The Papers of Thomas A. Edison

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During the early fall of 1876 Edison and his staff concentrated their efforts on practical tests of acoustic transfer technology. They demonstrated the system to Western Union and at the end of December Edison began negotiating a new financial arrangement with Western Union on the strength of his expectations of success. At the same time, Edison was working on his new repeating recorder for Morse telegraphy. At the end of October he executed a patent application for a perforating repeater and began work on an embossing repeater, which he would continue to develop into the next year.

Edison also experimented briefly with sewing machines driven by large, electrically powered tuning forks; with various copying processes, including a duplicating ink and a device based on the electromotograph principle; and occasionally on the telephone. He twice made a virtue of necessity when his stock of chemicals suffered damage—first from sunlight and then from freezing weather. Both times Edison recorded extensive observations of the condition of the chemicals, even using some of the observations as the basis for a short publication in the American Chemist.

A few changes in the Menlo Park crew occurred during the fall of 1876 as Tony Bronk, Edison’s boyhood friend, and Jim Gilliland, Ezra’s brother, temporarily joined the regular staff. Charles Batchelor also began to spend more time in the laboratory, primarily experimenting with the sewing machine motor.

The electric pen business continued to grow and prosper. Batchelor hired assistants in the New York office of Edison’s Electric Pen and Duplicating Press Company. By the end of the year the company had sold 205 pens and presses and
showed a profit of over $1,100. At the end of November, Western Electric Manufacturing Company contracted to manufacture the copying system. The Electric Writing Company of London faced new competition from a pneumatically powered pen system, and the manager of the company pushed Edison to develop an improved battery and a high-speed press. The Continental rights to Edison's electric pen patent remained unsold.

The experiments on carbonized paper conducted during the summer and the development of duplicating ink led Edison and Edward Johnson to set up the American Novelty Company in late November. The company was devoted to the manufacture and sale of these and other miscellaneous inventions, including Johnson's ribbon mucilage.

Edison grew increasingly exasperated by the Port Huron street railway business. He continued to support his brother's involvement, sending $600 in early December but stopping short of the $4,000 Pitt requested. At the end of that month, individuals connected with the opposition line extended an offer to Edison to settle the competition. Although Edison did not accept the offer, the negotiations thus begun led to the eventual merger of the two street railroads into a new company.

On 10 December, a man named Horace Day visited Menlo Park and offered Edison and Batchelor each a one-sixth interest in copper and gold mining rights to a piece of land in Vermont rich enough "to make 50 companies and last a century." Although they apparently let the opportunity pass by, Day did return later to test some ores in the laboratory.²

1. Cat. 1213:6-7, Accts. (TAEM 20:8). Alfred Swanson, whom Jehl identifies as a night watchman, also appears in these accounts.
2. Cat. 1240, item 15, Batchelor (TAEM 94:10-11). Day returned in mid-February and spent "all day testing some ores." Cat. 1233:49, Batchelor (TAEM 90:77).

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New York, Oct 3 1876

From Alfred Nelson

Dear Sir

We are notified that the suit of Mr. Morten against this Co.¹ is to be called on 6th inst, and as you are a very important witness and, I am very sorry to hear, are now confined to your house, we should be much obliged if on receipt of this, you would mail us a physicians certificate of the fact to be presented as a reason for delay²

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In ordinary cases, it would be sufficient to notify the opposing counsel but as he has already acted with discourtesy, we do not desire to run any risk. Trusting you will soon recover.

Respectfully

Alfred Nelson  V.P.


1. The nature of the case has not been determined.

2. On 8 November, Nelson notified Edison that Morten v. Domestic Telegraph Co. was to be heard in Part III of the Supreme Court at New Court House in New York on 10 November. Nelson requested that Edison join his former manufacturing partner James Murray in attending the trial (DF [TAEM 13:1235]).

3. Unidentified.

[Menlo Park,] Oct 12th 1876

Speaking Telegraph

This works but not so good as Plumbago on hard rubber. Tried mercury instead of water but it is a dead make & Break.

T A Edison

James Adams

1. Figure labels are “Parchment Diaphragm” and “tin cup filled with water.” In his testimony Edison noted that one electrode was formed with a stick of Arkansas oilstone attached to the center of the diaphragm and coated with plumbago. This was dipped into a cup containing water and an immersed plate that formed the other electrode (TI 1:43–44 [TAEM 11:42–43]). Edison had experimented in fall 1873 with “resistance coils of Kansas stone & plumbago graphite also on glass hard rubber etc” in connection with his artificial Atlantic Cable experiments (NS-74-002, Lab. [TAEM 7:102]).

2. Edison’s testimony indicated that this meant the “short circuiting of a film of plumbago on hard rubber, by a spring connected to a diaphragm, and resting on the film, which served in its motion to cut in and out resistance due to the film of plumbago” such as was shown in
A telephone transmitter in which metallized felt, resting on a diaphragm, short-circuits the current across a thin layer of carbon.

An undated drawing that Edison placed between April 1876 and March 1877 (Edison's Exhibit 117-15, TI 2 [TAEM 11:624]). There "a piece of either hard rubber or stone, coated with carbon, is used with a circuit passing through it, a piece of felt resting on the diaphragm and provided with a metallic surface, being in contact with the surface of carbon. The vibration of the diaphragm, cutting in and out, or rather short circuiting a portion of the film" (Edison's testimony, TI 1:44 [TAEM 11:43]).

Notebook Entry:
Miscellaneous

[Menlo Park, Oct 18 1876]

Controlling Line
Acoustic Telegraph Transfer.
Working Contacts direct = ?
if the switching forks are worked direct on the controlling line, duplex, it will probably be necessary to add a Condenser shunting a Rheostat in the bridge wire to weaken the effect of the Static charge—otherwise one fork will lag on the other & change the circuits=

Idea has occurred to me to arranged two needles with electric pen one having an eye at the end with a thread the other provided with a hook so that by passing pen over cloth stretched it will make a loop stitch thus allowing beautiful embroidery etc to be made with speed=

Stencil copying press felt Roller saturated with ink over which stencil is placed previously having ink worked in= The rollers are geared or otherwise fastened together & paper is passed between them²
Electric Sewing Machine Tuning fork applied to drive machine which fork set in motion by Electromagnets

May want use Hinkly & Lyon SM wheel feed
Forged steel would perhaps be cheaper than bell metal secured thus.

Rubber rim disk to vary speed.

TA Edison

Chas Batchelor

James Adams


1. Figure labels are “Same here,” “big fork,” “nix,” and “Same here.” The big fork may refer to the design drawn in the same notebook on 13 October (Cat. 997:27, Lab. [TAEM 3:365]) or to a fork like the ones at the Edison Institute, Dearborn, Mich. (Acc. 00.1382.537, 00.3.11616). See also the multiple contact arrangements for acoustic transfer forks drawn on 6 October (Vol. 10:112–14, Lab. [TAEM 3:911–13]).

2. Figure labels are “This is a copy of the new prtr”; “Stencil”; (p. 152) “stencil” and “sheet to be p[rin]t[in]g,” and “ink.”

3. Figure label is “teeth very fine.”

4. Edison may be referring to the Finkle & Lyon Sewing Machine Co. of Boston, which began production about 1859 and continued until 1867. Cooper 1976, 69.

5. A bronze of three or four parts copper and one part tin.

6. Figure label is “brass pillars.”

7. Figure label at bottom left is “Rubber.”
One of the large tuning forks used in Edison's acoustic transfer system.

Technical Note: Multiple Telegraphy

[Menlo Park, October 18, 1876?]

We now duplex the controlling wire as above shewn and find that Duplex itself works with the vibrator going but the receiving vibrator does not work strong enough with the 60 cells Callaud we have on circuit. The loop to phila & return is
used transmitting with NY battery at one end & our 60 cells at the other

I think that the addition of 100 cells will make it work perfectly satisfactory we are now going to add 25 cells;

We tried it on direct loop with NY battery at each end consisting of 100 & .90. Callaud & the strength of vibration was $\frac{3}{4}$ if not $\frac{1}{2}$ more than we should ever want

(Wrks OK with 90 cells Callaud one end, ie its 90 cells that wks fork = but had to have 4000 ohms each side bridge at the reed which is in main)


1. Edison apparently wrote this note soon after Doc. 800. Although he seems to have continued these experiments through the fall (see Doc. 833), few notes remain. However, for work during November see Vol. 10:115–16 and Cat. 1169, both Lab. (TAEM 3:914–15; 6:574–75).

2. Figure labels are "NY battery," "60," "Rheo," and "Condenser."

3. Figure labels are "ground" and "line."

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Notebook Entry: Electric Motor

[Menlo Park,] Oct 22nd 1876

Electric Sewing Machine

Edison's idea that the greatest amount of power can be got out of a magnet by the aid of a tuning fork seems to stand good so far. We applied the principle to the driving of a Wilcox & Gibbs sewing machine and succeeded in stitching through 6 thicknesses of cloth at a speed of 82 stitches per minute with the following device:—

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October–December 1876
A is a fly wheel on same shaft as 300 tooth ratchet B. This ratchet is driven by 2 pawls D & E working by prongs of 12 in fork giving about 60 vib. per minute. This wheel A was connected by belt to sewing machine. This device was made from stock in hand and was only a preliminary experiment and as such far exceeded our expectations. It seems to want a much larger fork, each prong having large weights on & each prong having both push & pull prawns on so as to utilize both backwards and forwards movements of prongs. I now altered the ratchet to 30 teeth and put it directly on the sewing machine shaft thus:

A is ratchet fastened directly on to shaft carrying flywheel B. this was run in the same manner as Fig 2 only clicks were altered to suit the upright ratchet wheel. This did not work so well it seemed to require more power as ratchet was smaller.

It seems to be necessary to get some motion on there that will not allow the fork to throw out.

Chas Batchelor.


1. Redated at end: "Monday Oct 23 3 a.m. 1876."

2. In his private notebook Charles Batchelor indicated that this idea arose out of experiments they were doing with large tuning forks. Cat. 1317:28, Batchelor (TAEM 90:671).


4. Batchelor noted that they stitched through "six thicknesses of shirting with 4 ordinary cells of Bunsen battery. This of course is nothing very great but it convinced us that the apparent great strength of a tuning fork when vibrated by a magnet can be utilized if you only strike the right way of applying it." Cat. 1317:28, Batchelor (TAEM 90:671).

5. On 16 October, Batchelor had drawn another form of driving the
Another drawing of the sewing machine motor, showing the magnets and weighted prongs.

paratus for an electric sewing machine in which the tuning fork drove the flywheel by means of a smooth disk rather than a toothed ratchet. Cat. 1307:57, Lab. (TAEM 90:642).

6. In the other version of this entry, Batchelor corrected this to “60 vibrations per second.” Cat. 1317:29, Batchelor (TAEM 90:671).

7. In his notebook Batchelor indicated that they used a bell metal fork with 3/4-inch prongs, each prong carrying a two-pound moveable weight, and he drew a diagram (at left) to show the arrangement.

A B are the prongs, C D the moveable weights, and G H are arms extending from the prongs and carrying driving clicks for ratchet wheel and shaft I, to which was attached the twenty-pound flywheel (not shown here; A in figure 1 of the document).

Batchelor went on to note that “click H is much further from the fork than G and consequently the prong A has much more work to do than B; this throws the fork out of tune (when it is very weak and will do no work at all) but by moving the weights on prongs they can be brought into tune and the maximum strength of the fork is gained when both prongs are exactly in tune. I have now commenced on a large fork which I think will give us a surplus of power.” Cat. 1317:29, Batchelor (TAEM 90:671).

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To Frederic Ireland


Dear Sir,

Yours of Oct 9 rec'd.¹ I saw the article in the Mechanics Magazine [d]escribing the pneumatic Pen; you do not often see a clearer [ca]se of infringement than that.² I do not know what your laws are [in] England but in this country the parties could be stopped [im]mediately.³ You will find in the patent the very same thing; [ie?]⁴ turbine or leaf'd wheel within a circular box propelled by [w]ater falling from a high to a low level. now our courts would [sa]y⁵ that substituting air for water is no invention, as it does not [req]uire the exercise of the inventive faculties. It dont matter what [the othe?]⁶ power is that drives the machine, if the patent for the machine [ ]⁷. If those people have a peculiar machine for getting air [pres]sure applicable to the pen that does not give them any right [to]⁸ use our pen.

[The tr?]⁹ ade here is increasing rapidly caused 1st by a revival [of]¹⁰ business & 2nd by our establishing agencies. Some of the [telgh?]¹¹ supply houses keep it on sale, notably Tillotson & Co³ who [ ]¹² last week. They also sell our pen batteries for other purposes. I think you should put them on sale [ ]¹³ your opitician & Philosophical apparatus houses; they are peculiarly adapted for Medical coils, etc. in tfact it is the only “Table” battery yet devised =

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We have an embroidering pen for perforating lace work designs in paper through the holes of which colored dust is passed upon cloth. Shall we send you one; We are going to roughen the ends of the pen tubes, and if satisfactory will hereafter make them rough. The pattern for the large press is now ready shall we send you one as sample;

Batchelor promises to attend to the points you speak of. What are the improvements on the press. I have several but I fear to make changes as you never can tell how it will turn out, besides it cost considerable to get up special tools. I will have assignments of Patents for France & Belgium sent to Serrells Agent in London immediately, will give you address as soon as I get it. Telegraph: Had a test last week over line to Phila. it worked fairly, am waiting now for a set of more delicate relays. Preece, one of your PO Engineers has left Eng[land] for this Country to inspect our telegraph. I shall get him down to Menlo & fill him up with Telgh and will try & get a good impression for the new machine. Sir Wm Thomson was here at Menlo & had a very interesting time. You see he speaks of my Automatic Telegraph before the B.A.

Notes: We are selling a number of machines to Colleges = Catholic priests, the latter issuing notices to the faithful with them. We are printing a 300 page book with the Pen; (foolscap size) being the lectures of Prof Thurston of the Stevens Institute of Technl'gy = heretofore each student had to make his own copy. they clubbed together and pay $5. each which gives us 25¢ per stencil and $3¢ for each impression = besides three profs have bought them =

We obtained a medal at the Centennial, but have not yet rec'd the judges report.

Yours

T. A. Edison


1. In this letter Ireland discussed a number of issues related to the electric pen. He indicated that problems remained with the manner of packing pens shipped to Great Britain and suggested changing the screwdrivers used to adjust the pen, improving the grip of the pen barrel by roughening it, and creating a pamphlet specially suited to the British market. He also indicated that they had acquired a greatly improved press. TAEM 13:978.

2. See Doc. 796. In December, Charles Batchelor’s brother Tom sent him an illustrated clipping from Cassell’s Family Magazine about the pneumatic pen (Cat. 1240, item 11, Batchelor [TAEM 94:8]).

4. See Doc. 800.

5. Ireland wrote to Edison on 11 October asking him to separate the French and Belgian assignments and to send signed transfers for these countries (DF [TAEM 13:980]). On 26 October Edison's patent attorney Lemuel Serrell wrote Edison to indicate that he would take care of it (DF [TAEM 13:1047]). The agents were probably Brewer and Jensen (see Doc. 1033).

6. This probably refers to Edison's acoustic transfer telegraph system.

7. William Preece (1834–1912) was at this time a divisional superintendent of the British Post Office telegraph system. Later appointed engineer-in-chief, he was one of Britain's most prominent and influential electrical engineers. He and Henry Fischer, controller of the central telegraph office in London, crossed the Atlantic in April 1877 to study the American and Canadian telegraph systems. Baker 1976, chap. 16; Fischer and Preece 1877; see Doc. 904.

8. Edison is apparently referring to Thomson's opening address as president of the mathematical and physical section of the British Association for the Advancement of Science. In his remarks Thomson spoke briefly of what he had seen at the Centennial, focusing primarily on Alexander Graham Bell's telephone. Of Edison's automatic he stated that he had seen it “delivering 1,015 words in 57 seconds; this done by the long-neglected electro-chemical method of Bain, long ago condemned in England to the helot work of recording from a relay, and then turned adrift as needlessly delicate for that.” “British Association,” Nature 14 (1876): 427.

9. Robert Thurston was a pioneer mechanical engineering educator. See TAEB 2:309 n. 2.

10. Sir William Thomson, who authored the award report for Edison's automatic telegraph system (see Doc. 757), also drafted the award report for Edison's electric pen and duplicating press, calling it an invention of “exquisite ingenuity and . . . usefulness” (draft of 20 June 1876, Centennial). The actual report, printed in U.S. Centennial Commission 1880 (194–95), was apparently authored by Joseph Henry (draft of 1 Aug. 1876, Centennial). Both Thomson and Henry extracted material from one of Edison's electric pen circulars in their reports. For Batchelor's recollections concerning the medal, see App. 2.

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From Frederic Ireland

My dear Sir

I have just received your telegram at 3.20.—I had waited till midday before wiring you as per Enclosed copy.—

I will now try and act promptly with regard both to the French & Belgium Patents— the latter I think can get taken up at once. I am also negotiating about Spain.

Our sales here have not been so large as I could wish— we
have much prejudice and stupidity to overcome. — We have found it impossible to get people to recharge their batteries once a week and their general neglect of the pen is something difficult to comprehend — "Out of Evil Cometh good." — We have succeeded in obtaining a battery quite as strong and contentent as our own and it will work for three months without attention — we are assured it will work for Six — of this we have not had time to obtain proof but our Experience leads us to believe in it. —

Shall we send you battery & press. — They are not patented in the States, but if you are willing to give the inventors something for their trouble, they would, no doubt, appreciate it. — Yours very truly

Frederic Ireland


1. Not found, but see Doc. 807 n. 3.

2. No enclosure has been found, but the following copy was written in an unknown hand at the end of the letter: "Telegram. Must sell samples Continent to sell patent. Wire authority. Belgium three thousand dollars Wire." The original telegram is in DF (TAEM 13:982).

3. Edison had filed the French patent (No. 112,719) on 6 May; it issued on 10 July. He filed the Belgian patent (No. 39,502) on 8 May; it issued on 30 May. Undated memo, 76-012, DF (TAEM 13:1026).

4. Ireland probably meant "constant."

5. This was the Fuller battery, a particularly powerful bichromate of potassium cell invented by John and George Fuller (Brit. Pat. 3,339 [1877]). Relatively inexpensive to maintain, untended Fuller cells could stay in good condition for a few months if little used. Steady usage required attention to the cells at intervals of four to six weeks. Ireland to TAE, 27 Nov. 1876, DF (TAEM 13:992); Niaudet 1884, 211–20; Maver 1892, 17–18.

6. Although Ireland soon reported that the battery was patented in the U.S., no such patent has been identified. Ireland to TAE, 28 Oct. 1876, DF (TAEM 13:986).

From William Wastell

T A Edison

Tel received this evening¹ did not clearly understand, called on J P Sanborn² and asked him; he informed me he had a talk with you in N.J. and had written you at length since he arrived home³ if Sanborn can be induced to take hold of this matter he can do much towards a positive arrangement — You may rely on me acting with you as a square man, it is my wish to do any thing to benefit my stock in GStRR and if I am bene-

Port Huron Oct 26. 76

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fited you must be if you are I must be— I have not seen WPE for weeks—he and family are away from home I supposed he was with you or on his way there I have heard no more about Stewart defalcation—it is all smothered for the present—

I am still receiving the earnings of the road and only pay out as ordered by W.P.E. our earnings are not improving will keep you posted if anything turns up—

Write Sanborn your ideas and let him try and see what can be done Yours Respectfully

William Wastell

ALS, NjWOE, DF (TAEM 13:1074).

1. Not found.
3. No Sanborn letter to Edison dating from this time has been found.

[Menlo Park,] Oct 28 1876

Electric Engine or other source of power clockwork etc giving continuous feed or an intermittent feed can be used either with a fork Reed electromagnet or other source of power

by continuously moving the paper and having a groove in a plate C the deepest part being slotted & having an embossing point have a knife on its eaxtreme end it embosses & at the same time cuts a slot in the paper in transmitting the contact lever is provided with a knife edge point and the emboss or rather indentation as I prefer to use the inden latter guides the point & it by presses drops into the indentation & through the slot allowing its eend to touch a contact point thus closing the circuit.
I propose to arrange the punching and feeding devices in such a manner that I can punch the messages in a continuous circle like the record on a Bain chemical disk. Starting the message 2 inches from the centre & thence outward I can use a square blank & this will be very convenient for handling. The disk may be revolved by one of the eccentrics in the motor feeding it around step by step, and the shaft carrying the disk secured to a moveable slide is moved continuously by another motor.
Idea is to have rolls of tin foil, strips $\frac{1}{4}$ wide, and form characters by bringing it down on pasted paper by magnet which keeping closed allows foil to run out from roll & pbe pasted to roll but when lever raises breaks foil & again allows it to run out when closed again =

![Diagram of a mechanism involving foil and paper]

Electric* pen large needle. dots & dashes formed transmit by having full thickness paper close sounder & character formed of the dots* vibrate lever & open circuit & Reverse points=*

Embosser*

![Diagram of a mechanism involving embossing]

deep plate for feeding the jointed lever out

T A Edison
Chas Batchelor
James Adams


1. Figure labels are “electric engine or other power,” “eng shaft,” and “shaft.”
2. Bain's receiver is illustrated in TAEB 1:65.
3. Figure label is “worm driven by another engine.”
4. The Morse code preceding this word spells “this.”
5. Edison's first automatic transmitter patent (Doc. 101; U.S. Pat. 114,656) used the thickness of the paper tape to open and close a reversing circuit.
6. Figure label is “point [-----].”

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Dear Tom,

Your report received with thanks. I have just wired Ireland of London authority to sell Belgium as he has a customer for it. Do you know any one going out to India or the other colonies that would be a likely person to work up a trade for us. I have got South America going pretty well & the West Indies & am working on Mexico & the Central America. Who is working the 'Manchester district' for the London people? Everything has been dull here for the last few months owing to the Presidential Election but they are now picking up & the prospect looks brighter for the winter. I was very much obliged to you for report of Breckon it gave us a hint although I believe he is good. He has already paid a bill for us at Elliot Bros of £90.17— & accepted our drafts which I put into Drexel Morgan & Co's hands to collect.

All well at home. I have got some help to run this thing & am spending a great deal of my time on a new electric Sewing machine. I expect to use up some 8 or 9 months on it but if it is a success we shall be all right. Yours as ever

Charley.

ALS (letterpress copy), NJWOE, Lbk. 3:19 (TAEM 28:507).

1. This letterbook contains Batchelor's correspondence as agent of Edison's Electric Pen and Duplicating Press Co., which business he conducted at the office in New York.
2. Not found.
3. The party interested in Belgium is unidentified. A copy in Edison's hand of a cable to Ireland, dated 27 October 1876, states "Sell Belgium." DF (TAEM 13:985).
4. This may refer to Vesey Butler, who was headquartered in Havana, Cuba. See Doc. 830.
5. Not found.
8. Either Ezra Gilliland or Robert Henry might have been assisting Batchelor. On the sewing machine see Doc. 802.
You Can Duplex This & make .6.

1 message by reversals 1 [message]$^3$ by increase & decrease 1 [message]$^3$ by acoustic Vibrations$^b$.

with burglar alarm circuit closers on windows of a house contact short circuits magnet & that releases button pushing mechanism which is so arranged that the cord is just long nuf to depress button 4 times more or less$^c$. 

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Notebook Entry:
Miscellaneous

[Menlo Park,] November 1 1876

October—December 1876
Tower bell striker for Fire alarm\(^5\) Teleg\(^5\)

Cannon balls released at proper intervals by magnets

Acoustic\(^6\) Transmitters each making different note

ditto Shewing another way throwing battery in

Throws in a neutralizing battery\(^7\) to right neutralizes to left doubles strength = Acoustic System =

Combination Printer method\(^8\) of pasting strips on WU Blanx Every time you print letter it puts paste on or you can have a paste roller =

T. A. Edison

Chas Batchelor

James Adams

October–December 1876
1. This document marks the end of Edison's attention to acoustic transfer telegraphy. Figure labels in the drawing below are “Polarized armature,” “key,” “key,” and “main battery.” The armature for each of the four electromagnets driving the two lower tuning forks is a bar magnet (i.e., a polarized armature) attached to the tuning fork and labeled “n” and “s.” The apparatus at top right would put the main battery rapidly into and out of the circuit without ever breaking continuity.

2. In this circuit Edison adds acoustic instruments to his basic diplex (and quadruplex) plan (Docs. 348, 472, 512, and 513) in an attempt to achieve a sextuplex circuit, much as he added his electromotograph the previous year (Docs. 583 and 611). While in theory this third type of signal should neither interfere with nor be disturbed by the other two types of signals, it was by no means obvious whether this could work in practice (see headnote, p. 280 and Doc. 877 n. 3). In the receivers, shown at left, a complex polarized relay (center) responds to increases and decreases in signal strength, replacing the neutral relay originally used. This had become typical in quadruplex practice by this time. Docs. 512 and 513 n. 2.; Preece and Sivewright 1891, 198.

3. Figure labels are “Dom Tel Co NY” and “window.” Burglar alarms were becoming a common feature of district telegraph companies (Greer 1979, 25–27; Israel 1992, in). Edison had drawn similar designs for a Domestic Telegraph Co. burglar alarm on 10 October (Cat. 997:26, Lab. [TAEM 3:365]).

4. In sophisticated district telegraph systems the signal transmitted indicated which of several services the subscriber wanted (messenger, medical help, police, firefighters, etc.).

5. Figure labels are “apparatus provided with character wheels,” “ball alley trough,” “Bell,” and “strike edge.” Edison probably intended this design for the Domestic Telegraph Co. fire alarm system. The intervals at which the cannon balls dropped were determined by the signal transmitted from the fire alarm box and would indicate the box’s location. The signal also operated an apparatus (not shown; attached to the two wires at lower left) to provide a printed record of the signal.

6. Figure label is “to distant acoustic instruments.” In this and the following two acoustic multiple telegraph sketches, as in the first design in this notebook entry, Edison devised signaling arrangements that maintain the line circuit’s continuity. Here each transmitting key interrupts the regular pulses of its tuning fork by short-circuiting a battery; in the next design the key adds a battery to the line.

7. Figure labels are “same” and “ditto.” What Edison refers to as right and left movements would be up and down in the drawing.

8. Figure labels are “Western Union Tel” and “ABCDEF.” The Phelps combination printer typed its message on a paper tape. See TAEB 1:62 n. 1.
I propose now to emboss the messages for transmission by having the blank stationary on a radiating spiral block, the blank being held down by another block with radiating spiral groove cut clear through.

Perforating Embossed dots & dashes cut off leaving a perforation doubled up.

Perforating
doubled up platina wire kept white hot by a battery and connected to a magnet operated by a relay or key or direct on a Telgh line, the closing of the magnet serving to bring white hot platina up to paper & burns thro it a hole the length of which is determined by the continuously moved paper, & length of closing of the magnet =

Wheatstone perforator

for working it over a Telgh line.

Embossing from a Continuous Roll—

T A Edison

James Adams


1. Figure labels are "reversing cutter," "Eng[ine]" and "paper"; and "Eng." Edison sketched similar ideas in Docs. 1358 and 151A.

2. Edison had worked intermittently with the British automatic telegraph system of Charles Wheatstone (see, for example, Docs. 348 n. 2 and 457). Here he is using a polarized relay and a standard relay to send three signals that operate a Wheatstone perforator at a remote location.
Discovery

I have three bottles containing in a 100 cc HO, 15 & 20 gramme solution of Tannate of Iron. I find after many weeks that a thick deposit has formed on the side of the bottles facing the light. I do not know how long it took to bring this about. On the 1 gramme solution it is thin & clean on the 5 gramme from some cause (probly bottles been exposed all round) the deposit is all round but on the 20 gramme it is sharp where exposed & very thick but not so clean as on the 1 gramme solution. This fact can probably be used in photography and its allies, for printing etc. Note 10 gram sol Tannin acid shews same but it dont adhere to galass; The 1 gram sol d[on't] show.

Phenomenon— After many weeks there appears a crop of crystal both at the bottom of the bottle & floating on the solution. These crystals are of amber color and apparently square $\frac{1}{2}$ sharp edged and are very transparent = I never saw such crystals from crystalizable chemicals = The solution is 1 gramme of Acetate Strychinine in 100 cc Rain water.

Phenomenon 14 gramme sol acetate urinum 100 cc HO crystallizes only on side of bottle exposed to the sun—other side in diffused daylight = These crystals creep up on side bottle & adhere $\frac{1}{2}$ inch from surface of the Liquid = Same with 8 gramme 100 cc HO proto-acetate Copper—creeps up $\frac{1}{2}$ inch deposits large crystals in quantity = Same with Cyanide Mercury 20 gramme sol = Same with acetate morphin 5 gramme solution. Cant say how long these crystallizations takes = pby 1 month at least = also formate copper in 4 10 & 20 gramme also oxalate ammonia in 20 gramme sol & many others = Sulphate anilin 10 gramm [---] = shews greatest 1 [notg?] 5 same crystalizes from inch of solution in bottom 4 inches above the surface of the Solution tho this may be due to pouring some sol out—but think not 1 & 5 gm of sul aniline turn Red but 20 gm doesn't =

phenomenon = I notice in [Goltah?] ammonia 10 & 20 gramme solutions & in other sols which shew a fungus growth ie. cotton like stuff that when it settles it settles at the bottom & back furtherst from the Sun—

Phenomenon = 5 gramm Gum Myrrh in 1 gramme Caustic Potash sol 100 cc a sponge like cloud rises up in the solution in that part of the Sol towards the sun = it doesn't adhere to sides bottle or apparently touch it = its clear on other side =

Phenomenon— Noticed that certain bottles & sols gave
streaks of colors out of 300 only 5 gave them distinct & these were colorless solutions. 1 gram sol Caustic Pot gave it good also oxalate Pot= changed bottles & this appeared to diminish it. very poor bottles may be something in it— try clean glass = (Oxalate Ammonia 5 grm (caustic Baryta 1 gramme (Stannate soda 5 gram) 500 milegms Caustic Stronta=  

T. A. Edison


1. Edison stocked his laboratory shelves with hundreds of bottles of prepared chemical solutions. Sunlight and age had apparently ruined many of them. He continued his observations in Vol. 8:69 (Lab. (TAE M 3:501)) and published several of them (Docs. 813 and 845).

2. According to the next entry in this notebook, Edison used rainwater in many of his chemical solutions. Cat. 996:67, Lab. (TAE M 3:313).

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Dear Edison,

I got your note all right.1 Siemens2 expects to return to NY on or about the 10th when I have no doubt he will avail himself of inspecting your many interesting objects.3 I understand Preece and Fischer are not likely to come out before the spring.4 I know the latter very well indeed and I shall not fail to let them know of your institution. I intended doing this if you had not mentioned it. I dare say I shall see something of them.

I shall try & come with Siemens.5

In haste. Yours, Truly,

G G Ward

--

From George Ward

[New York,] Nov 4th [1876]

ALS, NJWOE, DF (TAE M 13:781).

1. Not found.

2. Charles William (Carl Wilhelm) Siemens, F.R.S., later knighted, was the fourth of eight adult brothers, five of whom became eminent figures in industrial, engineering, and scientific endeavors in the second half of the nineteenth century in Britain, Germany, and Russia. William made significant contributions in several fields of technology and science and headed a London firm that became a prominent producer and installer of submarine telegraph cables, among other electrical products. (This firm was one portion of the complex of family enterprises.
led by the oldest brother, Ernst Werner von Siemens [see *TAEB* 1:82 n. 4].) William had been chosen as one of the judges for the Centennial Exhibition in Philadelphia and had come to the U.S. at the start of October. Pole 1888, esp. 9–15 and 280–81; Siemens 1968, 278–79.

In *TAEB* 1:82 n. 4, Johann Georg Siemens, a co-founder of the Berlin firm of Siemens and Halske, is incorrectly identified as one of Werner's brothers; he was a cousin. Siemens 1968, 52; Weiher and Goetzler 1977, 113, 25.

3. The Centennial Exhibition in Philadelphia closed on 10 November 1876.

4. See Doc. 803 n. 7.

5. No record of a visit by William Siemens to Menlo Park has been located in the U.S., U.K., or B.R.D. However, a member of the family and firm did visit the following summer (see Docs. 977 and 987). William spent 13–14 November visiting the Western Union and Atlantic and Pacific main offices in New York and there saw Edison's quadruple and automatic telegraphs in regular operation and saw Gray's "electro-harmonic" (i.e., acoustic) telegraph apparatus as well. He left by ship on Wednesday, 15 November. *Telegr.* 12 (1876): 281. (This report, as was usual in the *Telegrapher* during these years, credited Gray with his devices but only mentioned Edison disparagingly.)

6. George Ward was American manager of the Direct United States Cable Co. (Reid 1886, 526). Siemens's firm had manufactured and laid that company's cable as its first major project in submarine telegraphy. Pole 1888, 206–10; Bright 1974, 128–29.

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**Notebook Entry:**

*Battery and Copying Machine*

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**Menlo Park,** Nov. 6, 1876.

Gavlinic battery

**Cloth on Carbon Roller** saturated with exciting solution & a salt Hg. rotated. Zinc roller = or vice versa, Carbon roller & zinc with cloth on = object semi dry battery — no polarization

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October–December 1876
I propose to write the letter etc with an ink that will give great frictional surface; place it on a drum provided with an E.M.G lever on the extreme end of which is a fountain pen opposite another roller with the paper on for receiving the copy the ink marks by their friction move the EMG lever cause it to bring the fountain pen against the other paper at every mark the Cylinders revolve together & are fed endwise by any suitable device such as a ratchet, worm-screw. the whole thing may be rotated by pen Electric Engine, clockwork handpower foot, or any source of power ie or tuning fork set in motion by magnet= I can use a stylus & put carbonized paper on over second paper & roll, could use several EMG levers on one roll & thus expedite copying—

T. A. Edison

Chas Batchelor
James Adams


1. Figure labels are "Carbon," "cloth," and "zinc."
2. On 10 November 1877 Edison sketched an alternative version of this electromotograph copying machine with electrical connections (NS-77-002, Lab. [TAEM 7:350]). An undated but more finished drawing of the 10 November device, without electrical connections, is in NS-77-002, Lab. (TAEM 7:445).
3. Carbonized paper was a common material in the laboratory. See Doc. 829 n. 11.

MENLO PARK, N.J., Nov. 10, 1876.

LABORATORY NOTES

BY T. A. EDISON.

1. HARD RUBBER or vulcanite, placed for several weeks in nitrobenzol, becomes soft and pliable like leather, and easily broken.

2. The vapor of chloral hydrate is a solvent of cellulose. I have found the corks of bottles containing the crystals eaten away to the depth of a quarter of an inch, the cork being resolved into a black semi-liquid. Certain kinds of tissue paper are partially dissolved in time, if thrown in a bottle containing the crystals.²

3. A very difficult substance to dissolve is gum copal. I have found that aniline oil dissolves it with great facility.

4. Hyposulphite of soda is apparently soluble to a considerable extent in spirits of turpentine. Large crystals of “hypo” melt down to a liquid after several weeks, and if the bottle be shaken, partially disappear. The turpentine smell nearly disappears.

5. The vapors of iodine, in the course of several months, will penetrate deeply into lumps of beeswax.

6. If to a solution of bisulphide of carbon there be added twice its bulk of potassic hydrate in sticks, and the bottle be well sealed, the whole will, in two months, become an intense reddish, syrupy liquid, with scarcely any free bisulphide of carbon.

7. Some substances in solution form crystals or deposits on the sides of the bottles containing them generally above the water line. Among such solution in 100 c.c. of rain water may be mentioned a 14-gramme solution of acetate of uranium, 8-gramme of protoacetate of copper, 5-gramme of acetate of morphine, 10-gramme of formate of copper, 20-gramme of tannate of iron. These deposits invariably take place on that part of the bottle most exposed to light. This phenomenon may be due to heat, but deposits or films occur in some solutions within the liquid as well as above it—especially noticeable with tannate of iron, the film of which adheres strongly to glass.

1. These notes were the product of various experiments undertaken by Edison and his staff or the results of observations made of chemical solutions prepared for experiments. See, for example, Docs. 791 and 810 and Cat. 966:41–47, Lab. (*TAEM* 3:299–302). These published notes are continued in Doc. 845.

2. Edison intermittently investigated the solubility, absorbency, and permeability of variously treated paper, and its constituent cellulose, both as related to automatic telegraphy and his electric pen copying system and as topics in their own right, over several years; see e.g. Docs. 579, 586, 655, and 915 n. 2.

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**From George Walter**

**Phila Nov 13/76**

Dear Sir,

I have a prospect of selling yr Patents¹ for India, for Italy, for Spain, for Queensland, for Netherlands, for Austria, for Russia at least I have parties here at work on each of those countries also Norway & Sweden.

I have strong parties considering my proposition for the purchase of the United States, But I guess the price will be too high for them² I have talked up very strong since I have been here with all these parties and I am satisfied that I shall make some sales for you before long.³

If any of these parties call upon you or Mr Batchellor say to them that I am authorised to sell the Patents for you and that all arrangements made through me will be fulfilled by you & oblige Truly Yrs

Geo B. Walter

(OK Edison)


1. That is, for the electric pen.

2. The next week (24 November) Walter wrote to Edison that the commission Edison had offered for the United States sale (five percent) was too low; Walters asked for ten percent. DF (*TAEM* 13:1053).

3. In January, Edison wrote to Walter about royalty terms for the sale of the copying system, and also discussed the possibility of beginning manufacture of the apparatus (excepting the pen itself) in Austria (4 Jan. 1877, DF [*TAEM* 28:532]). See also Doc. 892.
My dear Sir

Pneumatic Pen

Our Patent Laws are so unsatisfactory that—rather than risk a law suit—we have consented to buy up the invention—It certainly works wonderfully well and with a little improvement, would do quite as well as the "Electric"—the cost of production was very small and had we not come to terms the opposition would have been very serious.

There is an effort being made to get the Pneumatic patented on the Continent—had you not better authorize me—or someone—on your behalf—to oppose this—or to come to terms with the inventor

Please send us an Embroidery Pen. ¹

—Press.—

I enclose you sketch of this—² Frame A has a groove in it—B has a projecting band of India Rubber—the two fasten together by two hooks and the paper is held firm at all points.—However thin the paper used may be it cannot "sag" and it cannot tear away as it is apt to do where it is pierced by the pins

Ink

Our new ink is working very well and—as a close assimilation to writing Ink is an immense improvement.

Batteries

These also are working well—the fact of their portability is alone—an immense—advantage—but independently of that they are lasting well—We are putting them to the severest tests and we quite believe what is said of them—i.e. that they will keep in good working order—without renewal—for many months.³

I think we had better send you samples of the battery—⁴—press & Ink.—Yours truly

Frederic Ireland


¹. See Doc. 800.
². Not found.
³. In a letter of 27 November, Ireland said that this battery—the Fuller—could still write after six weeks of use, unlike other batteries he had tried, which weakened after half an hour's writing (DF [TAEM 13:992]). See also Doc. 804 n. 6; and Niaudet 1884, 223.
⁴. On 1 December, Ireland wrote Edison that the batteries would be on a steamer to New York departing the next day. DF (TAEM 13:996).
Dear Sir

The examination of witnesses is progressing in the Gamewell case vs Domestic Tel Co.¹ and Mr Pope² is being examined on behalf of the former Co= He is very voluminous and on a cross examination we shall need some one who can match him and by general consent you are looked on as the proper person—I have told Mr Wheeler³ our counsel that I presumed you would appear if requested to do so, as I know how tenacious you were on the question of not having infringed on Gamewell's Patents in securing your own, as expressed to me, and the study necessary to make this certain would qualify you very fully to prove the fact of noninterference—Please say whether or not you will come tomorrow if possible⁴ Respectfully

Alfred Nelson V.P.

¹ Although infringement suits tried in New York City would have been heard by the Circuit Court for the Southern District of New York, this case could not be found listed in the court docket and no record appears to exist.

² Franklin Pope, Edison's former business partner, was a prominent electrical engineer and inventor who was at this time in charge of Western Union's patent department. TAEB 1:115 n. 1, 226; DAB, s.v. “Pope, Franklin Leonard.”

³ Everett Wheeler (1840–1925) was a prominent New York attorney who represented Atlantic and Pacific Telegraph Co. in the Quadruplex Cases. He later authored a reminiscence of his association with Edison. DAB, s.v. “Wheeler, Everett Pepperrel”; Wheeler 1927.

⁴ Edison's response is unknown.
hundred and eighty thousand eight hundred and fifty-seven, and also a certain patent granted by the Dominion of Canada, Sept. 6th, 1876, and numbered six thousand five hundred and eight, for an electrical pen and duplicating press for Auto-graphic Printing;

And WHEREAS the said parties of the first part are in possession of a certain lot of special tools for the manufacture of the machinery under such letters patent, and exhibit of which is hereto annexed and marked Exhibit A, and have established certain agencies for the sale of such manufactured articles in the United States and the Dominion of Canada;

And whereas the said party of the second part is desirous of acquiring the business of the said parties of the first part, and the sole right to manufacture and sell said Duplicating Apparatus under said patents within said countries for a period of three (3) years or more, and are also desirous of acquiring the said special tools to enable them to economically and expeditiously manufacture the said apparatus;

Now it is hereby agreed by and between the parties hereto as follows:

The said parties of the first part do hereby transfer to the party of the second part the business as above mentioned, and the sole right to manufacture and sell within the United States and the Dominion of Canada, and nowhere else, the articles covered by the above recited patents; and also transfer and sell the said special tools upon the following terms and conditions—namely:

That the said party of the second part shall pay to the parties of the first part five (5) dollars royalty on each and every Duplicating Apparatus as covered by said patents and which may be sold within said countries, and fifteen per cent on the price of all parts and supplies as fixed and shown in Exhibit B hereto annexed, sold in such countries, which payment shall continue for a period of three (3) years from the date of this Agreement, and fifteen hundred dollars for the said special tools in three (3) equal annual payments of five hundred (500) dollars each, the first of such annual payments to be made on the delivery of said tools.

The said party of the second part does hereby guarantee and bind itself that the royalty paid by it shall not be less than two hundred and fifty (250) dollars in each and every month during the said three (3) years on complete Apparatus.

It is further agreed that if six months before the expiration of this three (3) years, said party of the second part shall notify the said parties of the first part that they desire to continue
this contract for a further period of three years or more, it shall be extended accordingly for that period.

It is further agreed that, in case the sales of said Duplicating Apparatus within the said countries (excepting those for exportation) shall reach fifteen hundred (1500) in any one year, then the said royalty of five (5) dollars shall be reduced to four (4) dollars in that year, and in every year in which that number is sold. If the sales shall reach twenty-five hundred (2500) in any one year (those for exportation excepted) then the royalty shall be reduced to three (3) dollars.

It is further agreed that, upon the first day of January in each and every year, that the said party of the second part shall make full and true returns to the said parties of the first part, under oath, and that the said royalties shall be paid monthly to the said parties of the first part in the proportion of seven tenths \( \frac{7}{10} \) to said Edison,\(^7\) and three tenths \( \frac{3}{10} \) to said Gililand.

Should the party of the second part desire to discontinue the manufacture and sale of such patented articles after the expiration of the three (3) years they shall return said special tools in as good condition as when received, for which they are to be paid back the price—viz: fifteen hundred dollars.\(^8\)

And whereas the said party of the second part is desirous of manufacturing and selling to the said Edison complete machines under such patents for his foreign trade and to furnish the owners of the foreign patents with such machines and the parts thereof;\(^9\)

Now it is hereby agreed that the said party of the second part shall deliver to the said Edison, in New York or Jersey City, all the machines that he may require to supply his foreign orders for the sum of twelve dollars and fifty cents, currency, for each and every duplicating apparatus (packed) and the parts thereof at prices shewn in Exhibit C hereto appended,\(^10\) during the continuance of this contract;

And whereas the said Edison has disposed of the patent for the said Duplicating Apparatus for the Kingdom of Great Britian to one John Robt. Breckon, of Sunderland, England, and his assigns, and has agreed to furnish him with as many duplicating apparatus up to thirty (30) per week for a period of four (4) years from June 29th, 1876, at a fixed price of two pounds nine shillings and six pence sterling for each and every duplicating apparatus, the same to be paid for in London by his acceptancies of ninety (90) days drafts, bearing date of delivery of such goods in New York or Jersey City, to any steamship company named by said Breckon.

\( \text{October-December 1876} \)
Now, therefore, the said party of the second part agrees to furnish to the said John Robt. Breckon all the Duplicating Apparatus, or parts thereof, the prices of which are shewn in Exhibit D hereto appended, necessary to carry out the said contract between the said Edison and said Breckon as long as said Breckon shall promptly pay such drafts. And the said party of the second part further agrees that the last mentioned machines shall be packed well and delivered F.O.B. in New York or Jersey City.

And whereas the said Edison has patented said invention in foreign countries other than Great Britian and the Dominion of Canada, and has not yet disposed of his said patent rights in such foreign countries;

Now it is hereby agreed by the party of the second part that it will not sell any of the said patented Duplicating Apparatus, for exportation to foreign parts, other than the Dominion of Canada and Great Britian until the said Edison shall authorize it in writing signed by him so to do. The party of the second part shall have the benefit and advantage, if it shall elect to accept the same, of any further contract or contracts that may be hereafter made by the said Edison for the supply from the United States of the said patented Duplicating Apparatus. The license hereby granted is to extend to all reissues and renewals of the said patents, or either of them, and similar license or licenses shall be granted to the party hereto of the second part by the said T. A. Edison for the use of any invention or inventions of any addition to or improvement or improvements upon the said invention, such additional license or licenses to be granted upon fair and equitable terms. And the said parties of the first part further agree to prosecute all infringers upon the said patent and bear all the expenses of such prosecution, for the purpose of protecting said party of the second part in the full and exclusive enjoyment of said patent.

And finally it is agreed that the provisions of this agreement shall go into effect on and after December fifteenth (15) 1876. In witness whereof, the said Thos. A. Edison and Robert Gilliland have hereunto affixed their hands and seals; and the Western Electric Manufacturing Company has caused these presents to be signed by its President and its seal to be affixed and attested by its Secretary.

(Signed) Thos. A. EDISON. (Signed) ROBERT GILLILAND.

THE WESTERN ELECTRIC MANUFACTURING CO.,
By (Signed) ANSON STAGER, Pres't.

Attest: (Signed) E. M. BARTON, Sec'y.

October–December 1876
TD (transcript), NJWHE, Miller (TAEM 28:1019). "Date taken from text, form altered. "(COPY)” in top margin. Interlined above.

1. Robert Gilliland, Ezra's father, owned a three-tenths interest in Edison's autographic printing (i.e., electric pen system) patents. See Doc. 724.

2. Western Electric was a major electrical manufacturer in which Western Union owned a one-third interest. See TAEB 1:402 n. 5.

3. Not found.

4. See, for example, TAEB 2:598 n. 11.

5. Not found.

6. The first $500 installment was the only money received until the end of February 1877, when the first royalty check arrived. Western Electric paid $3,779.56 in royalties in 1877 and just over $2,000 by September 1878, when Edison's account record ends. Batchelor to Gilliland, 31 Jan., 21 Feb. 1877, Lbk. 10:68, 81 (TAEM 93:77, 87); Cat. 1185:88, Accts. (TAEM 22:595).

7. Edison shared the profits from the electric pen system with Batchelor and Adams. See Doc. 637.

8. On 27 April 1877 Edison and Gilliland signed an agreement with George Bliss and Charles Holland granting Bliss and Holland manufacturing rights if Western Electric discontinued its manufacture of the pens. Miller (TAEM 28:1044).

9. See Doc. 892.

10. Not found; but see Doc. 892, Schedule B.

11. Not found.

12. The term infringement here referred to any legal challenge or illegal manufacturing of the electric pen system that threatened Western Electric's exclusive manufacturing rights. See, for example, Doc. 900 n. 8.

13. Anson Stager (1825–1885) entered telegraphy as an operator in 1846. He was general superintendent of Western Union Telegraph Co. in the 1850s and during the Civil War also served as head of the Union military telegraph, attaining the rank of brigadier-general. After the war he declined the general superintendency of Western Union, choosing instead to head the company's newly created Central Division. In 1878 Stager was elected a Western Union vice president. In 1872 he helped organize Western Electric Manufacturing Co. and served as its president until 1884. DAB, s.v. "Stager, Anson.”

14. Enos Barton (1842–1916) became a telegraph operator in 1859. In 1869 he organized the telegraph manufacturing firm of Shawk & Barton, which soon became Gray & Barton when Elisha Gray bought out George Shawk's interest. Anson Stager also became a partner in the firm and the three men formed Western Electric in 1872, with Barton serving as secretary. Barton became company president in 1886. NCAB 30:383.

Dear Sir

Before you was taken ill you agreed to allow me to draw on account of Acoustic for four weeks. I drew for three only. may

-[Menlo Park,] (Dec 4/76)
I have the balance. I would not ask it only I need it, to pay my "Intellectuals"  Yours

T A Edison


---819--

To George Prescott

I have something that will allow one man to work one end of a Quadruplex:= no change in present system= all morse: will you cooperate with me so that I can introduce it= It will save the Co a large sum by reducing the number of employees:

AL, DSI-NMAH, WUTAE.  "Dated (with initials) by William Orton.

1. George Prescott was chief electrician of the Western Union Telegraph Co. See TAEB 1:258 n. 4.

2. This note and Doc. 820 were written on the same sheet of paper.

3. Edison is referring to his embossing translator. Doc. 857; also see Docs. 789, 806, and 809.

4. On 28 November, Norman Miller had written Edison a letter saying that he had "had some talk with Mr. Orton] about your economic and he says 'that sounds like business, but don't print it in the newspapers.'" Miller offered to set up a meeting between Edison and Orton, but Orton was sick for much of the fall and there is no evidence that they had met by the time of this letter. DF (TAEM 13:1257).

---820--

George Prescott to
William Orton

Hon. William Orton  President

I have said to Mr. Edison, verbally, that I would assist him in every possible way to bring out and introduce upon our lines any improvements which he might devise. I told him I had never accepted, or agreed to accept, any pecuniary interest in any invention designed for the use of the Company, with the single exception of the Duplex & Quadruplex, & had not done so in these cases until he had experimented thirteen months upon our lines, and had had full use of our workshop & apparatus and had then informed me that he could accomplish nothing without my personal assistance, and personal interest in the invention. That I had not taken such part—accepted such an interest—until I had submitted the proposition to you and received your assent—and that now I expected, and had no doubt of receiving proper compensation for that interest, but that I should never accept another under any circumstances.

[New York,] (Dec 4/76)
I would, however, assist him in developing his invention for the Company to the full extent of my ability, and as fully as if I had a primary interest in its success. Mr. Edison seemed to feel satisfied and pleased with my assurance of help and said he would bring his apparatus here for development. I offered him a room for experimenting and all assistance necessary. He said he had just come from Gould & they wanted him to testify in their case. I said I hoped he would do so—that the truth could do us no harm—and the more we had of it the better. Yours truly

Geo B. Prescott

ALS, DSINMAH, WUTAE. Dated (with initials) by William Orton.

1. This letter and Doc. 819 were written on the same sheet of paper.

Dea Bro

Our Suits came off last week I send you copy of each1 the Wm Stewart & Co claim he levied on our lots which we will give us 15 months time at 7 per cent which which is less interest than we could get the money for so that disposes of No 1 the next claim is Guy Kimbals2 I fixed with him this3 way I paid him $50.00 down and am to pay $25.00 a week untill it is paid so that fixes No 2 for I can pay it out of the earnings of the road the F C Harrington3 Judmnt is what we owed the Savings bank I see him Saturday also H M McMorran4 the Vice Pres't of the bank they will give 6 months on their amt so that will arrange No 3 we have been sued on 4 small accts last week5 which I will put in a Stay for 5 months the notes at the first Nat bank Mr Barnum6 told me to pay $10.00 or $15.00 each month on the principal and the intrest all would be OK so you see with this to take care off and to look to this & the Sarnia Road and to watch the opposition you may imagine I have something to do although they write that I do not attend to buisness so you see something must be done within the next 3 or 4 months and in my opinion one of the following first to sell out if posable second to buy out if posable Third to lease the new road or to leas our road to them if we can agree fifth which I think would be the boss to rais Money if posable and buy up all the

Sarnia, Ont., Dec 4th 1876

From Pitt Edison

October–December 1876
notes and claims of the old road and force the paymt as soon as posable bid it in and build arround to Gratio & go for them it needs about 4000.00 to bring this gents to Tirm if you could come out here with 4000 you would fix this thing up in some way in less than 48 hours


1. Pitt enclosed a newspaper clipping listing the proceedings of the November term of the Circuit Court. Included were Wm. Stewart & Co. vs. the Port Huron and Gratiot Street Railway Co., judgment for $1,148.71; Guy Kimball vs. the Port Huron and Gratiot Street Railway Co., judgment for $306.07; and Charles F. Harrington vs. the Port Huron and Gratiot Street Railway Co., Wm. Wastell, and Wm. P. Edison, judgment for $578.63. DF (TAEM 13:1080).

2. Guy Kimball was a Port Huron dealer in flour, feed, and seeds. History of St. Clair County 1883, 581.

3. C. F. Harrington was cashier and later vice president of the Port Huron Savings Bank. Jenkins 1912, 429.

4. Henry McMorran, a wholesale and retail grocer and ship chandler, was vice president and later president of the Port Huron Savings Bank. Endlich 1981, 101; Jenkins 1912, 429.


6. On 12 December 1876 Pitt acknowledged the receipt of Edison's $600 to pay Harrington (see note 3) and also noted that the men connected with the City Railroad were about to make Edison an offer to settle the street railroad business. On 27 December Pitt wrote that they were ready to make a formal proposition. He indicated that the City Railroad people wanted to "call both roads even including real estate," but noted that the Gratiot Street Railroad had "4 cars and ten Horses" while City Railroad had "two devilish poor cars and three horses" and were hiring three horses. In this letter he again urged Edison to "come out here and you can make a trade in one day it would be to your advantage to do so" as the City Railroad people were "red hot for to do something right away." DF (TAEM 13:1082-84).

--822--

From Josiah Reiff

New York, Decr 8th 1876

Strictly Confidential
Dear Edison

I desire to see you as soon as possible & alone. I am seriously contemplating going into bankruptcy, to rid myself of the load that is crushing me & I want your advice in several matters.

I must avoid anything that will injuriously affect our joint interest, (yours & mine) but I must do something. O1 seems to promise fairly with his lips, but for some mysterious reason, either of over confidence or insincerity, he simply delays. If
after a careful review of the situation, it is deemed bet, I shall
go through the form of legal relief, but my moral obligation
to pay every dollar I owe, still remains absolute, if I am ever
able. When will you be over? Truly

J. C Reiff

You better destroy this after reading. I sent copy Bill* to
G.B.P today.

York," and "187" preprinted. *Obscured overwritten letters. *(yours &
mine) interlined above. *On two lines spanned by brace.

2. Probably the bill of complaint in Harrington v. A&P.

N.Y. 8th December 1876

Confidential

Dear Sir/ Having been informed that you have recently made several
new and important inventions in Telegraphy I beg leave to
offer for your patient and careful consideration the follow-
ing suggestions.

1. If you submit these new inventions to Mr Orton with the
understanding that he may control them if he pleases discon-
nected from your prior inventions in Automatic and Quadru-
pex telegraphy you will seriously damage your own interests
as well as those of your friends.

2. Mr Orton has recently felt well disposed to adopt our
theory that the true way to impair the strength of the A.&P.
and to prevent the further acquisition of prestige by them is
to make an arrangement with you and your party whereby the
Western Union may hold the title to your Automatic and
quadraplex patents in connection with your more recent in-
ventions.

3. It is a question of policy which they have to consider. An
improvement in their own present mode of doing business is
of course of some importance to them, but it is not so im-
portant to them as the weakening of their great enemy, and
especially the prevention of the acquisition by that enemy of
the great strength they would obtain by coming to terms with
Mr Reiff and your party and thereby holding your automatic
and quadraplex inventions as the basis of further improve-
ments in Automatic and Quadraplex telegraphy.

-823-

From Robert Russell

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4. It is true you might show the Western Union how to improve the present system but if the A.&P. should then acquire your Automatic and Quadruplex inventions they might have afterwards important improvements invented and thus be able to maintain a strong competition with the W.U. That is what they want to prevent.

5. Our true plan is to couple your former inventions with those now contemplated by you, not to dispose of them separately to the W.U. By coupling them together you will have in your own hands the control of the negotiation and we should so apportion the total price paid as to secure the larger part for you individually, for your newer inventions.

6. If on the other hand you should endeavor to dispose of the new things separately to the W.U. you would have to wait a long while before you would receive any considerable payment on account of them—the payment would depend upon future experiments and trials.

And by separating the newer inventions from the former ones you would disparage the Automatic and Quadruplex and cool the ardor of the W.U. in the pursuit of the policy—which they have (or recently had) in view viz the deprival of their enemy of their prestige derived from the supposed control of your Automatic and Quadruplex systems.

It appears clear to my mind that you have everything to gain by holding the inventions to be disposed of as a unit and that great loss and damage would result to you if you were to adopt the opposite policy.

Yours truly

R W. Russell

P.S. We must take care to prevent as much as possible the disparagement of your prior inventions seeing that your reputation is at stake. This letter has been written without conference with Mr Reiff.

ALS, NJWOE, DF (TASEM 13:1176).

1. Edison had filed patent applications for his acoustic transfer telegraph system in August (U.S. Pat. 185,507, 200,993, and 235,142) and for the perforating telegraph recorder/repeater in November (U.S. Pat. 200,994).

2. Jay Gould's Atlantic and Pacific Telegraph Co. was Western Union's primary competitor.

3. That is, the American Automatic Telegraph Co., of which Russell was company trustee and in which he held 100 shares of stock (Doc. 676; Articles of Association and By-Laws, 31 Aug. 1875, DF [TASEM 13:480]). Russell had previously acted as Edison's confidential adviser and attorney (see Docs. 577 nn. 2–4 and 734 n. 6; and Russell's undated memorandum [probably written earlier in 1876], DF [TASEM 13:1194]).
This assumes the validity and legal vindication of the claims of Edison and George Harrington to patent rights for Edison's quadruplex and automatic telegraph technologies. Those claims, however, were contested in pending litigation, primarily *Atlantic & Pacific v. Prescott & others* and *Harrington v. A&P.* See *TAEB* 2, app. 3; and Docs. 740 n. 5 and 750 n. 5.

That is, if they won *Atlantic & Pacific v. Prescott & others.*

5 below Zero—

No fire in Laboratory fearful cold great wind storm nearly blown Laboratory down had brace it with 20 poles (Telgh)¹ Record of phenomenon of freezing of different chemical solutions:

100 Milgrms Citrate Quinine, in 100 cc HO, Frozen solid, in 4 oz bottles transparent cracked beautifully in centre there is a egg shaped peice which looks like Cotton. The surface towards Cork is very uneven sunk in place & raised in others ¼ inch

1 gram Camphoric Acid in 100 cc HO = raised in places on top ½ inch = greatly expanded bottle busted =

1 gramme & 400 m.g. Cyanide Silver & 100 cc HO. shoots formed by gas = spread out from centre in curves ½ bending upwards & ½ downwards

500 mg. Hydrate strontia same.

Chloride Zinc 1 gramme 100 cc — same on end of shoots have a globule =

1 gramm Sulphate Soda Expansion burst bottle.

20 grammes pyrogallic acid = Beautiful Brown scintillations of crystals on side of bottle

Frozen Ferridcyanide of potassium looks deep yellow =

1 gramme gum Guiacum² has fuzzy looking elongated egg in centre bottle with innumerable shoots running from it

20 grms Nitrate lead throws up a button ½ inch high in centre on surface of solution

Picrotoxin³ 500 m.g. = white opaque column in centre & clear [and?]⁴ otherwise looks as if ice had thrown the picrotoxin with great force = this appear to illustrate⁵ that phenomenon strongly =

Iodine 1 grm in HO 100 cc shows fuzzy Column in centre
The Menlo Park laboratory, showing telegraph poles bracing the walls.

wcolored but the ice around it is clear this is like picrotoxin Ammonic Chloride crystals of Ice similra to the salt of the Am Chi cross-hatched


2. Guaiacum.

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Edisons Duplicating Ink

[Menlo Park,] Dec 13th 1876

On the 1st day of December 1876 or thereabout Edison compounded the following ingredients to form a new copying ink:— Aniline Violet, Alcohol and Gum dextrine in the proportions as mentioned below. We find it superior to anything in the market it being able to do the following:—

A copy can be taken on letter press paper & from such copy numerous copies can be taken on letter or other paper. A copy can be taken from such copy at any future time—

The following are the proportions to manufacture this ink:

No 1 Solution (Stand.)*

2 galls & 1 pint of Alcohol
5 lb 5 oz of Aniline Violet
4 galls & 1/2 pint of Water

No 2 (Stand. Solution)*
20 1/4 galls Hot water
21 1/2 lbs of Gum dextrine

Notebook Entry: Duplicating Ink

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My dear Edison

Ref'g to our conversation of a few days since when I suggested to you the idea of your discovering some means of detecting sewer gases in the atmosphere of dwellings or other rooms and thus preventing an enormous percentage of illness derived from such an insidious enemy and which you said you felt no doubt of being able to accomplish— referring that interview I now wish to repeat what I then said that in my opinion you wd render a lasting and inestimable service to the whole sewered world comprising a pretty large proportion of civilized existing civilization.

The subject is at this moment brought particularly "home to me by the fact that I have recently several times detected the presence of abominable odors in my bedroom & trace them unmistakably to the washstand drain pipe & yet I can never get anybody to the spot in time to corroborate my statement; consequently my landlord believing his plumbing to be perfect does nothing in the premises, & I am obliged for the sake of safety keep water standing in the basin, and yet sometimes upon my letting it out I get a puff of the vilest air imaginable—a poison which must impregnate the room until the air is completely changed. And thus is the health of my family endangered.

Here is a great field for you, & honor enough to me, the credit of having put your great genius on the track.

Do it & be blessed of all men

Geo. E. Gouraud

Written with the English ink GEG

ALS, NJWOE, DF (TAEM 13:786).

1. Gouraud addressed this from the Albany Hotel.
2. George Gouraud had represented the Automatic Telegraph Co.
in London and subsequently became Edison’s principal agent in Great Britain. See TAEB 1:280 n. 7.

WASHINGTON, D.C. DEC 24 1876

Dr Rff.

A short note from Edison dated 12-23, rec'd to-day declines to do as I suggested—¹ Says he is well pleased with his situation & pleasant relations to WU—and such is life! Truly

U H Painter

ALS, NjWOE, DF (TAEM 13:1180). ¹Place and date from Philadelphia Inquirer hand stamp.

1. On 20 December, Painter had written to Reiff that he had heard nothing from Edison in reply to an earlier letter, which probably contained the suggestions to which Painter refers. Reiff forwarded that note to Edison, and Edison apparently wrote to Painter. Reiff noted to Edison on the back of this letter, “Within is his interpretation of your letter.” (DF [TAEM 13:1178-79, 1181]). Neither Painter’s earlier letter nor Edison’s answer has been found.

[New York?],¹ Dec 27th 1876

Up to this date we have sold (205) two hundred & five presses complete and quite some extras amounting to altogether to $3,880.28 for which we paid $2717 98/100 leaving a balance of $1162.30

Net profit of sales $1162.30
Cash advanced etc 420.70
1583 00 to account for

Expenses $216.77
Brecons² D for (Due) 857.79
Cash in hand 217.05
Paper on stock 3.44
Fogg & Co³ 16.00
E T Gilliland 48.40
Lefferts⁴ 3
T A Edison 220.55
$1583.00

I have taken $450— & divided it as follows⁵

Edison $327.60
Batchelor 110.20
Adams 12.15
$450.00

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1. Batchelor crossed out the preprinted "NEWARK, N.J." He probably wrote this account in the New York office of the company.
2. John Breckon.
3. H. Fogg and Co., New York importers, were agents for Edison's electric pen and press in China and Japan. Wilson 1877, 447; see Doc. 892, Schedule C.
4. See Doc. 637 regarding the division of electric pen royalties.

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Charles Batchelor to
Thomas Batchelor

[Menlo Park,] Dec 28th 1876.

Dear Tom,

Yours of the 6th received¹ Glad to hear we are all in the same mind in regard to Father.² I think it would be a great deal better for him if he could be induced to give up and lead a quiet life at home.

I am not afraid that anyone will get ahead at present in regard to running sewing machines by electricity. It is a very difficult subject to handle. During the last five years I have made more than 50 different applications of electric engines (every one of different principle) to running small machinery and I also know from experience that all the patents taken out during that time for improvements in such engines are worth nothing, although in some cases there has been an immense amount of talk spent over them, in fact all the improvements made on "Electric Engines" during the last ten years you can value by calling it one, whereas to make it a successful motor you want one hundred. It is a well known fact that we do not get in practice more than ½ part of the power given out by a battery now if we can find some means whereby we can utilize the whole why then you can talk about Electric Motors, and until this is done or partly so, or some new principle found out Electric Motors will be a failure.³ Of course this does not apply to motors of very small power such as the pen and those used in Telegraphic printing Insts. but for sewing machines, printing presses, etc. I have been working on a new principle for the last 3 months and I must confess I have not met with very much success although I have succeeded in making a Wilcox & Gibbs machine stitch 130 stitches per minute through 8 thicknesses of cloth right along through the day with 3 cells of ordinary Bunsen battery.⁴ This of course is nothing great, but I do not know and cannot tell for certain

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for some short time whether I have the principle applied right. The power derived from an electromagnet is the most deceptive thing possible, and in this country has been the means through which some big frauds have been perpetrated.\(^5\)

I am glad you are connected with us and hope you'll make a little out of it.\(^6\) Is the Mr Chas Wilson\(^7\) the gentlemen who used to live near St Luke's Church? Much obliged for the names of his friends. I just sent 12 to Dunedin New Zealand today.\(^8\) Mr Ireland has sent us 2 batteries out by Steamer and they have arrived but I have not got them yet.\(^9\) We have started a new enterprise here in the shape of "the American Novelty Co"\(^10\) which we got up with the idea of working a great many of the "little things" that we should otherwise pass over in our experiments; many of them when worked are very valuable.\(^11\) It is a regular organized company of 50,000 shares. I think it will be very successful. I have another very good thing which I have already secured, but have not had time to do anything more than the first experiments. It is a new Holtz machine for the production of statical electricity\(^12\). After it is out I believe I can sell one to every college & professor in the world. It is a new application. Yours

Charley.

ALS (letterpress copy), NjWOE, Batchelor, Cat. 1238:57 (TAEM 93:68).

1. Not found.

2. Batchelor’s father had apparently suffered some sort of attack earlier in the fall and Charles had advised him to give up business and offered to help out financially if this proved necessary. He also offered to pay his way to Menlo Park for a period of recuperation. Batchelor to James Batchelor, 9 Nov. 1876, Cat. 1238:55, Batchelor (TAEM 93:67).

3. On electric motors see TAEB 1:230 n. 2.

4. See Doc. 802.

5. For example, the Paine motor. See TAEB 1:230 n. 2.

6. This probably refers to the electric pen. Batchelor had offered his brother the general agency for Great Britain, but had to withdraw the offer after Edison sold the rights to John Breckon. Charles Batchelor to Thomas Batchelor, 29 Mar. and 9 May 1876, Cat. 1238:46, 51, Batchelor (TAEM 93:59, 63).

7. Unidentified.

8. No other record exists of this order for electric pens. See Doc. 815.

9. The American Novelty Co. was incorporated in New York on 28 November 1876, with Edison as president and Edward Johnson as secretary and general manager. American Novelty Co. stock certificate, 15 Dec. 1876, DF (TAEM 13:791); Cat. 1240, item 4, Batchelor (TAEM 94:7).
11. Edison later testified that the American Novelty Co. was formed to “work off some of the small inventions which I was making. The manufacture of a great many articles from carbon was one of these inventions. Among other things was an electrical sheepshearing machine, an electrical drill, an electrical engraving machine, ribbon mucilage and other inventions which I cannot now remember. They were small things. I think he [Johnson] had a list of about twenty.” P. 3040, Sawyer and Man v. Edison (TAEM 48:27).

Edward Johnson testified that the object of the American Novelty Co. “was to acquire numerous inventions of Mr. Edison, Mr. Batchelor, Mr. Adams, my own, and others, and to put them upon the market. Several such were acquired, namely, Edison’s duplicating ink, Edison’s battery carbons, Edison’s jeweller’s engraving machines and others which I cannot now recall” (p. 105, Sawyer and Man v. Edison [TAEM 46:235]). At least one more product can be identified—Batchelor’s “Office Door attachment,” which indicated whether the occupant was in or out and, if out, the time of return (Cat. 1307:59; Cat. 1233:19; both Batchelor [TAEM 90:644, 61]).

Edison also described the experiments leading to the American Novelty Co.

I carbonized paper in the summer of 1876. Such paper was to be used for battery carbons, for non-conductors of heat, and articles were to be made in different shapes and carbonized. A great many articles were so made and carbonized from paper. Sheets of carbonized paper were used for electrical resistance about that time. Strips of cardboard or Bristol board, about a quarter of an inch wide and five inches long were placed in gas tubes and carbonized by placing the same in a furnace and heating the tube to a white heat. The strips were packed in the tube one upon the other and the interstices were filled with charcoal powder. Sheets of tissue paper were laid in iron boxes, fifty to a hundred deep, on the top of which was laid a weight of metal so that the carbon would remain straight after being carbonized. Also sheets of thick Bristol board several inches square were carbonized under strain to keep them straight. Some experiments were also made to carbonize small crucibles made out of Bristol board.

The experiments were quite extensive. My intention was to go into the business of making carbon wire for various purposes, electrical and chemical, for electric lighting and batteries. A company called the American Novelty Company was to handle the goods in connection with a gentleman named James, who is now dead. Mr. Charles Batchelor, and I believe Mr. E. H. Johnson, saw many of the experiments. Mr. Adams, one of my assistants, now dead, helped me in the experiments. I would mention that we also carbonized wood made up in various shapes, as well as paper. [Pp. 3006–7, Sawyer and Man v. Edison (TAEM 48:10)]

In his testimony Edison listed the following items to be manufactured of carbonized paper: “Battery carbons, strips of carbon for electrical resistances, dishes for use in making chemical reactions and tissue paper as a non-conducting packing.” He said they also “made four or five crucibles, a great many flat sheets and a half a pound to a pound
of carbonized tissue paper" over the course of two months during the summer. P. 3041, *Samyer and Man v. Edison* (TAEM 48:27); see also Charles Batchelor's testimony, pp. 3164–69, ibid. (TAEM 48:92).

12. Wilhelm Holtz's machine, which produced static electricity by induction, employed two glass plates (Atkinson 1890, 726–29). Apparently an important feature of the new Holtz machine mentioned by Batchelor was that it did not use glass. In a 4 November 1876 letter to Robert Spice, professor of chemistry at Brooklyn High School, regarding Spice's joining him and a man named Benjamin in developing such a machine, Batchelor noted that if experiments proved satisfactory the machines could be "made a great deal cheaper than glass" (Cat. 1238:54, Batchelor [TAEM 93:66]). A clipping from the October 1876 issue of the *American Chemist*, kept in one of Batchelor's scrapbooks, noted a new form of Holtz machine developed in Prussia that employed ebonite (hard rubber) instead of glass plates (Cat. 1240, item 30, Batchelor [TAEM 94:15]).

[Menlo Park,] Dec 28th 1876

Dear Sir,

Your letter of Dec 2[nd?] received and contents noted. The goods shall be shipped immediately though not with large presses: When we can get these large presses your troubles will be over for then all your orders can be filled promptly. I have already got your orders down first in the list for large presses so your people cannot buy in New-York till after yours are shipped. If we have any such applicants I shall tell them that I have shipped you a lot and it would be better to get from you.

In this case I also ship you two bottles of writing fluid, (invented by Edison but the property of the American Novelty Co) which I want you to try, and see what you think of it; and if you like it to introduce in Cuba, from a single writing with an ordinary pen you can take copies on letter or other paper up to 20 good and then lots of letter press copies after. I think it is good where they only want a few say 4 to 10, and I sell a great deal of it; I will send you further particulars in regard to it shortly. Respectfully Yours

Chas Batchelor


1. Nothing is known of Vesey Butler beyond his association with Edison. The familiarity shown in correspondence indicates that he knew Edison rather well, perhaps as a telegraph operator. In 1876 he was selling Edison's electric pen copying system. He continued his association with Edison through 1880, promoting the inventor's electrical inventions in Cuba. See *TAEM-G*7, s.v. "Butler, Vesey F."

2. That is, Edison's duplicating ink.
My Dear Alva—

Saw Batch today—¹ thought you would be in— told him about success at Direct Cable² how it was obtained &c—but he thought you would like to have it direct from me—on paper. So I set about it in the am & worked till 3 pm before we got it satisfactory—

Then did it by means of cloths obtained from the Erie RW³ ofs—⁴ the occupants of which I astonished by an Exhibition of the working of the Ink—⁵ We took 4 sheets of cloth down to cable ofs—ran them through the wringer—Had men make very light copies

Put them through the wringer Dried them—and took them upstairs to Letter Press—There put them through the following treatment with immense success—

Placed on Counter

1st an Oil Board
2d a cloth—
3rd a sheet of tissue
4th the Dry Copy—
5th an Oil Board
6th a sheet of tissue
6th a cloth
7th Tissue
8th Dry Copy
9th Oil Board

& so on till we had 4 complete sandwiches of this character—put them in Press gave em one min. & took them out before an appreciative & applauding audience—Ward⁶ being the Enthusiast—Did⁷ the same thing over again 4 times with the same copies & getting the same results—Whoop-la—being the tone of the meeting⁸

Explained to Ward how by going down to Ann St. & buying a stout 2d hand Press long enough to take 2 sheets on a page—

getting 4 long stout pieces of Card Board—
50 Cloths same length
50 Oil Boards* " a small wash tub—with Cheap wringer attached

He could make—25 Sandwiches (50 messages) Put em in press—then proceed to make another 25—by which time magnificent copies would be found in Press—& not a seconds time lost in waiting on em—Even Bucknor⁹ tumbled to this—The whole party saw the point—Ward ordered the ½
Doz I gave him sent to Rye Beach by that night Express—and is waiting for me to Deliver him some in half pint Bottles—give him the price for the same & pay me the money—Trot out em ½ pints & your prices for same
Come over on Tuesday to attend a meeting—Hurry up the mucilage Sutterlin wants put out Canvassers on em at once says more in it than in the Ink.

Happy New Year

E. H. Johnson


1. Batchelor spent his days at the electric pen office at 41 Dey St., New York.
2. The Direct United States Cable Co.; see TAEB 2:566 n. 2.
3. The Erie Railroad Co.
4. A label for the duplicating ink gives the following directions for its use.

Keep Bottle closed when not using. Don’t use a pen dipped in Other Ink. For LETTER PAPER COPIES; Copy from original on tissue sheet; Sponge a Letter Sheet both sides, blot surplus water from it; Remove original and put Letter sheet Exactly in its place on Tissue Copy. When this tissue copy ceases to yield other copies, take a Second impression from Original.

For COPYING FROM OLD COPY; Take a blotter; put a tissue sheet upon it, thoroughly SPONGE put INKED side of copy upon tissue sheet; put under good pressure One minute. To COPY A NUMBER AT ONE TIME; put in wet muslin cloths in place of blotters and do not sponge. To TAKE THESE COPIES ON LETTER PAPER; Sponge the Letter sheets in addition to use of cloths. [Cat. 1144, Scraps. (TAEM 27:338)]

5. George Ward.
6. Unidentified.
7. See Doc. 836.
8. Johnson had invented a ribbon gum mucilage, which was marketed by the American Novelty Co. Cat. 1240, items 8, 27, 35, Batchelor (TAEM 94:8, 14, 17)

Draft to Joseph Hickson

New York Dec 1876

Joseph Hickson General Manager G.T.R

Parties inimical to the interest of the old street railway between Port Gratiot and Port Huron have been scheming to have your company eject the road from the yard at that point.
From motives of spite against my brother and with hopes that they might succeed in ruining the old road through the G.T.R. by ejectment they have built a cheap and straggling road to run in competition with it. My brother Wm P Edison was the pioneer of the old road as well as the one running from Point Edwards to Sarnia and has worked in harmony with the G.T.R Co's representatives for many years and as yet without profit on either road. The rumors set afloat by the parties above mentioned of ejectment etc. are a course of constant fear and expense.

The road from Pt Edwards to Sarnia has a right of way (with certain restrictions) through the Cos grounds for a period of 10 years, signed by yourself. If not detrimental to the interest of your Co would you sign a similar right of way through the yard on the other side of the river

Yours Respy

Thos. A. Edison

ADfS, NjWOE, DF (TAEM 13:1087).

1. Edison gave "41 Dey St" (the Electric Pen business office) as his return address.
2. Another, undated draft is in DF (TAEM 13:1085).
4. The agreement, dated 9 December 1874, is in DF (TAEM 13:29).

[Menlo Park, December 1876]

Dear Sir:

Some six months ago while experimenting with the system of Acoustic Telegraphy called for by my contract with the Co & described in the French work of J Baille, on which system both Mr Gray of Chicago & Bell of Boston are also working, I was led into another principle of Multiplex transmission which promised great results and although not called for by my contract, I thought should be worked up and secured to the Co. and I have been continuously engaged in perfecting the same; and have reached a point where I am able to send and receive eight different messages simultaneously over a single wire, with Morse apparatus, and the same has been covered by patents & caveats setting forth every imaginable modification that I could conceive; the copies of such patents and caveats are hereto annexed = These pats & papers all of which have been assigned to the Company.
contain many devices which I have been unable to test & it will require some time to perfect the system. At the present time I can only work between New York and Philadelphia, on longer line the phenomenon of the Static Charge causes mutilation of the signals and I have been unable up to the present time to devise a compensation sufficiently powerful to counteract this effect beyond a distance of 100 miles. This apparatus upon an artificial line, has been shewn to Mr Smith assist to Mr Jno Van Horn & who I believe has made a report to your my assistants having sent & Recd 8 messages simultaneously on the artificial wire in his presence; These Instruments I have laid to aside, and am now engaged in experimenting up with a modification shewn in the patent papers with hopes of obtaining the compensation spoken of. It is only a question of time when the system will be perfected as the principle I am sure is correct, but you will readily allow that it is a very complicated subject and requires some elaborate contortions of the brain to manipulate the signals over th and eradicate the defects and hence the experimental labor is exceedingly tedious. While I have been engaged on this side issue, I have had caused Mr Murray to make me a complete set of Acoustic apparatus upon the principle set forth in the work of J Bailie & called for by my contract; I now propose to take hold of the subject again having gained much experience since I ceased experimenting with that principle. I annex hereto copies of patents & caveats which are in the patent office covering this principle. Two claims in these papers have been conceded to Mr Gray & Bell & he has they being prior inventors & Mr Gray has conceded me one, that one being substantially his Receiving system as shewn in the Centennial. It is not possible for either Mr Gray or Bell to obtain a base patent in this principle, and the only troublesome claim Mr Gray could obtain would be a method of manipulating the currents by transmitters which on which he has two plans; but one of which I had applied for & have now conceded him but I have 4 other methods entirely of effecting the same object which are shewn in the annexed papers and Mr Gray has filed no papers shewing these. I have no doubt of ultimate success with both systems, but the whole subject is of such a nature that quick results are impossible. I have drawn I think since last thirty two hundred dollars & have expended considerably half as much more than this of my own funds; the latter it is which I shall not call on the Co to pay except in the event of success; If you...
think that the showing is good, if you desire me to continue the experimenting it would be more satisfactory to reduce the $200. to $100. and arrange so I can draw it regularly; because at the end of each week if the experimenting has not been satisfactory to myself, I find it impossible to screw up my courage to the point of asking for the $200. & consequently have to suffer — Whereas it has been satisfactory you—a I do not always find you in & then I have to suffer— Your Respy

T. A. Edison


1. As the text makes clear, this document was written sometime following the resolution of interferences between two of Edison's acoustic telegraph applications and patents of Elisha Gray and Alexander Graham Bell, which occurred in mid-December 1876. Porter, Lowrey, Soren and Stone to TAE, 12 Dec. 1876, DF (TAEM 13:1055).

2. Doc. 695.


4. The acoustic transfer telegraph. See headnote, p. 27.

5. One caveat (Doc. 754) and three patent applications—Edison Cases 122, 124, and 125 (U.S. Pats. 185,507, 200,993, and 235,142)—covered the acoustic transfer system. Edison may also have considered a fourth application, Case 126 (U.S. Pat. 200,032), to have been related.

6. The caveat and Case 122 (U.S. Pat. 185,507) were assigned on 16 September 1876, and Cases 124–25 (U.S. Pats. 200,993 and 235,142) were assigned on 7 October 1876. "Letters Patent granted to Thomas A. Edison for, or relating to 'Telegraphy,'" WU Coll.

7. Smith is otherwise unidentified; see Docs. 786 and 788.

8. This test probably took place in September (see Doc. 788); no report has been found.

9. According to the judges, one type of receiving equipment exhibited by Gray was "founded on the remarkable property . . . discovered by Mr. Edison . . . in his electromotograph." U.S. Centennial Commission 1880, 454.

10. Four of Edison's pending patent applications involved claims at issue with those in patents and applications of Gray and Bell. Case 116, later issued as U.S. Patent 198,089, was placed in interference with Gray in July 1876. Edison resolved the interference by conceding the second claim to Gray and substituting devices not shown by Gray in the first claim. However, the wording of the claims continued to pose a problem and the patent did not issue until December 1877, after Edison erased all but the first claim and substituted two new claims. Case 118, later issued as U.S. Patent 198,087, was originally placed in interference with both Gray and Bell in June 1876, but this was amended to an inter-
ference with only Gray in July. In that case Edison dropped his first claim and Gray conceded Edison's seventh claim. Both of these patents issued in December 1877, as did Case 115 (U.S. Pat. 198,088). Edison originally intended Case 115 to go into interference with Bell, but he amended the contested claim in October 1877. One other application disputed with Gray, Case 117 (U.S. Patent 186,330), was amended in December 1876 to avoid interference with Gray and issued in January. Pat. Apps. 186,330 and 198,087–89.