## Bullets Swerved by Electricity

A curious phenomenon was recently observed by the committee of the Swiss Federal Rifle Meeting at Winter thur in summing up the results of the practice shooting of the troops. It was found that nearly all the shot fired from the right side of the range had hit the target to the right of the bull's eye, while those fired from the left side had, with an equally singular persistency, hit the left half of the target. The great number of men who took part in the shooting precluded the idea that this singular result could have been due to the personal peculiarities of the soldiers; for while it may be true that one marksman habitually shoots too high, another
too low or to the right or left of the mark, with a large number of individuals firing at the same target, these idiosyncrasies of marksmanship would be set off one against the other and the misses would be fairly distributed on all sides of the bull's eye. It became necessary, therefore, to find an extraneous and single cause for the remarkable uniformity with which the bullets appeared to have been deflected from their proper course. The wind could not have produced the effect noted, since, in the frst place, allowance had doubtless been made by the riflemen for deflection by aerial currents; and on the other hand, if the wind had diverted the missiles, the deflection would have been in the same direction on both sides of the range. An examination of
the steelclad bullets extracted from the targets disclosed the fact that they had become magnetic; and this led the committee to entertain the theory that the phenomenon observed by it might have been due to electric influence exerted by the large number of telegraph and telephone wires which run along both sides of the range at Winterthur. Further experiment at the ranges of Thun and Berne proved this theory to be correct; and the remarkable discoveries made at these trials may The following account of one of the experiments is given by the Journal de Génève

At Thun authorities established parallel with the rifle range, at a distance of a little more that 40 yards, an electric current of 8,000 volts, carried along four steel cables. With a view of tracing the whole effect, paper circlets were placedjat every 10 yards. The first experiments were made with the Swiss model rifle of 1889. With this the influence of the electric current was at once apparent. In a distance of 260 yards the bullet took a lateral deviation of 24 yards, and after that the
curve of the trajectory was still more marked. The second experiments were made with the Japanese 33 mm . rifle of Col. Yamagata, and they were still more decisive, the bullet being rapidly attracted to the elec
tric wires and following their course with absolute ser vility. Further attempts were made with artillery The range selected was one of 3,000 yards, and 200 yard in front of the targets, but 40 yards to the side, was placed the electric battery. Every shot was diverte by its influence far to the side of the target-to be exact, the deviation was one of 14 degrees.

The conclusions drawn from these experiments ar that a section of infantry exposed to fire at 300 yard would enjoy complete safety if a dynamo or accumula tor were placed on its flank; a whole company would be in the same security at 500 yards, and artillery fire could be rendered innocuous at 1,000 yards. If these facts are sound, the new small bore rifle is doomed, and we shall have to return to the heavy bullet of lead because it is unaffected by electricity. But to military reformers this will signify a repulse along the whole line."

The facts may be as stated, but the conclusions by no means follow. We should dislike, in case of a fight to be the man running a dynamo that had a weaknes for drawing bullets to it. It would have all it wanted of them, and the attention of the commanding officer would be chiefly occupied with detending his dynamo Besides, if skilled marksmen can allow for the deviation due to the wind, why not for the deviation due to electricity?
It would, perhaps, be premature to assert that the consequence of this discovery will be the doom of the modern small bore military riffe, with its steel jacketed bullet; for it might be practicable to inclose th leaden missile in hard bronze or some other metal not
affected by magnetism. Artillery would probably reaffected by magnetism. Artillery would probably re
main destructive enough on the battle field by the use of explosive shells. It is in naval warfare that the dis covery may have the most important consequences. In .Conan Doyle's "Stark Munro Letters" the hero is credited with an invention to render a warship immune from the shots of an enemy by placing electric accumu lators at its stem and stern. The idea was to deflec steel projectiles by magnetism, just like the Swiss military authorities have in fact succeeded in doing. It would certainly be a revolutionary departure if, in stead of incasing our battleships in heavy bombproo armor, we could encompass them with an impalpable magnetic veil which would compel the great armor piercing steel projectiles to pass harmlessly by.
The discovery, however, will give the military and naval experts a new problem to work out. In passing is worthy of remark how frequently the apparently mpossible feats suggested by imaginative writers hav been followed by the demonstration of their possibil
ity. Phileas Fogg's wonderful trip around the world in eighty days would to-day be a very commonplace performance; and another generation may see Stark Munro's magnetized battleship an accomplished fact Fiction seems stranger than fact only because so smal a part of the truth of science has been revealed to humanity.

## Library Circalations.

Those high class weeklies that are in general demand the public libraries throughout the country enjoy circulations" that are of ten beyond the claims of thei publishers or the beliefs of advertisers. It has been recently shown that, during eleven days, the six copies of Harper's Weekly were called for and read by 550 people in the Chicago Public Library. In the same period at the same place, four copies of the Youth's Companion were read by 228 individuals and two copies of the Sci antific American by 213 people. If the public libra es of the whole country showed the same proportion of calls for these publications, it will be readily seen that their library circulation alone must run away up nto the thousands.
But there is a vast number of weeklies and monthlies, too, that do not get into the public libraries, for the reason that their intellectual caliber is not high enough This is an important item which all advertisers might wisely consider-whether a medium is of a sufficiently high standard to find place in the public libraries, because, if it is, it is sure of a much larger number of eaders than if it is not.-John Chester, in.Printer's Ink.

New Metals for Coins.
Advices from Washington, D. C., state that experiments with pure nickel and aluminum as substitute or the present nickel pieces and one and two cent bronze pieces will be made at the mints by order of Director Preston during September or October. A resolution was passed by the House of Representatives authorizing such experiments. There is some doubt whether the actual adoption of a new metal for the minor coins will be recommended at an early date by he treasury officials, even if the experiments provesuc cessful. The objection to a change in any form of coins or notes is the disposition of the public to refuse the old forms and insist upon having the new. This would drive into the mints for recoinage $\$ 14,000,000$ in aickel pieces, which are now in circulation, and $\$ 7,500$, 00 in pennies. The advantage claimed for pure nickel nstead of the alloy now used in five cent pieces, is its greater hardness, durability and distinctness of impresgreate
sion.

## RECENTLY PATENTED INVENTIONS.

Railovay Appliances.
Street Railway Switch.-Hugo L. Dallig and Wladyslaw Kryezewski, Jersey City, N. J.
This is a switch which may be readuly ret by the driver This is a switch which may be readily set by the driver or motorman on a car, according to the direction in
which the car is to travel, either along the main track rails or to the side track rails. The invention comprises pivoted switch point on the under side of which is a
segmental rack meshing with a pinion carried by a rock shaft in gear with a secoud rock shatt carrying two arms, whule an arm pivoted on one of these arms nas a
head adapted to be engaged by a roller carried by the head adapted to be engaged by a roller carried by the head by the car.
Car Cúdpling. - Thomas Galligan, Bradford, Ohio. This invention relates $\omega$ couphngs of Nhe Jannes type, in which the drawhead has a pivoted
laterally movable knuckle, the coupling being automati. ally effected when two cars come together, and the cars being readily uncoupled from the side, without it being necessary for the trainmen to go between them. The
pivoced knuckle has a hooklike latching jaw, and a spring is adapted to hold the jaw in coupled engagement. coupling of ears with a link and pin of the old style, the link being held in connection with the coupling so it will not be lost when not in use.
Car Coupling. - Joseph L. Linou, Narbonne, France. According to this improvement, the
coupling apparatus attached to each end of the car comprises a spring jaw placed horizontally on one sluc and a shackle placed vertically on the other side of the ordinary coupling, the shackles being always opposite the cor-
responding jaws when the cars come together. The responding jaws when the cars come together. The
shackles are of such depth as to allow of a certain ing is antomatically in the heigh or che car. a and the cars are readily uncoupled from either side.

## Electrical.

Electric Railroad. - Charles Sill, New York City. This invention provides for dispensing
with both the overbead conducting wires and the underwith both the overhead conducting wires and the undergroun 1 conduits which have heretofore been emplosed for supplying the carrent for electric cars, and subatitut-
ing therefor a conductor placed in a longitudinal duct ing therefor a condactor placed in a longitudinal duct reccse along the inner side of the rail, the conductor and the trolley wire being normally disconnected from each other and automatically connected as the car passe日
along, whereby all sections of the trolley wires are cut out and remain dead escept when a car is passing over them. By the construction provided for making connec-
tion between the conductor and the trolley, complete Intion between the conductor and the trolley, complete inthe duct in which the conductor is located.
advertising Device.-Frederick A. Ruge, Springfield, N. Y. According to this device, a series of incandescent lamps is arranged in fanciful
shapes or torms to attract attention, means being pro ided tor closing the circuits through any desired seriea of lamps and leaving the others cut out. By this means a certain sign may be exhbited for four or five minates, ad after thas exhibition the circuit closer will be turned howing another sigu.

Mechanical.
Pipe Wrench. - Joshua Musgrave and William Cook, Aguilar, Col. This is an improve a pipe, and provides for such construction of the
ment or substantially the entire circumference of a pipe, obviating the danger of crushing in the pipe. The wrench jaw has a curved serrated inner sarface, and on Its outer end are flngers dealgned to be engaged by lateral shoul-
ders on the chain links, each of which has a bleurcated ders on the chain links, each of which has a blfurcated
portuou and a stem portion, and is preferably curved on portuoil and a atem portion, and is preferably curved on
its inner edges to conform somewhat to the curvature of the pipe.
Machine to Hull Coffee Berrtes -Afredo D'Coota Gomez, Bucaramanga, Colombia. Be neath the nopper, from which the berries drop in a of unequal size revolving In opposite directions at differof unequal size revolving in opposite directions at differthe smaller one smooth, a knife separator projecting upwardly between the rollers. The berries are sabjected to sufficient crushing or squeezing pressure by the rollers to cause the flbrons hull to adhere to tne rough surface
of the larger roller, the grains going toward the small roller, and the separation being completed by the knife

Paper Making Machine.-George W. Lewthwaite, Greenwict, N. Y. This invention provides ylelding perforators for puncturing the felt belts for car
rying wet pulp while the water is being extracted from rying wet pulp while the water 18 being extracted from
the latter, instead of the rigidly mounted pins heretofore employed, by which the felt is torn or cut. The pins, according to this improvement, are supported in a yielding
material, such as rnbber, held in troughe secured in $V$. shaped longitudinal prooves in a roller provided for each endless felt apron over which the wet pulp is carried whereby the pins will yield out of the felt without slitting
it, and thas peeserve the strength and porosity of the felt apron.

## Miscellaneous.

Cash Recorder. - David J. Wilson Washington, $D$. C. This is an instrument for use by bank tellera and similar offlcers, the teller printing in the
depositor's book the amount and date of the deposit and simultaneoasly prinung the amount apon a recora atrip,
there being also mechanism for calculating the aggregate The book, on presentation, is placed the sum at the foot. side of the casing of the machine, where a type bar has two sets of adjustable type, strip holding devices being dhe book to one set of type, and a book clamp holding other set of type, while printing devices operate the type of both sets simultaneously.
Bicycle Railway. - William F. Mangels, Brooklyn, N. Y. This invention providee an apparatus by means of which an ankilled person can
safely mount and nde around a track without incurring danger. Within a suitable buildıng is arranged a track,
preferably but ilttle wider than the tre, and baving low preferably but little wider than the tre, and baving low
side gaards and adjacent to the track, at about the side grarda and adjacent to the track, at about the
height of the bandle bar, a continuous rail is sapported height of the handle bar, a continuous rail is supported
by fixed staudards, the top and bottom edgea of the rall beling adapted for engagement by grooved wheels carried The frame is the latter being then aecurely held In vertical position on a good track, where it may be propelled with but little Pory
Portable Fire Escape. - Ed ward Ruley, Spokane, Washington. This is a device which may be carried in a astchel or in the pocket, and consists
of two metal tapes wound on a pulley having differential sections inclosed in a metal case, a combined sus pension and brake device of elastic rod or wire being wound around the enlarged central portion of the pulley and extending below the case for connection with
strap, to beattached to the body of the person to be lowered. The friction device acts as a brake to prevent too rapid paying out or the tapes, and this friction may be Increased by manual pressare as deaired. The apparatus
is very compact, a case ahout three inches in diameter ccommodating tapea fifty feet long

Sash Lock and Operator. - Michae F. Robingon, New York City To raise and conve-
niently lock a sash to form any desired opening, for ventilation or other porposea, or to secarely lock it when entirely closed, without using the ordinary weights and sash cords, this inventor has devied a construction which comprises gearing suitably located in a small
casing in the side of the window casing and engaging a rack on the sash, a spring operating the gearing in connection with a locking device composed of a clutch,
one member of which is connected to the gearing, while the other member is movable in and out of connection The locking mechnolim cannot be interfered with by
any one from the ontside. any one from the oatside.
Curtain Fixture. - Alderic F. Gionard, Leominater, Mass. This is a fixture which may be adjanted to any length of shade roller and secured
upon the window casing without the aid of nails or apon the whndow casing withont the ald of nails or
screws. Brackets carring adjustable sildes to which the cartain fixtures may be conveniently attached are
adjastably dxed in the top Inner portiou of the window

Into firm engagement with the inner which are brough dow frame through cross rods connected faces of the win rode and sleeve having a right hand interior thread at ends of the sleeve sliding within an outer tube
MuSical Instrument.-Francisco Barrientos, San Juan Bautista, Mexico. This invention relates to instruments played with a pick, and is de aves, producing sounds as if he were playing two tostruments. For this parpose a special construction of ranged on its body provided, in which a raised stop 18 ar pick, the pick being double, and the performer striking the strings with it both above and below the bridge.
Vehicle Axle Spindle and Box.John A. Rumrill, Salina, Kans. The axle spindle, according to this invention, has a socketed stab end and a grooved journal bearing, while the box has hollow bear-
ings spaced by an annular chamber, the improvement rendering thy an analar chamber, the improvemen also affording means for storing a supply of lubricant which automatically feeds itself while it lasts.
Farrier's Knife. - Francis M. Me cartes, San Jaan, Cal. This knife has at one end of it thumb screw, the blade having at its end a mud scrape and a hook or pick for cleaning out the seam on the
bottom of the horse's hoof, while at the other end of the hanale are pivoted a bleeding knife and a searching the hanale are pivoted a bleeding knife and a searching cool. In the handle are also chambers to receive two lance, and a sounder or probe, and the other constituting lancc, and a sounder or probc, and
a hoor pick, a needle and tweezers.
Suction Dredge.-James H. Bacon, Wilningwon, N. C. This dredge has an open bottom suction box that are sutomatically actuated on con ging the box along the bottom of a waterway. The boiz is fushed by valves in its sides actuated from the deck of the dredge, and adjustable stope limit the swinging motion of the eatter.
Applifina Paints or Varnishes. Howard C. Cleaver, London, England. This inventor has devised an apparatus to facilitate the application
of oil paint, flatting paint and varnish with greater raof oil paint, flatting palnt and varnish with greater ra-
pidity, uniformity, smoothness and lightness than posible with a brush, the paint or varnish belng atomized and projected in fine spray by an air blast through an extt orifce, where it is met by a blast directed aciose the orifce. By this means the paint or varnosh is laid so ilghtly that a second coat may be applied as soon as the prevlous one becomes tacky, quickly giving a smooth
surface without brush marks and dispensing with rubbing down.
Wheat Steamer, Hfathr, etc. William H. Rella, Somerset, Pa. This is a devicc fo
use with flous mill, regulating aloo the feed of the
wheat to the break rolls. The fights of the conveyer are so constructed that the wheat will be carrred from posite side, the grain being moistened by steam or water of condensation at a point above the conveyer, and the fights briuging the wheat in contact with the steam, while the grains are thoroughly mixed to render them all equally moist. The grains are also thoroughly warmed, he heat serving to mantain the moisture on the exterio

Churn Opfrating Mechanism. Zachariah A. Taylor, Bridgeport, A:a. For churna!havng a vertically movable dasher, this inventor has devised an operating mechanism consisting of a snitably ear carries a series of pins adopted to engage an arm on vertically movable cross head, the pins thus rasing the cross head as the gear is revolved, and the cross head, which is connected with the dasher, beng quickly returned by means of springs. Owing to the regularity of
the stroke, the cream is not splashed or wasted, and the butter is quickly formed. The mechanism is simple and designed to be operated by a treadle
Jar Clamp.-Frank H. Palmer, Brooklyn, N. Y. According to this invention a ring-shaped rame seated on the jar cover has downwardly extending neck or the jar, and on the top of the frame are lugs in which is beld a spring rod on which is fulcrumed a cam with a friction roller in its cam end. By means of the cam lever the clamp is readily applied, the spring rod yielding sufficiently to prevent the cracking or breaking of glass,
clamped on the jar
Sanitary Pail.-Charles M. D. Baron, New York city. This invention convers an improveformerly granted to the same inventor, greatly lessening eo cost of manuracture and providing an airtight cove means of the bail. The cover is light and strong and the bandle on the bail acta as a locking roller for the cover.

## Designe.

Grip for Skirts, etc.-Ella L. Cole, New York City. To hold a belt in close engagement shank adapted to go outeide the belt and another depending shank on which are twin spurs or hooks.
Note.-Copies of any of the above patents will be
furnished by Munn \& Co. for 10 cente each. Plesse furnished by Munn \& Co. for 10 cente each. Please
seud name of the patentee, title of invention, and date of this paper.

## NEW BOOKS AND PUBLICATIONS

alaska: Its History and Resources. Gold Fields, Ruutes, and Scenery. By Miner
W. Bruce. I. lustrated. New York
Frederick Warne \& Company, Paper edition 75 cents.
Many want to know about Alaska, what the mnch debated country is, what is its climate, its conditions of
life and different industries. This desire, the present book, with beautiful illustratious and really attractive ext, will excellently supply. There is much thatis prac tical and popular in it, such as the descriptions of the Indians, with their mode of life, with their boata, clothing, etc., all of which is in the line of the most attractive kind of anthropology. The illustrations from photographs are especially good, and say a great deal for the
clear atmosphere of the country. One of Sitten 10:30 P. M., speaking eloquently of the long Arctic twilighi.

How to do Business. By Seymour
delphia Philadelphia: P W. Ziegie delphia. Philadelphid:
\& Conipany. Pages 334.
This is, in many senses, an up-to-date book, bright original, and full of information not generally found
heretofore in books of this clase. Modern methods of heretofore in books of this class. Modern methods of
banking and making collections ; the business in neotiable papers, stocks, bonds, and other secarities insurance; importing, exporting. shipping, and ware
housing ; margin trading ; bneiness correspondence housing; margin trading; boeiness correspondence;
short cuts in figures; doing business by telegraph, and modern bookkeeping ideas, form the subjects of some of the most important chapters. For a young man wanting o anderstand how business in general is conducted is the great commercial centers, this book, thoroughly mac tered, affords a "short cut " to a most serviceable, stock of information. Its author is Director of the Department of Industry and Finance of the Drexel Institute, each chapter, thus adapting it for use in commercial chools and business colleges
The Engineering Index. Vol. II. neering Magazine. Pages 474. Price $\$ 4$.
led index to the engineering literature in the periodical press for the past eleven years. The work was begun by the Asbociatior of Engineering Societies, and is now being carried out by the Engineering Magazine, it being a Manual of Steam Boilers. Their

By Dr. R. H. Thurston Sibley Col
By Dr. R. H. Thurston, Siblev Col John Wil

This is the fifth edition, revised and enlarged, of a gineers, depigned to be a fainy complete, systematic, and scientific treatise, while yet meeting the practical wants of an engineer laying out work. Dr. Thurston is
also the author of a "History of the Steam Engine," also the author of a "History of the Steam Engine," ing," and other works in this line, and for the past ing," and other works in this line, and for the past
quaster of a century has been recognized as one of our leading authorities in mechanical engineering.

## Dusiness and æersonal.

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especially adapted for Bicycle work. C. N. Cady, anast
Tbe celebrated "Hornsby-Akroyd " Patent safety On cbine Company The best book for electrrciany and beginners in elec By mall. \& , Jiunn \& Co.. publishers. 351 Broadway, N. Stay with your job. and witb your wakes pay installWbiting's Olive Colony, Byrne Bullding, Los Angeles,

Ez-send for new and complete catalogue or scientifc and other Rooks for sale by Munn \& Ca. 361 Broadway.


HINTS TO CORRESPONDENTY. Namen and A d dreme must accompany all letters
or no attention will be paid thereto. This is for our
information aud not information and not for publication.
Refcrences to former articles or answers should


 or in this department, each must take his turn.
Buyers wishang to purchase any article oot addertised
in our columns wil be fonished with addreesee of
hones manusacturin

 Mil price.
marke sen or tor eramination should be distinctly
(6957) W. E. K. says : Will you kindly give me a recipe for preserving cider, in your Notes and calcium sulphite (sulphite of lime), insteadof mustard and sulphurous oxide gas. It is much more convenient and effectual. To use it, it is simply requisite to add $3 /$ to $3 / 4$
of an ounce of the sulphite to esch gallon of cider in the of an ounce of the sulphite to each gallon of cider in the cider, then pouring it bock into the cask and giving the atter a thorough shaking or rolling. After standing action, it may be bottled off. The sulphite of lime (which should not be mistaken for the sulphate of lime) is a commercial article. It will preserve the sweetness of the cider perfectly, bnt unless care is taken not to add oo much of it, it will impart a slight sulphurons tast fectly clean, and the corks wired down. A little cinna mon, wintergreen, or aseapfras, etc., is often sdded to sweet cider in the bottle, together with a drachm or so of bicarbonate of soda at the moment of driving the stopper. This helps to nentralize the acids, and renders the
liquid effervescent when unstoppered; but if used in xcese, it may prejudicially affeĩ the taste
(6958) H. R. S. says : Will you please publish the receipt for making a flour paste? A. T. A.
 common moist or brown sugar, and a few drops corroive sublimate; the whole to be boiled, and continually stirred to prevent getting lumpy, till of the right thick-
ness. To prevent mouldiness, a few drope of sential oil, as lavender or peppermint.
(6959) J. C. W. says : Would you be so kind as to sendme your formula for browning blue prints your valuable paper, at your earliest possible convenience? A. Immerse the blue print after it is dried in a solution of aqua ammonia containing 22 per cent am.gas, 2 parts; distilled water, 18 parto. Leave the print in this ntirely diantwo to forr minutes, or uanil the blue color in a filtered solution of tannic acid 2 parto; distilled water, 100 parts. Keep in this solution about twelve he bath If not as dark as desired, intensify by adding to a few min few drops of ammonia water. Take out after ble sepiantes and wash thoroaghly. The prints resemprinte by drawinge. A greenish tone may be given blue tion of sulphuric acid.
(6960) W. C. W. says : Will you please give me receipt for a good wine of coca ? A. This is a French preparation. lte strength is about in 30, and ing, about one-sinth of the strength of the offlial liguid extract (Extractum Cocæ Liquidum B. P or Extractum Erythroxyli Fludium U. S.) To obtain the liquid extrach coca leaves are exhausted by percolation (which
differs from either decoction or infngion) with proof

## spirit. At the termination of the process the strength should be adjusted so that 1 ounce $=1$ of leaves

 should be adjusted so that 1 ounce $=1$ of leaves. Theprocess of percolation is as follows: The leaves are placed in a vessel very like an elongated funnel, closed into a receiver, and a small tube passes up its outer side and enters it near the top, forming a means of communication between the two. Spint is now poured on the leaves, and the percolator closed. As the percolate
filters slowly through into the reservoir, the disalters slowly through into the reservoir, the diaplaced air passes up the tube, and so maintains an equilies principally in the presence of the alkaloid cocaine This, in the dried leaves, is suppoeed to exist as an This, in
inert aat
bark.
(6961) M. H. R. says: I have a 12 inch reflecting telescope, 72 inch focus. What diameter and
trength of concave lens is required to make an amplife or "Barlow" lens to be nsed with the telescope, to ena ble me to lake phoographs of the moon? Aud will make any difference as to which side of the lens is pu next to the eyepiece? A. It will depend on the mount
or tube of the telescope as to where the amplifer can be placed. The nearer the focus the smaller diameter it can be. As to focus, it will depend on how much amplification is wanted. The general size of a Barlow lens is 1 inch diameter and 6 inches focus. If it is correctly made for photographing, it will not make any difference
(6962) H. S. writes: Some weeks ago here was pabiished in your weekly an exhaustive article or the heat-resisting powers of difereat materials sula ble for steam boilers and pipe coverings. I am in a dis want to right myself before deciding. A. Wig. relative values of different materials. We give following teets of Mr. G. B. Dumford, of Hamilton, Ont.

Combination of asbestos, hair felt, alf space
and wood........................... 100
Asbestos and hair felt and chopped straw.
the straw mixed with lime putty..
A plastic cement manufactured by parties a Paper pulp mixed with lime putty outoide. $86^{\circ} 6$ Paper pulp mixed with lime putty, 1 inch Mineral wool cased with wood.

Charcoal.

Asbestos.
Coal ashes
Air space.
Fire brick
Sand.
(6963) F. F. says: Please be so kind inform me how to polish cattle horns. A. First scrape with glass to take off any roughness, then grind some and dipe slone to powder, and with a piece or cloth wetted and dipped in the powder, rub them until a smooth face oil, and flish with dry flour and a piece of clean linen rag. The more rubbing with the stone andoil, the better
the poligh. Trent sand is used in the Sheffleld factories. It is a very fine and sharp sani, and is prepared for use by calcining and sifting.

## TO INVENTORS.




INDEX OF INVENTIONS
and EACH BEARING THAT DATEE

## (See note at end of list about. coples of these patent

For which Letters Patent of the
United States were Gransed

September 8, 1896,
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