REPERTORY

OF

ARTS AND MANUFACTURES.

NUMBER XXVII.

XVIII. *Specification of the Patent granted to Mr.* WILLIAM NICHOLSON, *of New North-ſtreet, Red Lion-Square; for a Machine or Inſtrument for printing on Paper, Linen, Cotton, Woollen, and other Articles, in a more neat, cheap, and accurate Manner, than is effected by the Machines now in Uſe.*

WITH THREE PLATES.

Dated April 29, 1790.

TO all to whom theſe preſents ſhall come, &c. Now KNOW YE that, in compliance with the ſaid

proviſo, I the ſaid William Nicholſon do hereby declare, that my ſaid invention is deſcribed in the plan hereunto annexed, and the deſcription thereof hereunder written, and in manner following; that is to ſay, my invention conſiſts in three parts or particulars; namely, firſt, the manner or method of making, preparing, or placing, the original model, models, caſts, types, engravings, carvings, or ſculptures from which the impreſſion is to be made. Secondly, in applying the ink, or colouring-matter, to ſuch models, caſts, types, engravings, carvings, or ſculptures. And, thirdly, in taking off the impreſſion, or tranſferring the ink, or colouring-matter, from ſuch models, caſts, types, engravings, carvings, or ſculptures, to the paper, cloth, or other material upon which it is intended it ſhould remain.

I. In the firſt place then, I not only avail myſelf of all the methods of making, preparing, and placing, the original models, caſts, types, engravings, carvings, or ſculptures which have hitherto been known or uſed in printing, and do myſelf make uſe of them in conjunction with my newly-invented method of applying the ink, or colouring-

colouring-matter, to ſuch original models, caſts, types, engravings, carvings, or ſculptures, and alſo with my newly-invented method of taking off the impreſſions, but I do likewiſe make, put together, and arrange them in a new manner, as occaſion may require; that is to ſay,

II. I make my moulds, punches, and matrices, for caſting letters, in the ſame manner, and with the ſame materials, as other letter-founders do, excepting that, inſtead of leaving a ſpace in the mould for the ſtem of one letter only, I leave ſpaces for two, three, or more letters, to be caſt at one pouring of the metal; and at the lower extremity of each of thoſe ſpaces (which communicate by a common groove at top) I place a matrix, or piece of copper with the letter punched upon its face in the uſual way. And moreover, I bring the ſtem of my letters to a due form and finiſh, not only by rubbing it upon a ſtone, and ſcraping it when arranged in the finiſhing-ſtick, but likewiſe by ſcraping it, on one or more ſides, in a finiſhing-ſtick whoſe hollowed part is leſs deep at the inner than the outer ſide. I call that ſide of the groove which is neareſt the face of the diſpoſed

letter, the outer ſide; and the purpoſe accompliſhed by this method of ſcraping is, that of rendering the tail of the letter gradually ſmaller the more remote it is, or farther from the face. Such letter may be firmly impoſed upon a cylindrical ſurface, in the ſame manner as common letter is impoſed upon a flat ſtone. I ſpecify and affirm that the above deſcribed methods of caſting two or more letters at once, and of chamfering or ſloping their tails, are parts of my new invention.

III. I impoſe or diſpoſe my letter for printing in the common manner, to be uſed in conjunction with my newly-invented improvements. And I likewiſe impoſe it in frames or chaſes adapted to the ſurface of a cylinder of wood, or metal, and faſten it to the ſaid ſurface by ſcrews, or wedges, or in grooves, or by other methods well known to workmen; and this impoſing letter upon a cylinder I ſtate and affirm to be part of my new invention.

IV. I cut, carve, engrave, chaſe, caſt, model or make, (in the uſual manner of performing thoſe operations,) blocks, forms, plates, types, or originals,

ginals, to be uſed for printing, either of wood, metal, or other materials; and theſe I uſe in conjunction with my other newly-invented improvements. I likewiſe, for other kinds of work, do faſten with glue, cement, ſcrews, wedges, or by other known methods, ſuch blocks, forms, plates, types, or originals, as aforeſaid, to the ſurface of a cylinder. I likewiſe, for other kinds of work, do cut, carve, engrave, chaſe, caſt, model or make, blocks, forms, plates, types, or originals, as aforeſaid, of a cylindrical form, of wood, metal, or other materials. And I ſtate and affirm that this diſpoſition of blocks, forms, plates, types, or originals, upon a cylinder, and alſo that the cutting, carving, engraving, chaſing and caſting, modelling or making, blocks, plates, types, or originals, of a cylindrical form, as aforeſaid, are parts of my new invention.

V. In the ſecond place, I diſtribute or apply the ink, or colouring-matter, upon the ſurface, or in the interſtices, of the blocks, forms, plates, types, or originals aforeſaid, by cauſing the ſurface of a cylinder, ſmeared or wetted with the colouring-matter, to roll over, or ſucceſſively

apply itſelf to, the ſurfaces of the ſaid blocks, forms, plates, types, or originals, of whatever figure or conſtruction ſuch blocks, forms, plates, types, or originals, may be. Or elſe I cauſe the ſaid blocks, forms, plates, types, or originals, ſucceſſively to apply themſelves to the ſaid cylinder. I call the ſaid ſmeared or wetted cylinder, the colouring-cylinder. Its ſurface is covered with leather, or the dreſſed ſkins which printers call pelts, or elſe it is covered with woollen, or linen, or cotton cloth. When the colour to be uſed is thin, as in calico-printing, and in almoſt every caſe, the covering is ſupported by a firm elaſtic ſtuffing, conſiſting of hair, or wool, or woollen cloth wrapped one or more folds round the cylinder. When the covering conſiſts of woollen cloth, the ſtuffing muſt be defended by leather; or oilſkin, to prevent its imbibing too much colour, and by that means loſing its elaſticity. It is abſolutely neceſſary that the colouring-matter be evenly diſtributed over the ſurface of the cylinder; for this purpoſe, when the colour is thick and ſtiff, as in letter-preſs printing, I apply two, three, or more ſmall cylinders, called

called diſtributing-rollers, longitudinally againſt the colouring-cylinders, ſo that they may be turned by the motion of the latter; and the effect of this application is, that every lump or maſs of colour which may be redundant, or irregularly placed upon the face of the colouring-cylinder, will be preſſed, ſpread, and partly taken up, and carried by the ſmall rollers to the other parts of the colouring-cylinder; ſo that this laſt will very ſpeedily acquire and preſerve an even face of colour. But if the colouring-matter be thinner, I do not apply more than one or two of theſe diſtributing-rollers; and, if it be very thin, I apply an even blunt edge of metal, or wood, or other material, or a ſtraight bruſh, or both of theſe laſt, againſt the colouring-cylinder, for the purpoſe of rendering its colour uniform.

VI. When I apply colour to an engraved plate, or cylinder, or apply the colour through the interſtices of a perforated pattern, or cylinder, as in the manufacturing of ſome kinds of paper-hangings and floor-cloths, I uſe a cylinder entirely covered with hair or briſtles, in the manner of a bruſh.

VII. The

VII. The whole of the manipulations or practices deſcribed in the two preceding paragraphs (numbers V. and VI.) are parts of my new invention.

VIII. In the third place, I perform all my impreſſions by the action of a cylinder, or cylindrical ſurface; that is to ſay, I cauſe the paper, or cloth, or other material intended to be printed upon, (and previouſly damped if neceſſary,) to paſs between two cylinders, or ſegments of cylinders, in equal motion; one of which has the block, form, plate, aſſemblage of types, or originals, attached to, or forming part of, its ſurface, and the other is faced with cloth or leather, and ſerves to preſs the paper, cloth, or other material, as aforeſaid, ſo as to take off an impreſſion of the colour previouſly applied. Or otherwiſe, I cauſe the block, form, plate, aſſemblage of types, or originals, previouſly coloured, to paſs in cloſe and ſucceſſive preſſure or contact with the paper, or cloth, or other material, wrapped round a cylinder with woollen. Or otherwiſe, I cauſe the laſt mentioned cylinder, with the paper, or cloth, or other material wrapped round it, to roll along the face of the block, form, plate, aſſemblage

aſſemblage of types, or originals, previouſly coloured. Or otherwiſe, I cauſe a cylinder having the block, form, plate, aſſemblage of types, or originals, attached to, or forming part of, its ſurface, to roll along the ſurface of the paper, cloth, or other material intended to be printed, and previouſly ſpread out upon an even plane covered with cloth or leather; the ſaid cylinder being ſupplied with colour by means of a colouring cylinder herein before deſcribed, and herein after more particularly to be noticed.

IX. The foregoing deſcription ſhews the nature of my invention; which may be applied to a great variety of uſes, and conſtructed or put together in a great variety of forms. Its uſes conſiſt in the printing of books in general, the printing of paper-hangings, floor-cloths, cottons, linens, woollens, ſilks, ribands, laces, leather, ſkin, and every other flexible material whatever. And its form or conſtruction, being no eſſential part of the invention, may without difficulty be obtained and carried into effect, by any workman poſſeſſed of common ſkill and ability. Nevertheleſs, as there may be ſome artiſts of ſuch a mode-

rate capacity as to find the foregoing inſtructions not ſufficient to enable them to conſtruct my machines, I ſhall proceed to exhibit drawings, and deſcribe ſeveral methods of conſtructing them. But, at the ſame time, I think it pertinent to take notice, that as the following conſtructions cannot be excluſively claimed by me by virtue of his Majeſty's letters patent granted unto me, excepting ſo far as the ſame include or contain my new improvements and inventions, ſo, on the other hand, I do not exhibit the ſame as the only practicable methods of carrying my invention into effect, but I claim the general and univerſal application of the principles diſcovered and brought into practice by me, as before deſcribed; and do here proceed to exhibit and deſcribe certain ſpecific applications of thoſe principles, chiefly from a conviction that it is my duty to render this preſent ſpecification clear and intelligible by every means in my power. And moreover, ſince in the following applications or particular methods there are, and may be found, ſeveral contrivances reſulting from a conſiderable ſhare of deliberation, labour, and expence, and tending to facilitate the practice

practice of my ſaid inventions, I do not by any means hereby exclude the following deſcriptions and drawings from my preſent ſpecification; for I do not conſider them as being merely illuſtrative of the general principles herein before deſcribed and explained, but do hereby aſſert and maintain, that all and every parts and part of the machines herein after deſcribed, which have not hitherto been uſed as parts of ſome other machine, or in combination directed to the accompliſhment of the like purpoſe of printing, are ſtated and claimed by me as parts of my ſaid invention; for the excluſive enjoyment of which, as well as of every other part of the ſaid invention hereby ſpecified by me, I claim all protection and every advantage which, by his Majeſty's letters patent, I may lawfully be entitled to.

Explanation of the annexed Drawings.

(See Plates VIII, IX, and X.)

Fig. 1 (Plate VIII.) repreſents a printing-preſs, more eſpecially applicable to the printing of ſheets of paper, or books. A and E repreſent two cylin-

ders, running or turning in a ſtrong frame of wood, or metal, or both. The cylinder A is faced with woollen cloth, and is capable of being preſſed with more or leſs force upon H I, by means of the lever M. H I is a long table, which is capable of moving endways, backwards and forwards, upon the rollers E and K. The roller A acts upon this table by means of a cog-wheel, or by ſtraps, ſo as to draw it backwards and forwards by the motion of its handle L. The table is kept in the ſame line by grooves on its ſides, which contain the cylinder A. D is a chaſe, containing letter ſet up and impoſed. B is a box, containing a colouring-roller, with its diſtributing-rollers C C; it is ſupported by the arm N. O is a cylinder faced with leather, and lying acroſs an ink-block; this cylinder is fixed by the middle to a bended lever movable on the joint Q.

The action. When D, or the letter, is drawn beneath the cylinder B, it receives ink; and when it has paſſed into the poſition R, a workman places or turns down a tympan with paper upon it; (this tympan differs in no reſpect from the uſual one, except that its hinge opens ſideways;) it then proceeds

proceeds to pass under the cylinder A, which presses it successively through its whole surface. On the other side, at S, the workman takes off the paper, and leaves the tympan up. This motion causes the cylinder B to revolve continually, and consequently renders its inked surface very uniform, by the action of its distributing-rollers C C; and, when the table has passed to its extreme distance in the direction now spoken of, the arm G touches the lever P, and raises the cylinder O off the ink-block, by which means it dabs against one of the distributing-rollers, and gives it a small quantity of ink. The returning motion of the table carries the letter again under the roller B, which again inks it, and the process of printing another sheet goes on as before. N. B. The table in this drawing is not quite long enough in its dimensions, compared with the inking-roller.

Fig. 2 is another printing-press; in this, B is the inking-roller; A is a cylinder, having the letter imposed upon its surface; and E is a cylinder, having its uniform surface covered with woollen cloth; these three cylinders are connected, either by cogs or straps at the edges of

of each. The machine is uniformly turned in one direction by the handle L. The workman applies a ſheet of paper to the ſurface of E, where it is retained, either by points in the uſual manner, or by the apparatus to be deſcribed in treating of Fig. 4. The paper paſſes between E and A, and receives an impreſſion; after which the workman takes it off, and applies another ſheet; and in the mean time the letter on the ſurface of A paſſes round againſt the ſurface of B, and receives ink during the rotation of B. The diſtributing-rollers C C do their office as in the machine Fig 1; and once in every revolution the tail F, affixed to B, raiſes the inking-piece G, ſo as to cauſe it to touch one of the diſtributing-rollers, and ſupply it with ink. In this way therefore the repeated printing of ſheet after ſheet goes on.

Fig. 3 is a printing-preſs, more particularly adapted to print cottons, ſilks, paper-hangings, or other articles which run of a conſiderable length. A is a cylinder covered with woollen cloth, or other ſoft ſubſtance. The web or piece of cotton, or other goods, is paſſed round this cylinder, from the carrying-roller F to the receiving-

ving-rollers G H; which are connected by a piece of linen, woollen, or hair-cloth, in the manner of a jack-towel ſewed round them; the rotation of this towel carries away the printed ſtuff or goods, and depoſits them at I. K L is a movable box, containing three rollers, which move againſt each other in rotation. The loweſt roller C revolves in a maſs of colour, contained in a trough or veſſel in the bottom part of the box K L; the ſurface of this colour is repreſented by the line M N. The next roller B is ſtuffed and covered, as deſcribed in paragraph V. The preſſure of B againſt C prevents the cylinder B from receiving too much colour. D is the carved or cut cylinder mentioned in paragraph IV. or any other of the cylindrical contrivances there mentioned; it receives colour, during the rotation, from the roller B, and impreſſes it upon the web as it paſſes round the cylinder A; in this way the conſtant and effectual action of the machine is ſufficiently obvious. It muſt be obſerved, that the cylinders A D B and G are connected together by cog-wheels, ſtraps, or other well-known equivalent contrivances; ſo that the handle P drives

drives the whole, without their neceſſarily depending on any adheſion or friction at their ſurfaces. The preſſure of B againſt D is governed by an adjuſtment of the axis of D, whoſe ſockets are capable of a ſmall motion; and the preſſure of D againſt A is governed by the poſition of the whole box K L. There are many other well-known ways of thus communicating the motions, and of regulating the preſſures; but as they are in general uſe in mills, and other rotary machines of various kinds, I do not conſider it to be neceſſary, in this place, to ſay more than that I alſo uſe them in the conſtruction of my new machines. When it is required to print more than one colour upon a piece, I cauſe it to paſs two or more times through the machine; or, in thoſe caſes where the materials are liable to change their dimenſions, I apply, at one and the ſame time, two or more ſuch boxes as K L, with their reſpective cylinders, ſo that the pattern-cylinder of each may make its impreſſion upon the web or material to be printed on. In this operation I am particularly careful to adjuſt the reſpective pattern-cylinders to each other, by trials on a waſte piece

piece of the material, before I proceed to operate upon goods for ſale; and in this way a variety of colours are impreſſed at one and the ſame time.

Fig. 4 (Pl. IX.) is a printing-preſs, chiefly of uſe for books and papers. 1 2 3 4 repreſents a long table, with ledges on each ſide; ſo that the two cylinders A and B can run backwards and forwards without any ſide ſhake. In one of theſe ledges is placed a ſtrip or plate of metal cut into teeth, which lock into correſpondent teeth in each cylinder; by which means the two cylinders roll along, without the poſſibility of changing the relative poſitions of their ſurfaces at any determinate part of the table. This may alſo be effected by ſtraps, and may indeed be accompliſhed, with tolerable accuracy, by the mere rolling of the cylinders on the ſmooth or flat ledges without any proviſion. A is the printing-cylinder, covered with woollen cloth, and B is the inking-cylinder, with its diſtributing-rollers. The table may be divided into four compartments, marked with a thicker bounding-line than the reſt, and numbered 1 2 3 4. At 1 is placed a ſheet of paper;

at 2 is the form or chaſe, containing letter ſet and impoſed; at 3 is an apparatus for receiving the printed ſheet; and 4 is employed in no other uſe than as a place of ſtanding for the carriage E, after it has paſſed through one operation, and when it takes ink at F. Its action is as follows: the carriage is thruſt forward by the workman, and as the roller A paſſes over the ſpace numbered 1, it takes up the ſheet of paper previouſly laid there, while the roller B runs over the form and inks the letter. The ſheet of paper, being wrapped round the cylinder A, is preſſed againſt the form as that cylinder proceeds, and conſequently it receives an impreſſion. When A arrives at the ſpace numbered 3, it lets go the ſheet of paper, while the prominent part of the carriage, G, ſtrikes the lever P, and raiſes the inking-piece, which applies itſelf againſt one of the diſtributing-rollers. In this manner therefore the cylinder A returns empty, and the cylinder B inked, and in the mean time the workman places another ſheet of paper ready in the ſpace numbered 1. Thus it is that the operation proceeds in the printing of one ſheet after another.

The preceding deſcription is not incumbered with an account of the apparatus by which the paper is taken up and laid down. This may be done in ſeveral ways: Figs. 9 and 10 repreſent one of the methods. D E is a lever, moving on the centre pin C, and having its end D preſſed upwards by the action of the ſpring G. The ſhoulder which contains the pin C is fixed in another piece F, which is inſerted in a groove in the ſurface of the cylinder A; (Fig. 4;) ſo that it is capable of moving in and out, in a direction parallel to the axis of that cylinder. As that cylinder proceeds, it meets a pin in the table; which, (letter P, Fig. 9,) acting on the inclined plane at the other end of the lever, throws the whole inwards, in the poſition repreſented in Fig. 10; in which caſe the extremity D ſhoots inwards, and applies itſelf againſt the ſide of the cylinder.

In Fig. 11 is a repreſentation of part of the table; the dotted ſquare repreſents a ſheet of paper, and the four ſmall ſhaded ſquares denote holes in the board, with pins ſtanding beſide them. When the lever D E (Fig. 10) ſhoots forward, it is ſitu-

ated in one of these holes, and advances under the edge of the paper, which consequently it presses and retains against the cylinder with its extremity D. Nothing more remains to be said respecting the taking up, but that the cylinder is provided with two pair of these clasps or levers, which are so fixed as to correspond with the four holes represented in Fig. 11. It will be easy to understand how the paper is deposited in the compartment N°. 3. (Fig. 4.) A pin P, (Fig. 10,) rising out of the platform or table, acts against a pin E, projecting sideways out of the lever, and must of course draw the slider and its lever to the original position; the paper consequently will be let go, and its disengagement is rendered certain by an apparatus fixed in the compartment numbered 3, (Fig. 4,) of exactly the same kind as that upon the cylinder, and which, by the action of a pin duly placed in the surface of the cylinder A, takes the paper from the cylinder in precisely the same manner as that cylinder originally took it up in the compartment numbered 1. (Fig. 4.)

Figs.

Figs. 5, 6, and 7, (Pl. X.) repreſent a ſimpler apparatus for accompliſhing the ſame purpoſe. If A *a* B *b* (Fig. 7) be ſuppoſed to repreſent a thick plate of metal of a circular form, with two pins A and B proceeding ſideways or perpendicularly out of its plane, and diametrically oppoſite to each other, and G another pin proceeding in the direction of that plane, then it is obvious that any force applied to the pin A, ſo as to preſs it into the poſition *a*, (by turning the plate on its axis or centre X,) will at the ſame time cauſe the pin G to acquire the poſition *g*; and, on the other hand, when B is at *b*, or the dotted repreſentation of the ſide-pin, if any preſſure be applied to reſtore its original poſition at B, the pin *g* will return back to G. Now the figures 5 and 6 exhibit an apparatus of this kind, applied to the cylinder A; and that cylinder, by rolling over the pins P and *p*, properly fixed in the table to re-act upon the apparatus, will cauſe its prominent part G, either to apply to the cylinder and claſp the paper, or to riſe up and let it go. The compartment numbered 3 (Fig. 4) muſt of courſe have an apparatus of the ſame kind, to be acted upon

upon by pins from A, in order that it may take the paper from that cylinder.

There is one other circumſtance belonging to this machine which remains to be explained. When the carriage E (Fig. 4) goes out in the direction of the numbers 1 2 3 4, both rollers, A and B, preſs the form of letter in their paſſage; but in their return back again the roller A, having no paper upon it, would itſelf become ſoiled, by taking a faint impreſſion from the letter, if it were not prevented from touching it: the manner of effecting this may be underſtood from Fig. 12. The apparatus there repreſented is fixed upon the outſide of the carriage E, near the lower corner, in the vicinity of the roller A; the whole of this projects ſideways beyond the ledge of the table, except the ſmall truck or wheel B. The irregularly-triangular piece, which is ſhaded by the ſtroke of the pen, carries this wheel, and alſo a catch movable on the axis or pin E. The whole piece is movable on the pin A, which connects it to the carriage. C D, or the part which is ſhaded by dotting, is a detent which ſerves to hold the piece down in a certain poſition. It may be

be obſerved, that both the detent and the triangular piece are furniſhed each with a claw, which holds in one direction, but trips or yields in the other, like the jacks of a harpſicord, or reſembling certain pieces uſed in clock and watch making, as is clearly repreſented in the drawing. Theſe claws over-hang the ſide of the table, and their effect is as follows. There is a pin C (Fig. 4) between the compartments of the table numbered 2 and 3, but which is marked F in Fig. 12, where G H repreſents the table. In the outward run of the carriage theſe claws ſtrike that pin, but with no other effect than that they yield for an inſtant, and as inſtantly reſume their original poſition by the action of their reſpective ſlender back-ſprings. When the carriage returns, the claw of the detent indeed ſtrikes the pin, but with as little effect as before, becauſe its derangement is inſtantly removed by the action of the back-ſpring of the detent itſelf; but, when the claw of the triangular piece takes the pin, the whole piece is made to revolve on its axis or pin A, the wheel B is forced down, ſo as to lift that end of the carriage, and the detent, catching on

on the piece at C, prevents the former poſition from being recovered. The conſequence of this is, that the carriage runs upon the truck B, (and its correſpondent truck on the oppoſite ſide,) inſtead of the cylinder A, which is too much raiſed to take the letter, and ſoil itſelf; but, as ſoon as the end of the carriage has paſſed clear of the letter, another pin R (Fig. 4.) takes the claw of the detent, and draws it off the triangular piece; at which inſtant the cylinder A ſubſides to its uſual place, and performs its functions as before. This laſt pin R does not affect the claw of the triangular piece, becauſe it is placed too low; and the claw of the detent is made the longeſt, on purpoſe that it may ſtrike this pin.

Fig. 8 repreſents an inſtrument for printing floor-cloths, paper-hangings, and the like, with ſtiff paint and a bruſh. D is a copper or metallic cylinder fixed in a frame A, like a garden-roller; its carved part is thin, and is cut through in various places, according to the deſired pattern. A ſtrong axis paſſes through the cylinder, and its extremities are firmly attached to the frame A. To this axis is fixed a veſſel or box of the ſame kind,

kind, and answering the same purpose, as the box K L in Fig. 3. It carries a cylinder P, which revolves in the colour; another cylinder E, which revolves in contact with P; and a third cylinder B, whose exterior surface is covered with hair, after the manner of a brush, and revolves in contact with E. This cylinder B is adjusted by its axis, in such a manner that its brush-part sweeps in the perforated parts of the metallic cylinder D. The circle C represents a cog-wheel, fixed concentric to the cylinder D, and revolving with it; this wheel takes another wheel concentric to, and fixed to, B: hence the action is as follows. When the metallic cylinder is wheeled or rolled along any surface, its cog-wheel C drives the brush B in the contrary direction; and this brush-cylinder, being connected by cogs or otherwise with E and P, causes those also to revolve and supply it with colour. As the successive openings of the cylinder D, therefore, come in contact with the ground, the several parts of the brush will traverse the uncovered part of that ground, and paint the pattern upon it. The wheel G, being kept lightly on the ground, serves to determine

the line of contact, that it ſhall be the part oppoſite to B, and no other.

Laſtly, I muſt take notice, that in theſe and every other of my machines, as well as in every machine whatever, the power may be wind, water, ſteam, animal ſtrength, or any other natural change capable of producing motion; and that the mechaniſm by which ſuch powers may be applied to produce a regular unceaſing, or an intermittent, motion, as circumſtances may require, may be uſed with theſe machines, though I have held it totally unneceſſary either to ſpecify or annex thoſe methods. The materials, the adjuſtments, the fittings, and that degree of accuracy neceſſary to the perfection of every machine, have likewiſe made no part of my ſpecification, becauſe every workman muſt know that no mechaniſm can be completed without a due attention to theſe well-known particulars. In witneſs whereof, &c.

XIX.

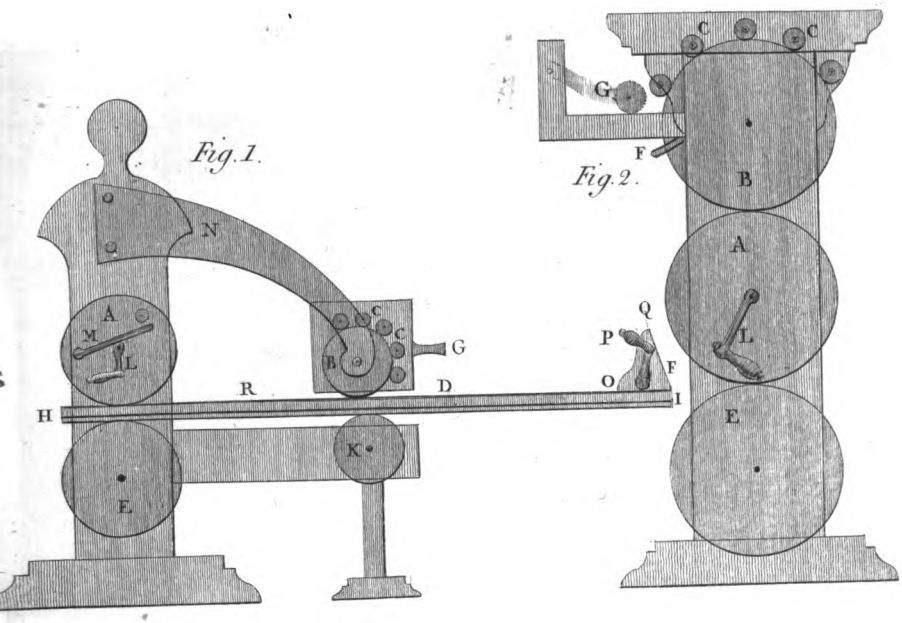


Fig. 3.

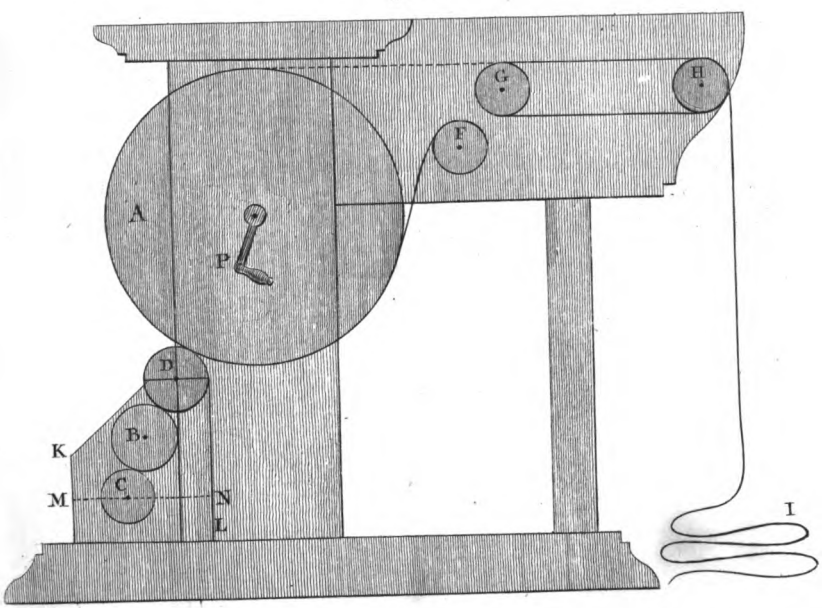


Fig. 4.

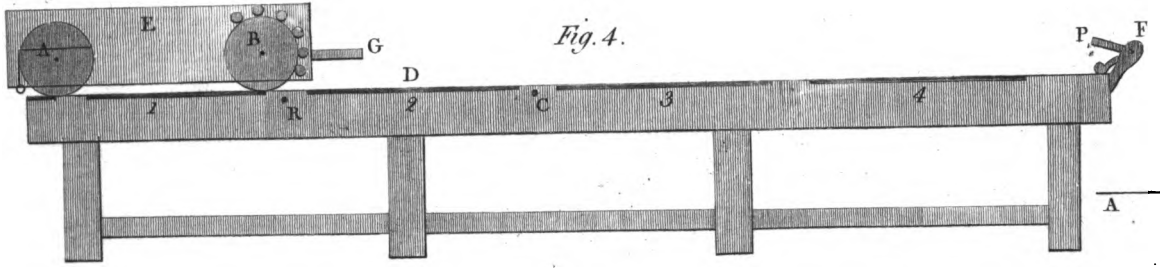


Fig. 9.

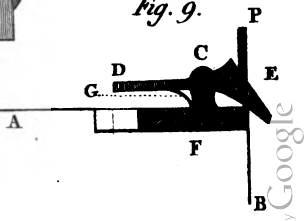


Fig. 11.

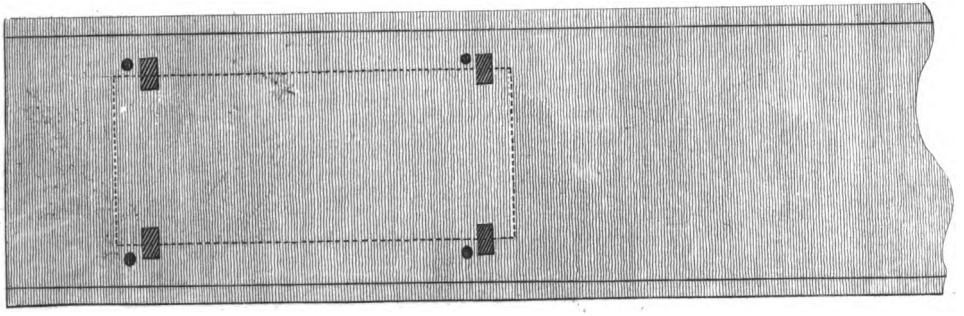


Fig. 10

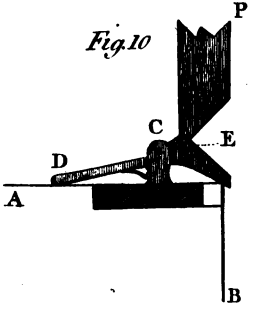


Fig. 5.

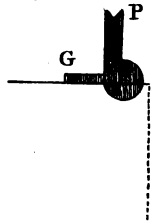


Fig. 6.

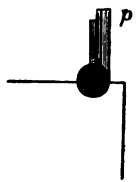


Fig. 7.

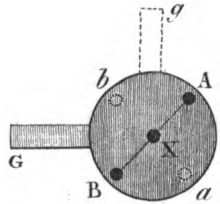


Fig. 8.

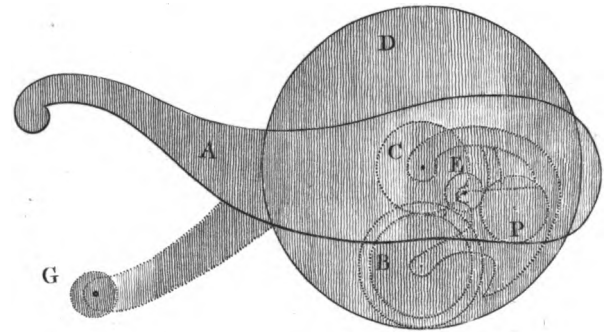
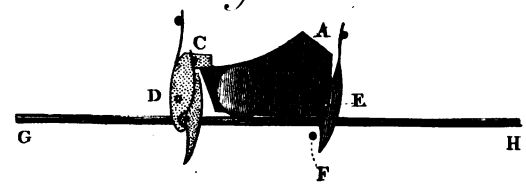


Fig. 12.



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