by bankrupting its founder. But it has triumphed over all calumnies, and no other cause attributable to this triumph can be greater than that of the schools.

The main feature of this institution is the palace, which is situated in the center of the garden, and consists of three edifices, each in form of a parallelogram, with a central court covered with glass—a main structure and two wings. These are four stories high, and are divided into 324 residences, each large enough to accommodate a family, and including from two to four rooms and an anteroom. The main structure has a front of 200 feet, with a depth of 130 feet. Its inner court is 150 by 65 feet. The wings are 160 by 140 feet, with magnificent inner courts, all furnished with cement floors, and covered with glass which admits light but no rain.

The corridors, galleries, and stair-cases are artistically constructed, and form at every floor of the palace a fine promenade. Such is the economy of the structure that a single gaslight sufficiently illuminates each court, casting distinct rays upon every door of the residences. These residences are so entirely separated one from another that they resemble houses in cities, and it often happens that near neighbors are unacquainted with each other. To give an idea of the cheapness of these rooms, let me say that the cost per month of one kitchen 10 by 13 feet, a parlor 12 by 14 feet, a cabinet 4½ by 6, lighted, and the vestibule, is two and one half dollars.

The workingman is fortunate who lives in this palace. It is not only an honor to live there, since it is far more commodious and *à la mode* than other houses, but he enjoys gratis a multitude of other favors peculiar to it. A co-operative store which sells at cost is in the basement. A society of mutual aid pays his physician's bills, and he and his children receive instruction. Music and merriment echo everywhere. Feast days come, and are celebrated with intellectual concurrencies, illuminations, and garlands; and above all, the noble principles of conscientious liberty are in every sense carried into practice, making the Familistery of Guise one of the most progressive workingmen's institutions in France. C. OSBORNE WARD.

Popular Errors in Regard to the Watch.

MESSRS. EDITORS:—I notice in the SCIENTIFIC AMERICAN, of the 22d inst., an article on "Popular Errors Regarding the Watch—Breaking of Mainsprings," by Mr. R. Cowles, of Cleveland, Ohio. I do agree with Mr. Cowles in his remarks, when he says the cause of breakage is an unexplained mystery. There are, however, many causes which can be explained and remedied.

One of the greatest and most frequent errors—one that no good workman should be guilty of—seems to prevail among most watch-makers. It is made by putting the mainspring into the barrrel when taken down to be cleaned, or in replacing it by a new one. The mainspring winder generally used cannot be used in all cases, and is not satisfactory when it can be used; besides in putting in the spring it will mar the flange of the barrel which serves to hold the cap on. The consequence is that the winder is scarcely ever used, except on very stiff springs, and they are put in with the fingers, forcing the spring out of shape, and leaving on the spring the perspiration and dirt of the hands, which causes destruction to the spring sooner or later.

I have adopted a mainspring winder of my own invention, that I have used for two years without a single breakage. With this winder the spring need not be touched with the fingers after it is ready for the barrel; besides, any kind or size of springs can be put in quicker and with the greatest ease and regularity.

I procured letters patent for this tool through your agency, as well as for several other useful tools of my invention. You will please accept my thanks for the prompt and satisfactory manner in which you have conducted the business I have intrusted to your care. M. D. KELLY.

Cadiz, Ky.

Remarkable Production of Bessemer Steel.

MESSRS. EDITORS:—The following was the product of the two five-tun Bessemer converters at the works of Messrs. John A. Griswold & Co., Troy, for the month of October:

No. of whole working days in the pay-roll month	27½
" " days in which steel was made	26½
" of days stopped for repairs	1
Total tuns of steel ingots made	1,686½
" No. of charges made	349
Average tuns of ingots made per charge	4·83
" No. of charges made per day	13·18
" tuns of ingots made per day	63·64

One of the best works in England, advertises that it can make, with the six-tun converters, 150 tuns per week, or say 650 tuns per month.

The highest product, it is believed, of a pair of five-tun converters in Europe is 750 tuns per month. The remarkable product of the Troy Works—1,686 tuns—is due to improvements developed there, and coming into use in the other works in this country. STEEL.

Troy, N. Y.

Effect of Artillery Discharges on Weather.

MESSRS. EDITORS:—I send you the following table showing the effect of artillery discharges on weather, a subject which I see by a recent editorial in your paper is exciting much attention at present in Europe. The table is prepared from notes of observation made on weather in the vicinity of the scenes of great battles fought during our own recent war, and made immediately subsequent to these battles, and shows the time, after the battles, which elapsed before rain fell:

Resaca—One day after.
Kenesaw—Three days after.
Jonesboro'—Five days after.
Altoona—All night and next day.
Nashville—All night and next day.
Franklin—Two days after.
Fort Anderson—Five days after.
Kingston—Five days after.

In all these battles from 40,000 to 100,000 men were engaged. E. W. BROWN.

Cambridge, Ill.

THE DARLING SELF-SUPPLYING PEN-HOLDER.—Mr. B. L. Goulding, of 108 Fulton street, New York, recently left on our table one of the above fountain pens. It contains enough ink to write several pages of manuscript without refilling. They fill by simply placing the point of the pen in the ink, and exerting a slight pressure with the thumb on the side of the holder. It is one of the best fountain pens we have seen.