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# No. 882.

For the Week Ending November 26, 1892.

Price 10 cents. For sale by all newsdealers

## A RECENT PROJECTILE TRIAL.

ing projectile took place on November 10, at Reddington, Pa.

While great strides have been made in the development and manufacture of armor and guns in this country of late, the subject of armor-piercing projectiles has not been neglected. The projectiles that have enrich some collector's cabinet may be the result. stood the most severe tests and are considered the most and the Holtzer, the balance of favor being with the latter. They are both made in France.

up the study, manufacture, and development of pro- observed comets it may have exceeded one hundred jectiles, some having purchased the secret processes of miles. Therefore, in a cometary collision we may be foreign makers.

The projectile fired at Reddington was one that had Head Proving Grounds, Maryland. There it was fired from a six inch breech-loading rifle at a six inch nickel- the destinies of a continent. steel armor plate. It penetrated the plate and wood in the bore of the gun.

42 UN. (27) Readers are specially requested to notify the publishers in case of ed to the rear a distance of 125 yards, and two large supply of this slight diluent or impurity. any failure delay, or irregularity in receipt of papers. pieces of it were found. About one-twentieth of the The comet of 1680 was subjected to heat two thouup into small fragments.

intact with the ogival head, the other part detached.

The average projectile either breaks up or becomes so distorted on the first fire at a modern armor plate that it is useless; but this one had passed, with very Von Leer.

#### THE COMET.

sun. The hair star or tress bearer, as its name "comet" this dust is supposed to reach us daily. may be rendered, pursuing its orbit, will approach much theorizing. We now may make the acquaint-|lery. meeting.

For to-day we know little of comets. They have as the gaseous friction of the atmosphere, and such part distinctive features a head or nucleus and a tail. The only we may assume can reach our earth. latter is of such excessive tenuity that although it may This would account for the cosmic dust, and for the be conspicuous on the absolutely black background survival of the fittest projectile material, nickel-iron or of the heavens, yet stars can shine with virtually un-inickel-steel, for even the carbon is there for its cementation. This gives us the satisfaction at least of feeling diminished luster through a million miles of it. Sir Isaac Newton compared the brightness of a that our earth's envelope of oxygen and nitrogen will protect us from all but metallic projectiles, and if we comet's tail to that of the motes in a sunbeam an inch or two thick. Imagine this diffused through the vast are to be bombarded, it will be with improved and space filled by the comet. Sir John Herschel was so modern shot. For of all meteoric material, only the nickel-steel or nickel-iron alloy, as a rule, reaches the impressed by this tenuity that he put the weight of a earth in masses. The rest is pulverized to dust. Its comet's tail as being perhaps only an affair of a few pounds, or only of a few ounces. Our earth will meet constitution may be widely different from that of the perhaps with the tail. It is satisfactory to feel that metallic meteorites we find on the earth. All or most in walking through a recently swept room the parof what is taught about comets and meteorites is little ticles of dust suspended in the air resist our progress more than theory and surmise. Even the name of the far more than would the matter in a comet's tail. present visitor is uncertain. We are not yet sure that it is Biela's comet at all. But the nucleus of the visitant is more solid and contains a greater concentration of mass. From it the THE demand for Percheron horses for export is so tail emanates. The tail points away from the sun in whatever direction the comet is moving, suggesting great that the purity of the breed is threatened, and a Stockton's "negative gravity." The nucleus of the stud-book has been started in France by which the largest comets resolves into a mere speck of light pedigree may be preserved and the race kept up to when seen by the most powerful telescopes. But this the standard

speck may be solid incandescent matter or may shine A very interesting ballistic trial of an armor-pierc- by reflected light. From it in its passage through space fragments of all sizes may be torn off and distributed along the comet's orbit. The earth intersecting this orbit may pick up or attract into her atmosphere some of these fragments, and a fall of shooting stars, a meteoric display and a rain of meteorites to

The tail of a comet points away from the sun. Runexcellent in the world are those known as the Firminy ning down its axis, a dark straight line has been observed. This seems to be the shadow of the unknown nucleus. The knowledge we possess as to the In this country a number of steel makers have taken size of the nucleus is negative and conjectural. In struck by a white hot missile of these dimensions.

Volcanic eruptions making or annihilating islands been manufactured under the Wheeler process, by the impress us as overwhelming in their might. The Sterling Steel Works, at Demuler, Pa. This projectile impact of a cometary nucleus in the formation of a had been tested by the government officials at Indian crater, with the possible penetration of the earth's crust, and in the creation of tidal waves, might affect

But even this is all conjecture. Meteorites are princibacking of thirty-six inches and embedded itself in the pally composed of metallic iron and nickel. These inearth bank behind the target. After recovery, it was cidentally are about the last things we should look for found to be in perfect condition. It had been so little in them. The fact is that their composition is such. injured and distorted that it could be and was pushed The theory that they are derived from comets is rather through the bore of the gun from which it was fired. a favorite one with astronomers. To determine the It had been upset or shortened a very small fraction of constitution of comets the spectroscope has been apan inch, and the diameter had been so slightly increas- plied and reveals the element carbon. This rather dised that there was no danger of its sticking or jamming concerts the upholders of the cometary origin of meteorites.

It was then sent to Reddington, to Lieut. J. F. | An extraordinary thing is noted by Langley. Sir Meigs, United States navy, who fired it again on No- Isaac Newton, he says, made one of his "guesses" in vember 10. He gave it a velocity of 1,660 feet per sec- this connection that take the nature almost of proond, firing at a soft nickel-steel plate of 14 inches thick- phecy. Two hundred years before the spectroscope ness. It penetrated the plate to a depth of 9/4 inches was invented, and a century before the work of Black and raised a front bulge of 21/2 inches in height and 16 had borne its fruits, Newton surmised that comets inches in diameter. The shot hole was surrounded by might supply the atmosphere with its carbonic acid a large combing wave fringe. The projectile rebound- gas. Our atmosphere in a few days may receive a new

projectile was lost, and no doubt that part was broken sand times greater than that of red hot iron, according to Newton's calculations. From the neighborhood of The point and ogival head were in splendid condition the sun the comet flew into the regions of almost aband were highly polished. The cylindrical part of the solute zero. These great alternations of temperature, projectile had split longitudinally, one part remaining it is probable, disintegrate the nucleus, and to that extent make it a possible source of meteorites.

The size of meteorites is generally small. In view of their high velocity this is a fortunate circumstance for us, who have to stand their bombardment. They are slight distortion, completely through one plate, and on also very widely dispersed. In a shower of meteorites, its second firing did not break up badly. A number of it is probable that the individual masses are ten miles distinguished men witnessed the trial, among them apart. Some of them are no larger than a pea, and are being Mr. G. W. Childs, of Philadelphia, and Baron probably two hundred miles in average distance from their nearest neighbors. Our present visitor may be disseminating such particles along its orbit.

When the earth meets these asteroids, which are of A day or two after the date of this issue of the far more than icy coldness, they fly through its atmo-SCIENTIFIC AMERICAN the earth will be on intimate sphere with enormous velocity. As certainly as the terms with a celestial visitor from far-off regions. For impact with an armor plate heats an iron cannon ball, on November 26 and 27 it is calculated that Biela's so the friction with the atmosphere heats the celestial comet will be probably within one million miles of the projectile. The mere friction is supposed to dissipate earth. This is about four times the distance of the most of them in the upper regions of the air, leaving moon, and about one hundredth of the distance of the them to slowly descend as cosmic dust. Many tons of

Here is at least a notch or foothold for a theory. our orbit at this remarkably small distance from The meteorites which reach us intact are masses of the earth, as distances are astronomically consider- | nickel and iron. Curiously enough, one of the very ed. The chemist has analyzed meteorites, the petro- alloys proposed for use in making projectiles for guns grapher has examined their structure; their con- and armor for war ships is a nickel-steel alloy, so that stitution, and even shape, have been the objects of we are not yet much in advance of the celestial artil-

ance of what is possibly a producer of meteorites. In Leaving this aside, we may assume that, however meeting Biela's comet we may observe phenomena large the nucleus of a comet is, it is composed for that will elucidate some of the perplexities of meteor-1 the most part of carbon and of easily disintegrated ites. The equal perplexities that hedge what we know materials to which our atmosphere will offer a real of the nature of comets may also be diminished by this resistance. Then we may suppose an exceedingly small part of it to be of sufficiently solid material to resist

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#### The Typewriter in Cipher Writing.

uses of the typewriter is made by M. Erve, in Le Genie nent position it has so long occupied. Civil. It is well known that a favorite form of cipher Like so many other establishments, the printing writing consists in substituting certain letters for room of Mr. Midwinter is covered in with glass, and others, each party to the correspondence having the it has the usual facilities for changing and filling key by which he can place the substituted ones by the printing frames. It was, however, the subsequent those intended to be read. M. Erve points out that a treatment of the prints in which we were now more secret correspondence of this sort can be carried on peculiarly interested. very readily by means of any typewriter. All that is Examining a few dozen prints as taken from the necessary is to transpose types on the type-bars, so frames, we found that, contrary to the custom of some How it acted he could not tell; but that, in his case at that, for example, touching the key marked A will print who use gelatino-chloride paper. these were slightly C, B will print R, and so on. After one instrument has over-printed, not very much so, but to rather been so transposed, the other is to be correspondingly a less extent than adopted by experienced albumen rearranged, so that the key C will print A, the key R printers. In the toning room, which is large and will print B, and so on. Then X., the correspond- roomy, the utmost cleanliness and method prevail. ent at one end of the line, on receiving a cipher dis- Along one wall, that in which the windows are, there patch from the other, Y., has only to copy it on his are arranged six slate tanks side by side. Above each typewriter. The machine, retransposing the letters there are water taps, and in the bottom are two outautomatically, will at once give an acurate translation, lets, one to permit of relegating valuable waste to its while X.'s reply, written on the same typewriter which suitable receptacle, the other communicating with the translated Y.'s original dispatch, will form an unintel- sewers. We observed that no sooner had a tank been ligible string of letters, which, by copying on Y.'s type- done with than it was thoroughly washed, sides and writer, will be in its turn translated. A cipher corre-' bottom, with a large sponge; and we further observed spondence of this kind has an advantage over the that separate sets of sponges and brushes are employed ordinary sort, in that the two parties use different, for the various tanks; thus, the brush for the hypo although reciprocal, ciphers, and a comparison of dis- tank could not possibly be used in any but its own, patches captured from each will give little clew to the unless one were willfully to ignore the lettering on its meaning of either. Moreover, it would not be very back. This cleanliness and method are perhaps due difficult, with some typewriters, which have two space to the fact of Mr. Midwinter having in early life gradkeys, to make the space keys actuate types, so that the uated in a chemist's establishment, where, above all document would be an uninterrupted string of letters. places, cleanliness and method must reign supreme. Such writing is very difficult to decipher, from the impossibility of telling where the words begin or end; one in a water bath, from which, after a good soaking, yet the corresponding instrument, by mere copying, they were transferred to the alum bath. This consists would translate it perfectly.

Another use of the typewriter which M. Erve suggests is an instrument for shorthand writing. Most stenographers, in addition to the characters for sound, employ a large number of abbreviations and signs, usually of their own devising, which no one but themselves can understand. Hence it comes that stenographers cannot read any one else's writing but their own, and occasionally fail to read that when their use of abbreviations has been too liberal. M. Erve says, very truly, that characters indicating sounds with sufficient accuracy can readily be found in the typewriter alphabet, while a code of abbreviations might easily be agreed upon among stenographers. With such a phonetic system of using the characters, and a reasonable number of abbreviations, it would be easy to write four hundred words a minute on a typewriter, which would be fast enough for the most rapid speaker, while the stenographic writing would have the great advantage of being legible to any other stenographer besides the one who wrote it.—American Architect.

### Has Albumen Received its Death Blow?

It will be remembered that recently, and as an append to a letter from the Britannia Works Co., relative to the uniformity of the tones obtainable on about without danger of one sticking to the other. the Ilford Printing-out Paper (the "P. O. P." as it is Mr. Midwinter strongly urged this as an important usually termed), we spoke in terms indorsing their statement of this quality. This we did after a careful uniformity of tone. We noticed that in measuring out examination of from four to five dozen cabinet por- the toning solution two-thirds of the bath used the day traits which bore the name of W. H. Midwinter & Co. Bristol.

delicate and vigorous with about these pictures that venience, for in our estimation some of the toning we felt impelled to address a request to Mr. Midwinter baths employed with gelatino-chloride paper act too for detailed information concerning his modus oper-energetically to enable the requisite care to be taken and i for publication either in the Journal or Almanac<sub>i</sub> in seeing that, when a considerable number of prints or both, as we saw occasion. To this a courteous re- are being manipulated by one person, due care is sponse was made, with an offer, should we find it taken in insuring uniformity. How otherwise could it convenient to visit his establishment, to afford us every be when contrasted with the helter-skelter turning facility for witnessing the whole of his operations from over of prints, accompanied by a fear to devote more beginning to end-an offer of which we promptly availed ourselves.

the profession and his long experience in photography when the toning solution is prepared as described. we consider him, more than many others, entitled to The printer here had time both to keep the prints in thod adopted by Mr. W. Crooke, of Edinburgh, which speak with authority—a feeling that has been strength-motion and to carefully and critically examine each imparts to the surface a delicate matt that for many up ateliers in 48 Park Street, Bristol.

and that too at a not distant period, albumen as an sources widely apart. No matter what care was taken A curious suggestion in regard to certain possible agent in printing will have to retire from the promi-

of-

#### Alum...... 4 ounces.

The chief printer-a most intelligent man-told us that he had at first adhered to the directions issued with the paper, which recommended *eight* ounces of alum to this quantity of water, but that he had reduced the strength to four ounces without any dis coverable disadvantage. After remaining in the alum solution for ten minutes, the prints were then subjected to a wash in a succession of three changes of water. This washing was not done in a perfunctory, but in a thorough manner. At this stage the prints had lost the purple tone they had when taken from the printing frame, and had acquired a red color similar to that which albumen prints have at the stage after being immersed in a solution of chloride of sodium or acetic acid previous to being toned-a custom adopted by some.

#### The toning bath consists of-

Sulphocyanide of ammonium	30 grains.
Water	16 ounces.
Chloride of gold	2 grains.

Of this a quantity sufficient is poured into the toning dish to give the prints plenty of room in which to float point both in convenience of working and as insuring previous were taken and refreshed with one-third of a new bath. This we think is an excellent system, There was something so exquisitely beautiful and viewed either economically or from the point of conthan a very few seconds to the examination of any one print in case the others are in the meantime getting 12s. for panels. From the high position Mr. Midwinter occupies in spoilt by over-toning? No occasion for such hurry

or what brand of albumenized paper was employed, the plague prevailed. An observant professional friend in the North found that the prevalence of the spots in his case was concurrent with his using a certain kind of hypo which he had recently purchased. Acting on a surmise, he made two fixing baths, one with an old and the other with the new purchase. A brief period sufficed to establish the fact that the spots were attributable exclusively to the soda most recently procured. any rate, it was the cause of the spotted prints he felt well assured. The subsequent employment of another sample insured freedom from all farther annoyance. We have written this apropos of Mr. Midwinter's care in using anything but the best quality of hypo.

With regard to the toning bath, forty-eight grains of gold for toning forty-two sheets of paper, and toning them well, cannot be considered otherwise than as being strictly economical. This, we were informed, is the proportion indicated by experience. There was no mealiness or defects of like nature apparent in any of the work done under the conditions described; indeed, we were told that such is altogether unknown.

The mounting is performed in the manner in common practice by many, that is, the prints are taken from the water and piled, face down, one on the top of the other. The surplus water is removed by gentle pressure on the top, but not to such an extent as to cause adhesion between them; starch is applied to the top one, which is then attached to the mount, and so on to the end. After spotting, they are placed in a grooved box, to remain for burnishing, which is done the next morning. The grooved box has a perforated zinc bottom and a drawer below in which two or more wet sponges are contained, the object being to prevent the prints becoming quite desiccated, which is inimical to their ultimately taking on the highest finish.

The burnisher, which acts the part rather of a hot roller than a burnisher pure and simple, is one of that form known as the quadruplex enameler, made by a Chicago firm. Having been passed through this a few times, the prints acquire a high glaze and finish; and, to prevent any curling, they are laid, face down, on a wooden table until cold; when taken up, they are quite flat. No lubricant is employed.

In the foregoing remarks we have given, in as brief a manner as possible, an account of the way in which we saw many gems of pictorial art produced. It is, however, proper that we should say that the negatives are pictorially and technically of great excellence. The former is doubtless owing to the fact that Mr. Midwinter, previous to becoming a photographer, had, on his return from the Crimean war, through which he had passed, gone in for an art education and graduated as a painter; the latter is a consequence of care, method, and a knowledge of what a photograph should be.

Before leaving, we had a look over the studio and adjoining rooms. The studio has a "lean-to" roof, fitted with double, nay, with quadruple spring roller blinds, one pair of white and blue overlapping each other, and either of them capable of being raised or let down. There is also a side vertical light, looking on a garden, the wall of which, with its trailing plants and bowlders, seems well adapted for the posing of large groups against.

Mr. Harvey, the operator, a near relative of the proprietor, who has been since youth with the firm. seems to have the art of lighting and posing the sitter at his fingers' ends; for, in an incredibly short period, he manipulated the screens so as to produce any effect desired. The reception and adjoining rooms are decorated with the choicest examples of Mr. Midwinter's work, and form quite an exhibition in itself.

The prices at this establishment are : 1*l*. a dozen for cabinets; 30s. for boudoirs; 2l. 2s. for imperials; and 3l.

In connection with the finishing of gelatino-chloride prints, we have been shown some examples of a me-

Conversing on the subject generally of our visit, we were informed that for a considerable time albumen had been entirely banished from his place, his printing the prints were kept almost invariably face down in now being confined to gelatine "P.O.P." and platinum. the various solutions. Information of this nature coming from such a repre-The fixing bath consists of three ounces of hyposentative man augured ill, we thought, for the long- sulphite of soda to the pint of water. The best quality continued tenure of the sway that albumen has had, of soda procurable, although costing somewhat more without any rival worthy of the name for these forty | than that of average quality, is alone employed, as it years past. Good old albumen! It has served us well is found cheapest in the long run, and Mr. Midwinter during its reign; and, in the prospect of its being has been taught by experience that ten minutes in a sooner or later deposed, we must endeavor to overlook solution of the above strength is sufficient to insure are not, in these days, doing much that is important demerits inseparable from its nature, and cherish its the prints being thoroughly fixed. They are then in the line of ironworking machines. Do they, asks memory as that of an old friend who has rendered us washed for two hours in running water.

Let us pause for a moment to speak of the influence to offer a profitable margin for work? Any practical good service. It is perhaps premature to cry, "The  $\mid$ king is dead! Long live the king !" but, remembering exerted by a bad sample of hypo upon the future of a ironworker can give the inventor an idea of improveour forecast many years ago concerning the chances of print. Only a short time ago there was a perfect ments that are possible. The inventors ought not to collodion retreating in favor of gelatine as a factor in epidemic of spots on albumenized prints. Complaints | turn from so important a field as this. It is not yet making negatives, we imagine that, in course of time, respecting this reached us almost daily and from closed by any means.

ened since we spent a forenoon in his admirably fitted one, which he did by transmitted light, holding it up purposes has a charming effect. We have not been against a gas flame before him. The average time for apprised of the method employed in producing this a print to acquire a purple black tone is about from matt, although the paper is of the same brand as that eight to ten minutes. During these various operations used by Mr. Midwinter. From some experiments of

our own, however, since made, by interposing a film of matt celluloid between the burnisher and the photograph, which imparts the effect in question, we may suppose Mr. Crooke's method must bear some resemblance to this.-British Journal of Photography.

THE Iron Industry Gazette complains that inventors the editor, consider these machines too nearly perfect