INTERESTING CORRESPONDENCE.

COTTON GINS---ATMOSPHERIC ELECTRICAL CURRENTS.

MESSRS. EDITORS:—I noticed a suggestion in a recent number of the SCIENTIFIC AMERICAN, in reference to a much-needed improvement in the cotton gin. During a late tour through some of the southern States, I was struck with the want of another improvement in the cotton gin, which will enable it to clean the dirty cotton that has fallen and been gathered from the ground.

Allow me to state to you some facts proving, I think, the existence of both ascending and descending currents of atmospheric electricity during the same thunderstorm and near the same time.

During a thunderstorm in May last, the lightning struck a three-story brick block at the corner, threw out perhaps 50 bricks, and tore down the tin conductor standing at that corner. No effect of the lightning could be found below the top of the corner of the building except the prostration of the conductor, and no evidence of fusion upon that. At the same instant, Judge Dickey, who was on the sidewalk more than a quarter of a mile north, very sensibly felt the effects of the current passing from his shoulder down. This last circumstance, I think, proves conclusively that this was a descending current of electricity. My house is situated upon an elevation one hundred feet above the city, and one and a quarter miles north of the brick block spoken of. In my office at the house, I have a telegraph instrument connected with the main circuit, about two hundred miles long. The office wires, very near the table, were, at the time, very near but not quite in contact with the gas pipe, which I use for a ground wire when necesssary. I have a cut-off, 12 feet outside the office (which was closed at the time), separating the office wires from the main line two inches. The cut-off is so arranged that the office wires were separated from each other four inches at that point. Both the main circuit and office wires connecting with the cut-off are No. 17 copper, consequently of equal connecting capacity. During the continuance of the storm and, as near as I could judge, about the time the building in town was struck, a member of my family went to the office in search of two small children, and found them looking, as they said, at the fire on the telegraph table. At that time there was a succession of slight reports and flashes about the table, and after the storm was over I found marks of the electricity, both on the gas fixtures and wires where they were nearest in contact, and upon the wires in several other places about the table and in the magnet, and between the office and cut-off, the wire was completely fused and parted. After the storm was over I repaired the damages, opened the cut-off and found the line working actively, and that distant offices on either side had been working regularly through my cut-off with very little interruption from atmospheric electricity. This was clearly ascending electricity.

About one hundred yards west of my house, and say fifteen minutes after the building in town was struck, a cherry tree (four inches in diameter) was struck, which I examined soon after the storm passed. Five feet from the ground the tree forks into two equal parts. On the north side of the tree the bark was torn off from a point fifteen inches from the ground to the forks. The denuded portion was from two to four inches wide. Along the middle of this strip, and extending its whole length, the trunk of the tree was split to an uncertain depth, and from this fracture, along its whole course, were projected splinters of from one to two inches in length, and standing uniformly at right angles to the trunk of the tree. Not a scratch was found upon any of the branches. The tree matured a fair crop of fruit, and is now well set with fruit buds, which are considerably swollen, though not as far advanced as its healthy neighbor. The trunk of the tree below the injury has since increased in diameter more than half an inch. The bark on either side of that thrown off was loosened from the tree, so as to leave a strip not more than from two and a half to four inches uninjured, and on the inside of the bark thus loosened from the tree solid wood has formed, in thickness more than half an inch, and in one place more than two inches. The observations which I made immediately after the storm, and which I have detailed, convince me that a current of electricity passed up the tree and burst out from it before reached the branches; and I have mentioned the growth of the tree since as something quite remarkable, so far as my observation extends. I have been tediously minute in every detail; yet, perhaps, not as much so as I aught, as the minutest circumstance is worthy of notice in such observations.

J. D. CATON.

Ottawa, Ill., April 5, 1860.

REPAIRING CRACKED BELLS.

MESSRS. EDITORS:—You are, of course, aware that the usual course pursued with cracked bells is to saw out the crack; but this operation greatly weakens the bell, while the tone is never completely restored. We wish to give you a brief statement of an experiment made by us with a cracked bell, which was entirely successful, namely, the fusing of the injured parts. We conducted the operation as follows:—The bell was buried in the sand, deep enough to make it easy to work upon, leaving the crack and several inches around it exposed. Then the half of a flask or box was placed on the exposed part, which was nearly in a horizontal position. The flask was then filled with molding sand, as in any ordinary mold, leaving the crack and a portion of the bell exposed for several inches around; we then placed parting sand on the mold, as is usually done, and placed another part of a flask to match that already on the bell—usually called the "cope"—which was filled with sand so as to have a body several inches above the topmost portion of the crack. This was then removed, retaining the exact shape of the fractured portion of the bell. A receiving and discharging gate was then cut into the cope at each end of the crack; also, a channel, one inch wide and one inch high, for the metal to flow through from the receiving to the discharging gate, in a line with the crack. The inside of the bell was then filled and well-rammed with sand, so as to support that portion of the bell when in a melted state, and also to support the outer portion of the flask as the sand is filled out further than the edge of the bell. The cope was then dried, and a charcoal fire made on the cracked portion of the bell, while exposed, for the purpose of creating as much expansion as possible and getting the metal into a red heat, so that the metal, when poured, would do its work more quickly and not be as liable to crack the bell further up, or in another direction, as it would be if this precaution were not taken. The fire was then removed, the dust and ashes blown away with bellows, and *the crack cleared out clean.* The cope was then placed back on the other portion of the mold, on the bell, and weighted down to keep it from rising while the metal was being poured through the channel. The crucible containing the molten metal was then taken from the furnace; it should always be very hot, and ready to use as soon as the cope is placed on the bell. The metal was then poured into the receiving gate, and flowed through the channel over the crack in a continual stream, until the cracked portions, and several inches around it, were in a molten state and completely fused. The bell was then allowed to cool. The amount of metal poured was from 50 to 60 lbs., the weight of the bell was about 200 lbs., and the crack about 7 inches long, from the mouth upwards.

W. T. & J. GARRATT.

San Francisco, Cal., March 30, 1860.

PREVENTING BOILER EXPLOSIONS.

MESSRS. EDITORS:—I notice on page 196 of the present volume of the SCIENTIFIC AMERICAN an article on the above subject, signed by "T. A." He says that "the frequent displacement of water from one boiler to the other can be prevented by the following plan:—The further ends of the boilers from the fire should be connected near the bottom with a pipe for that express purpose," and adds, "this is a sure preventive of explosions from this cause." Last season, we constructed a cylinder boiler to be placed in the arch beside two others, which was 30 feet long and 30 inches in diameter, and under the back end of each, a short boiler was coupled, which was 8 feet long and 30 inches in diameter. The feed-pipe was attached to the front end of these short boilers or heaters entering the head. The steam-pipe connected all the boilers on top, and we found the water would not equalize, sometimes two of them being full, and the other empty. We then connected the long ones in front by a pipe attached to the lower end of the manhole. This we find to overcome the difficulty in part, but not entirely, and we shall yet connect them on the top of the forward end. Thus your correspondent can see we have connected these boilers in *three* places by *two* water passages and *one* steam, yet it does not accomplish the purpose. The bore of the pipe for the water connections is three inches, and steam-pipe bore 8½ inches, and none of these passages can possibly be closed up. We think a connection on top of the front end will remedy the difficulty by equalizing the pressure. I mention this to show that there are instances where T. A.'s plan will not accomplish the end sought. A. G. S.

Oswego, N. Y., April 18, 1860.

A PROFITABLE WAY OF BURNING SAWDUST.

MESSRS. EDITORS:—Having noticed several communications in the present volume of the SCIENTIFIC AMERICAN with regard to furnaces for burning sawdust, and knowing it to be a subject of interest to mill-owners, I send you the following. I have had a great deal of experience in constructing such furnaces, and have never failed to construct them so as to burn sawdust of any kind; in many cases the dust being from timber taken from the water, and almost heavy enough to sink.

I never use a fire-front, which I consider an abomination, where a single boiler is used; the reason being as as follows:—1st, The conductor and front can never be kept sufficiently tight to insure a good draft, which is the great essential in burning sawdust. 2d, The conductor almost red hot and right in the fireman's face, together with the heat of the iron front, and the inconvenience of the doors, makes it almost impossible to give the fire the proper attention. 3d, With the front arrangement the ash-box doors are in front, and the fuel that may be spilled in filling is apt to catch fire, and has to be swept up at each time, and usually with as much fire as may be among it, which we may safely consider as the manner in which so many sawmills are burned; sawdust being the most treacherous fuel in this respect.

In setting-up single boilers for sawmills, I place the boiler in the stack; the stack being of the same width and a continuation of the furnace walls, the grates being laid across the boiler, the fuel doors being on one side of the furnace, and the ash-bed doors on the other. I use an air-tight slide damper in the stack to regulate the draft and amount of steam, so that the furnace can be kept always full of the fuel. Below I give the dimensions for a furnace for a common sawmill boiler with two flues, each 14 inches in diameter; the boiler being 20 feet in length and 36 in diameter. I hope these figures may prove of use to some of your numerous readers:—

Hight of chimney, 50 feet; width at base, 7 feet 9 inches; diameter of flue (square), 24 inches; thickness of furnace walls, 17 inches; clearance on sides of boiler, 4½ inches; area of fuel doors, 15x30 inches; area of ash-bed doors, 6 feet; area of grate surface, 16 feet; area of flue under the boiler, 8 feet; area of throat at the bridge wall, 3½ feet; clearance over the grates, 19 inches; clearance at back end of boiler, 20 inches.

I constructed (for the Ohio Tool Co., at this place) a furnace of proportionate dimensions upon this plan:—Boiler, 30½ feet in length and 48 inches diameter; thickness of walls (single), 22 inches. The result has been that, while, during March, 1859, they burned 10 bushels of coal daily, besides the cuttings and shavings from their workshops, during March, 1860, when doing the same amount of work of the same character, they have *sold* more than 15 cords of wood from their cuttings—worth $40. This saving is due to the improved construction of the furnace and greater draft, enabling them to burn green sawdust. The walls being very tight, the steam is found at a good pressure in the morning, and the wood that was formerly used to raise steam is now saved.

J. R.

Columbus, Ohio, April 16, 1860.

A CHEAP FISHING-NET MACHINE WANTED.

MESSRS. EDITORS:—The fisheries train a race of hardy men, who are the main support of our commerce in peace and defense in time of war; they also promote shipbuilding and give encouragement to almost every branch of agriculture and manufactures; consequently they are of the first national importance. Every invention therefore, that gives aid and encouragement to the fisherman, should be promoted, hence any machine that would facilitate the making of nets and seins (articles at present very expensive), would operate as a great benefit; but for this purpose the machine must be cheap, simple, and easily worked. I consider that such a