(No Model.) 4 Sheets—Sheet 1.

S. JEFFERIES.

BRICK OR TILE CUTTING MACHINE.

No. 501,620. Patented July 18, 1893.

Fig. 1

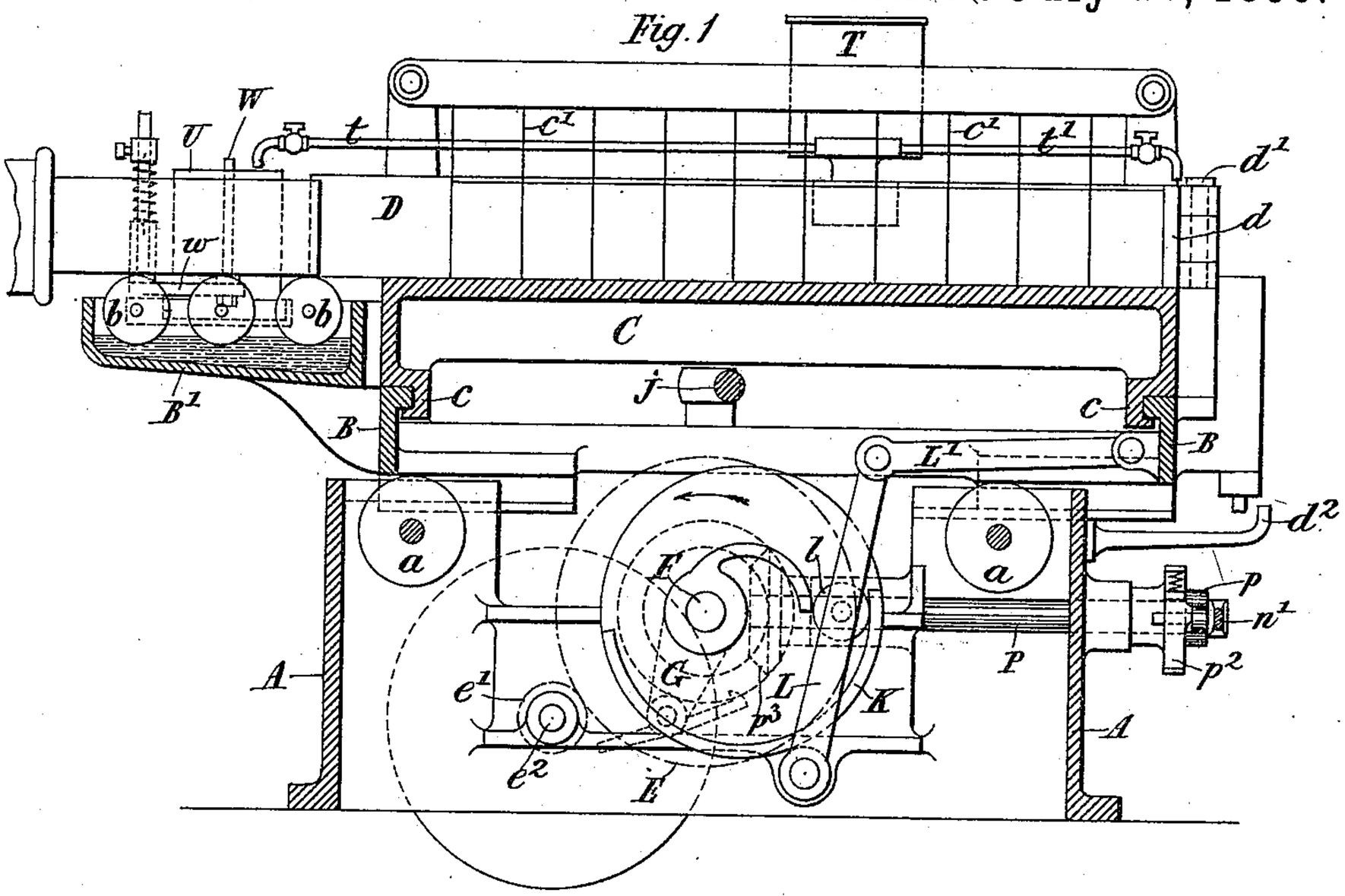
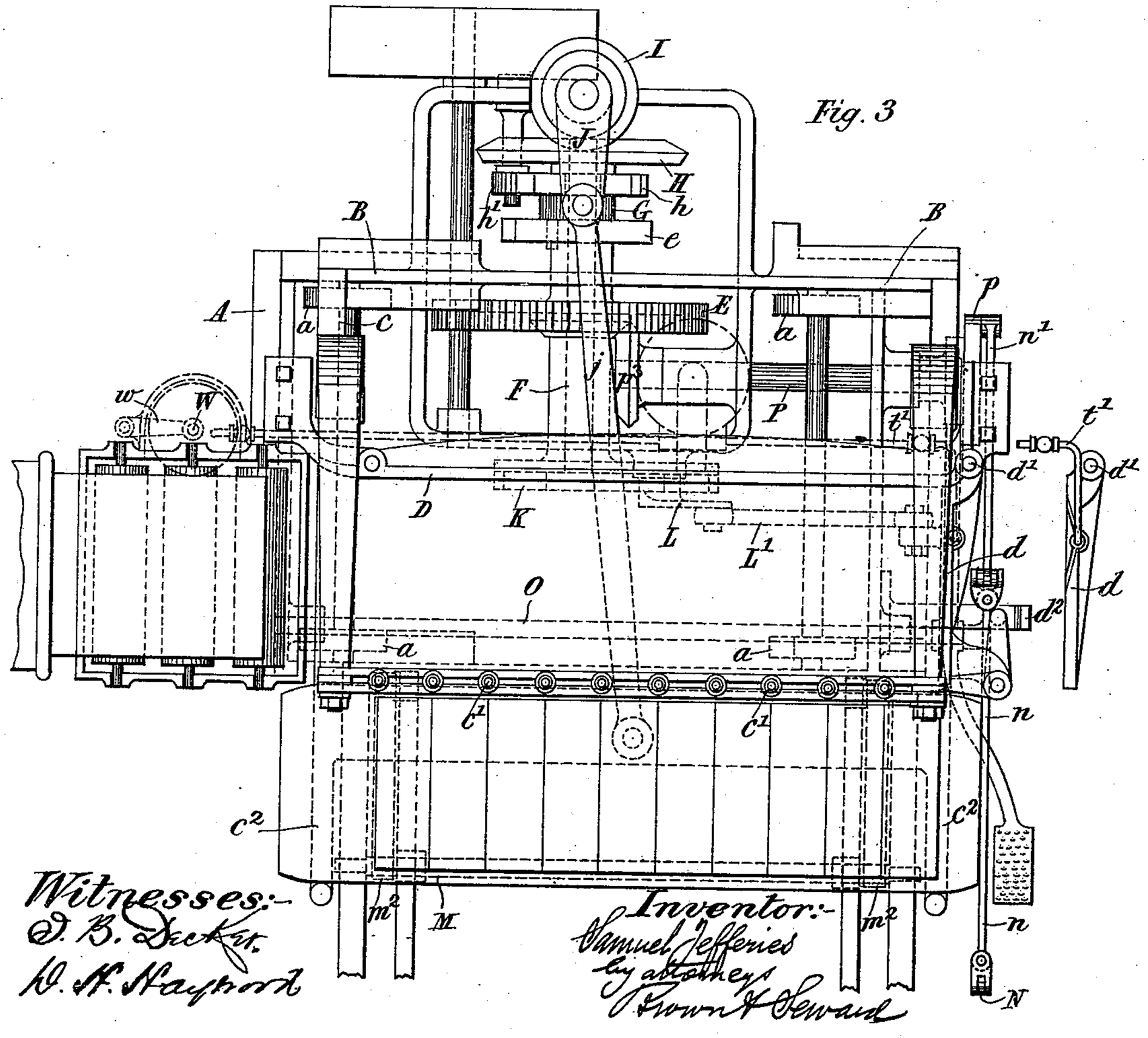


Fig. 3



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BRICK OR TILE CUTTING MACHINE.

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Fig. 2

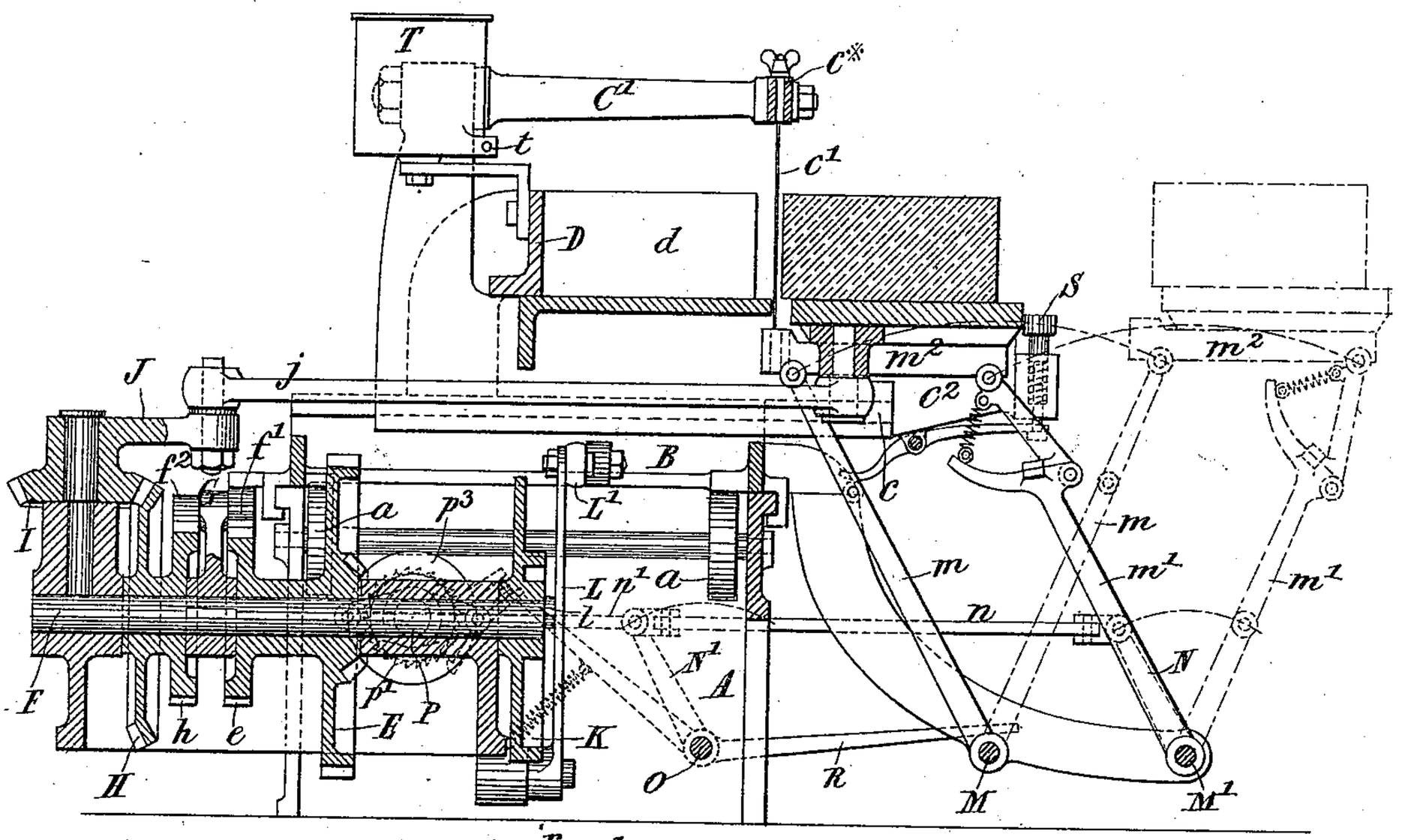


Fig. 4a

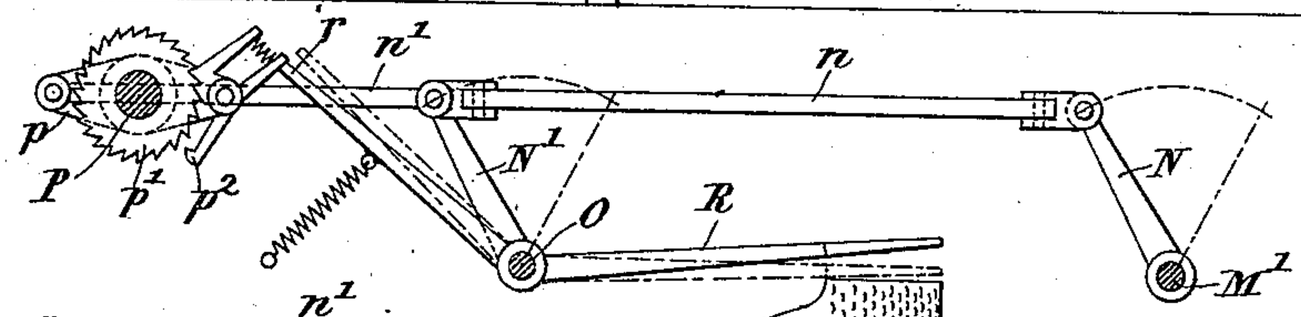


Fig. 5a

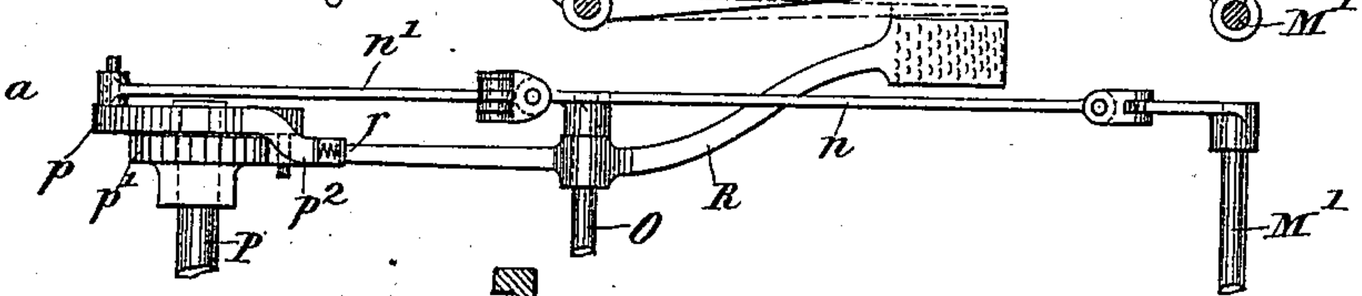


Fig. 4

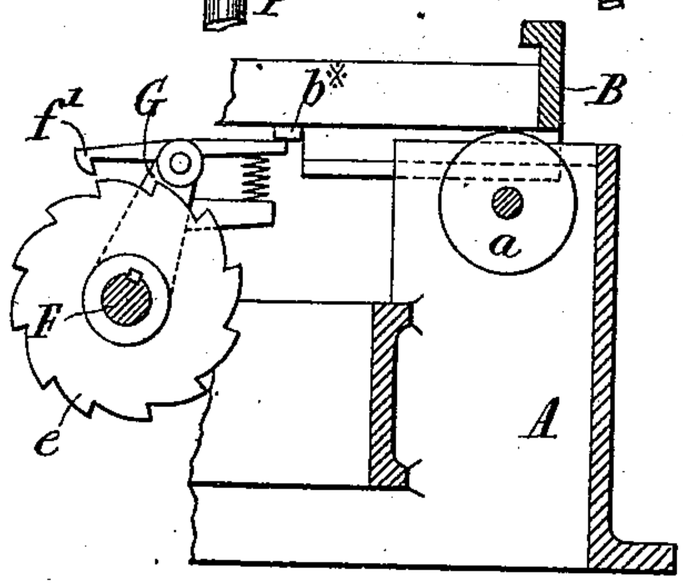
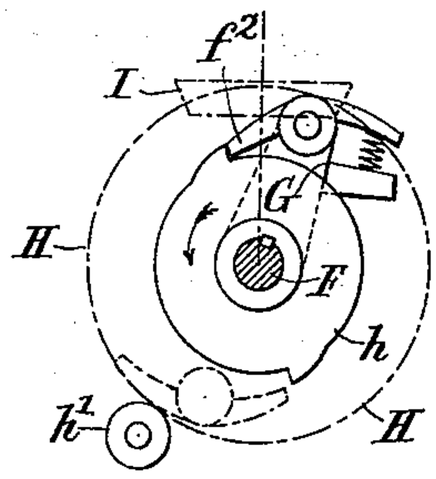


Fig. 5



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4 Sheets—Sheet 3.

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BRICK OR TILE CUTTING MACHINE.

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Fig. 6

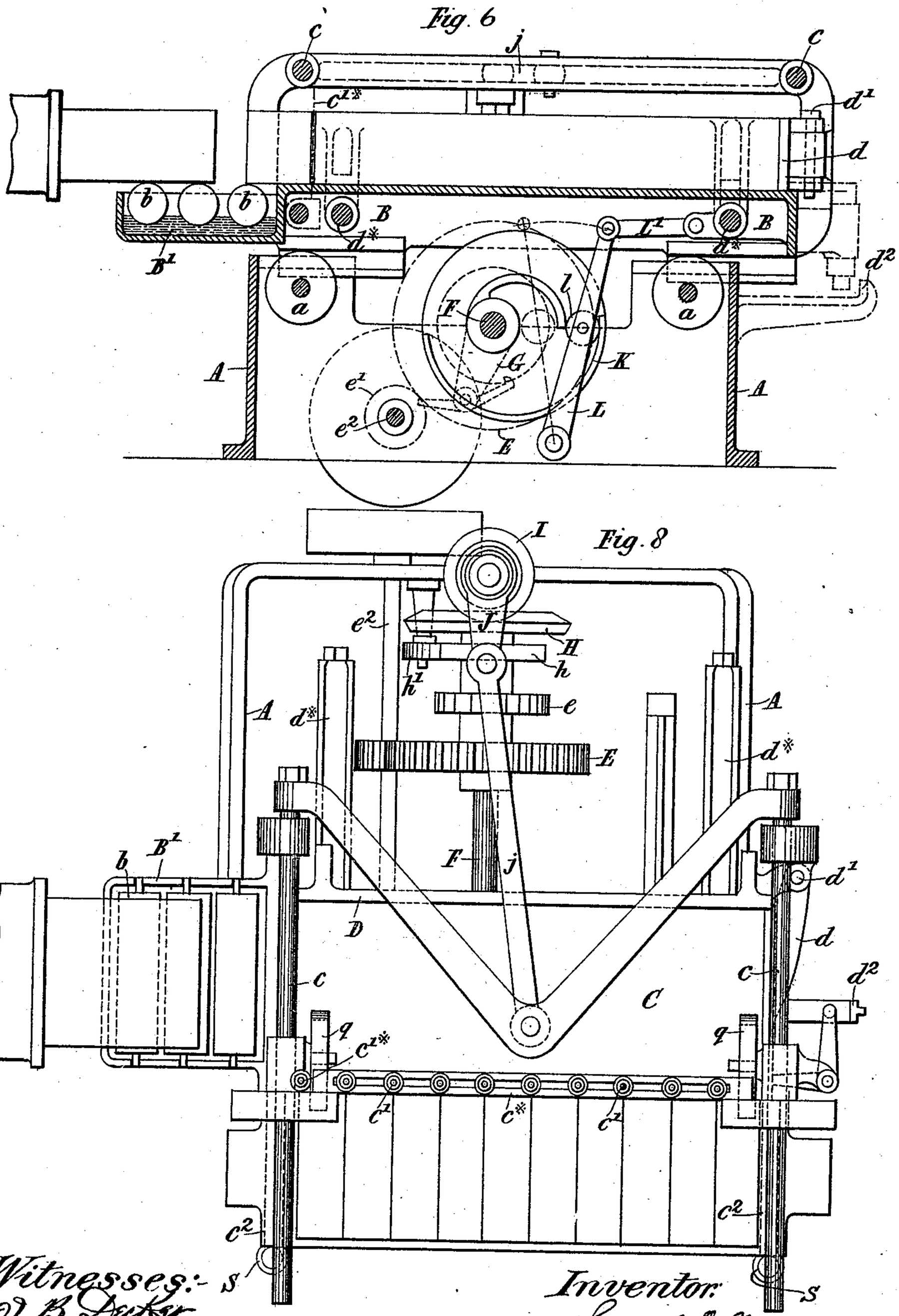

Fig. 8

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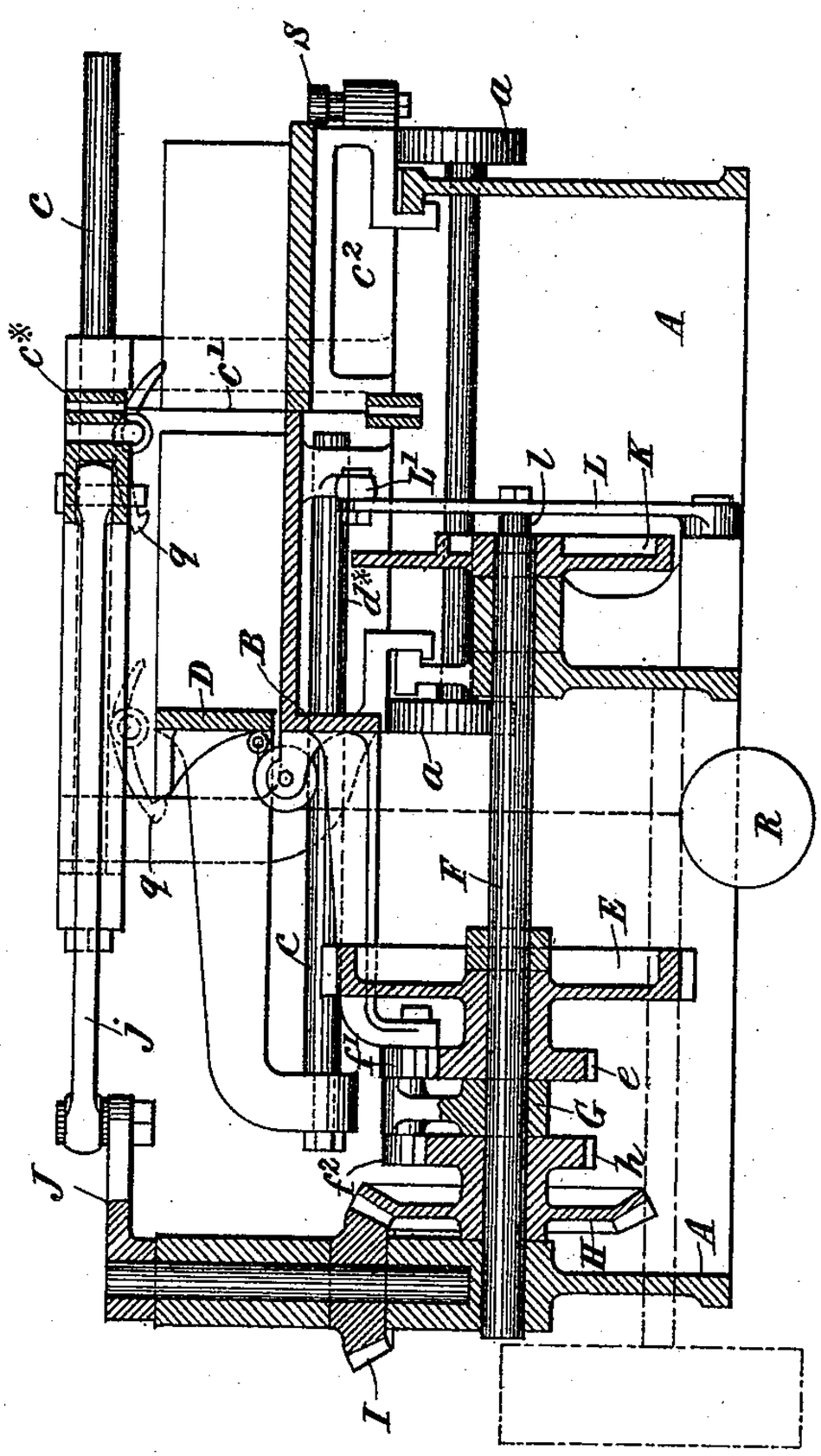
BRICK OR TILE CUTTING MACHINE.

No. 501,620. Patented July 18, 1893.

Fig. 7



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UNITED STATES PATENT OFFICE.

SAMUEL JEFFERIES, OF STROUD, ENGLAND.

BRICK OR TILE CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 501,620, dated July 18, 1893.

Application filed July 30, 1892. Serial No. 441,650. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL JEFFERIES, of Stroud, in the county of Gloucester, England, have invented certain new and useful Improvements in Machinery for Making Bricks, Tiles, or Similar Articles from Plastic Clay or other Material, of which the following is a specification.

This invention relates to that form of machinery wherein bricks are made by severing them from a stream of clay advanced from a die onto a cutting table, in connection with which are arranged a number of cutting wires.

The object of my invention is to improve the capabilities and efficiency of such machines, both by increasing the working speed, and by rendering the machine independent of the manipulations of the attendant.

In carrying out my invention, I propose to utilize the movement of the stream of clay for setting in action the cutting mechanism, so that the intermittent operations of cutting off the bricks are effected automatically at the proper moment, without attention from the men, who will have nothing to do but remove the bricks after being severed by the cutting wires, either by hand, or by mechanism hereinafter described.

According to my invention, I employ a table or carriage onto which the stream of clay from the die is delivered, in the same way as is already customary with the machines of a similar class. The clay fed from behind continues to advance along the table, until there is a sufficient length to make any desired number of bricks, say, nine or ten. At this point, the clay comes in contact with a stop or door mounted on a table, which table being movable longitudinally under the impulse of the advancing stream of clay, begins to travel in the same direction. The movement given to the table is immediately communicated to clutch mechanism, which causes a rotary movement from a pulley, continuously rotated by a suitable motor, to be given to a shaft mounted in bearings in the framing of the machine. In connection with this shaft, are arranged the cutting wires, which are mounted on the same carriage as the table, but have an independent movement transverse to the line of travel of the stream of clay. The rotary movement given to the shaft above mentioned at the moment the table begins to travel under the impelling influence of the stream of clay, is utilized, through the medium of suitably arranged gearing, to draw the cutting wires across the line of travel of the stream of clay, which is thereby severed into short portions or bricks. Immediately the wires are pulled through the clay, the separated bricks and table are caused to travel longitudinally faster than the stream of clay issuing from the die. On the return of the wires, the bricks, which now rest upon a board advanced to receive them, are pushed to the side of the machine, whence they are removed in due course. In lieu of having the wires drawn across the stream of clay, the latter may be thrust against the wires, which in this case, with the exception of the first wire, which severs the stream near the die, have no movement transverse of the line of travel of the clay. After one length of clay is severed, the table has to be returned to its original position, to take a fresh portion.

In the accompanying drawings, which illustrate my invention:—Figure 1 is a longitudinal section of the machine in which the wires are drawn through the clay. Fig. 2 is a cross section thereof, showing mechanism for lifting the finished bricks clear of the machine; Fig. 3 a plan; Fig. 4 a view of the main clutch gear detached. Fig. 5 is a view of the secondary clutch gear, also detached. Figs. 4^a and 5^a are side and plan views of detached portions of the brick-removing mechanism. Figs. 6, 7 and 8 are views corresponding to Figs. 1, 2, and 3, of a modification in which a length of clay is first severed from the stream, and then pushed through the cutting wires.

A is a stationary frame or table carrying four wheels *a*, upon which rests a longitudinally movable carriage or table B. The stream of clay issuing from the die, first passes over the rollers *b*, mounted in the oil trough B′, attached to the end of the carriage B, and thence to a carriage C, which is mounted upon the carriage B, and travels therewith. This carriage C is capable of an independent movement on guides *c*, transverse to the line of travel of the carriage B, and provides for the operation of the strained cutting wires *c′*. upon the clay.

c^2. c^2 are supporting arms for the movable boards placed to receive the bricks when formed. The cutting wires c'., which, in the machine illustrated in Sheets I and II of the drawings, are all movable with the carriage C across the line of advance of the clay, are stretched vertically between a rail or bar c^*, held at the extremities of the arms C', bolted to brackets on the carriage C, and a rail or bar c'^* secured to another portion of the same carriage. The arms C' which support the bar c^*, being somewhat elastic, give an elasticity to the cutting wires which is very desirable.

D is a bridge piece extending longitudinally of the carriage C, and bolted to the carriage B.

d is a stop upon the end of the carriage B farthest from the clay die, which stop may be hinged to the bridge at d'., so as to open and give way to the advancing stream of clay under certain circumstances. This stop d is intended to intercept the advance of the stream of clay, and thereby communicate the movement thereof to the carriage B, and the parts supported thereby, in order to set in motion the mechanism for cutting up the clay into bricks. This is effected in the following manner:—E is a spur wheel mounted loosely on a horizontal shaft F. To this wheel E, and to the ratchet wheel e. in connection therewith, rotary movement is continuously given from any suitable motor by the pinion e'. on the driving shaft e^2. of the machine.

G is a radial arm keyed on the shaft F, and provided with a hook f'. for engaging with the ratchet wheel e, and a pawl f^2. for engaging with the ratchet wheel h, which, with the bevel wheel H fast thereto, is loose on the shaft F. Thus, by means of the hook f', the spur wheel E may be locked to the shaft F, and the rotary movement of the former communicated to the latter, and, by means of the pawl f^2, the pinion H may be locked to the shaft F, so that the rotation of the shaft is imparted to the pinion.

I is a bevel wheel in gear with the bevel wheel H.

J is a crank arm fast with the wheel I.

j is a link rod connecting the crank arm J. with the carriage C.

K is a cam wheel keyed on the shaft F, so as to rotate therewith.

L is a lever pivoted to the main frame or support A (see Fig. 1), and having a bowl l, about midway of its length, in engagement with the cams of the wheel K.

L' is a link pivoted at one end to the lever L, and at the other to the carriage B.

The machine is at rest, except for the spur wheel rotating loosely on its shaft until the stream of clay from the die reaches the stop d. At this point, the carriage B, which carries the stop, is caused, under the pressure of the advancing clay, to move in the direction of travel of the latter. The hook f', which is normally held clear of the ratchet wheel e. by a projection b^* (see Fig. 4), carried by the table B, pressing on its tail, is released when the table is advanced, and, under the influence of a spring wherewith it is provided, engages with the said ratchet wheel e. The result of this engagement is, that the arm G (and with it the shaft F to which it is keyed) is carried round with the continuously-rotating spur wheel E. At the same time, the tail of the pawl f^2 is released when the arm G begins to move, and the pawl being provided with a spring, is pressed into engagement with one of the two teeth of the ratchet wheel h, fixed to the bevel wheel H, which thereupon begins to rotate, and communicate its rotation to the bevel wheel I and crank J. The rotation of the crank J, as before explained, has the effect of pulling the whole of the carriage C, including the cutting wires, across the line of travel of the stream of clay, which, being supported laterally by the bridge D, attached to the table B, is severed into bricks, beneath which is drawn the board supported on the arms c^2. c^2 of the carriage C. Immediately the severance is complete, the cam wheel K, now in rotation with the rest of the gear, comes into action, and is so arranged as to give an advance movement to the carriage B, through the lever L, independent of, and faster than the advance of the stream of clay. The object of this independent and quicker movement, is to give time for the removal of the severed bricks to one side, before they are overtaken by the clay continuously advancing at an even speed, and to allow the parts to come back to the proper position to receive a fresh length to be cut up. The return of the parts, and the removal of the bricks to one side, is managed by the continued movement of the cam wheel, which returns the carriage B as the bowl l. follows the cam, and by the crank J and bevel wheel I, which latter is proportioned to make a complete revolution, so as to bring the carriage C across and back again, before the pawl f^2. is disengaged from the ratchet wheel h. by a suitable trip h'., which occurs at the half rotation (see dotted position Fig. 5). The hook f'. remains in engagement with the ratchet e. until thrown out by the stop on the carriage B, now fully returned by the cam wheel to its position of rest, until a fresh portion of the stream of clay has sufficiently advanced to start the machine again.

In the drawings, the machine is shown at the point just previous to the return movement of the carriage B.

To prevent adhesion between the stream of clay and the table of the carriage C, the rollers b. rotating in the oil trough B' are used to deliver oil to the under side of the said stream. The bridge D and the stop d. may be supplied with lubricant by hand, by means of a brush. I prefer to use an oiling arrangement such as I have shown at Fig. 1 of the drawings, a small oil tank T bolted to the back of the bridge D.

t. t' are branch pipes delivering one (t) over the roller U, which is mounted on a vertical spindle standing above a tray projecting from

the oil trough B'., the other (*t'*) delivering onto the door or stop *d*, the top of which is grooved to guide the oil in a proper direction. The roller U is held elastically against the side of the stream of clay with which it is always lightly in contact, and to which it conveys sufficient lubricant to prevent adhesion to the bridge D. The elastic mounting of the roller U is conveniently managed as shown in the drawings, where the spindle or axis of the roller U. stands upon a radial arm *w*, which turns loosely upon the vertical shaft W, save for the coiled spring surrounding the latter, and attached to it at one end, while at the other it is attached to the arm *w*, the tendency of the spring being to keep the roller U in contact with the stream of clay.

For removing the finished bricks from the machine where they rest with the movable board on the arms c^2. c^2, I employ a parallel mechanism (see Fig. 2), which, on being put in action by the attendant, lifts or slides the board carrying the bricks bodily off the arms c^2. c^2 onto a barrow or traveling band placed in position to receive it, but not shown in the drawings. This parallel mechanism consists of a pair of horizontal rods M M'. mounted in bearings carried by brackets extending downward from the carriage B. To these rods M M', are rigidly secured two pairs of upstanding arms *m*. *m'*. Each pair *m*. *m'* is connected by bars m^2. The whole structure *m*, *m'*, m^2 forms a parallel rocking frame.

N is an arm keyed upon the rod M'., and N' is an arm mounted parallel to the arm N upon the shaft O, which is carried in any suitable way in the machine.

n is a link connecting the arms N. N'.

n'. is a continuation link connecting with the cross-head *p*, loosely mounted upon the continuously rotating shaft P.

p'. is a ratchet wheel fast on the shaft P, and capable of becoming locked with the cross head *p*. by means of a spring pawl p^2. thereon, when the latter is suffered to engage with the ratchet wheel. The engagement is effected when the bell-crank foot lever R Fig. 4^a fulcrumed on the shaft O, is rocked by the attendant, so as to clear the end *r*. from the tail of the pawl p^2. The shaft P, which is situated at right angles to the shaft F in suitable bearings, receives its continuous rotation by means of a bevel wheel p^3., which engages with a bevel wheel formed on the boss of the continuously-rotating spur wheel E previously mentioned. Thus, when the cross-head *p* is locked to the shaft P by means of the pawl and ratchet p^2. *p'*., the said cross head is carried round with the shaft, and causes, by means of the link rods *n*. *n'*, the parallel mechanism on the rod M. M'. to move to and from the dotted position of Fig. 2. This movement is complete in one revolution of the cross-head, which is disengaged from the ratchet wheel *p'*, and stopped by the bell crank lever R, released from the attendant's foot, catching against the tail of the pawl p^2, when one revolution is completed.

The normal position of the brick-removing mechanism is the drawn position of Fig. 2, with the bars m^2 underlying the board whereon the bricks rest. When it is desired, at the time of rest of the carriage C, to remove a load of newly-severed bricks from the machine, the attendant depresses the lever R, and sets the cross head *p*. rotating, as before explained. The parallel brick-removing mechanism actuated by the links *n*. *n'*, is pushed over to the dotted position, raising or sliding the bricks off the arms c^2. c^2, and depositing them on any suitable conveyance placed for them. To facilitate the return of the mechanism without the bricks, the arms *m'*. are made with elbows which give way under the weight of the bricks, on completing the forward movement, to clear the bars m^2. from the board, and straighten again under the influence of springs, during the backward movement.

The removal of the bricks must not be effected except at the proper time, viz: when the carriage is at rest before it is set in motion by the advancing clay, otherwise a breakage of the apparatus would result. If thought necessary, a stop may be provided to prevent the depression of the lever R at any but the right time.

In the modified arrangement shown at Figs. 6, 7 and 8, the cutting wires C'. are held in a frame supported by the carriage B, which has only the longitudinal movement as already described. The first wire *c'**, however, or that next the die, has a transverse movement with the carriage C, to sever a length of clay to be cut up into bricks. *c*. are the guide bars for the carriage C to slide on. D is the bridge, which is supported in separate transverse guides *d**, and has an independent movement across the machine. When the stream of clay has started the machine by meeting the stop on the carriage B, a length of clay is immediately severed by the single wire *c'**, operated by the carriage C, under the influence of the crank J, which pulls the carriage across the line of travel of the clay. The advance of the carriage B, at an increased rate, by the cam K, then takes place, so as to clear the severed portion of clay from the advancing stream, as before explained. The bridge D is caught by the hooks *q q*, pivoted to the carriage C (see Fig. 7), and drawn by the retiring carriage C across the machine, thrusting with it the severed portion of clay, which is thereby forced through the cutting wires. The hooks *q q* on the completion of this movement, are tripped by part of the frame of the cutting wires, and the bridge D is released, and returned to its former position by the counterweights R. In this modification, the brick-removing mechanism is not shown, but it may be arranged with it, as before.

If from any cause, the cutting or other gear

should become inoperative, and the carriage B, under the pressure of the advancing clay, should be too far advanced, a check d^2. is provided to open the stop door d, and thus allow the clay to pass, without injury to the mechanism.

S are spring bolts for retaining the boards in position on the arms c^2. during the severing operation, but they are capable of ready depression when it is desired to remove the boards, by means of lever arms pivoted thereto, and secured on a shaft which is carried by the carriage C, and rocks under the influence of a lever secured to said shaft, and acted on by a bowl mounted on one of the arms of the brick-removing mechanism.

From the foregoing it will be seen, that, with my arrangement, the cutting table and wires will remain quiescent until a sufficient length of clay is ready for division into bricks, and then, at the proper moment, is the severing automatically effected, and the table returned for a fresh charge. The rate of advance of the clay is immaterial as regards the timing of the operation, as the timing depends only upon the position of the clay. There is no danger, therefore, of bricks being spoiled by the attendant omitting to cut off at the right time, or otherwise improperly operating the machine; his only responsibility in the whole proceeding, is the removal of the completed bricks, which must be lifted off with the board on which they are,—an operation so simple, that a mistake therein is hardly likely to occur.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a brick machine, the combination of a die and a press for forcing a stream of clay therethrough, a table movable back and forth in the line of the delivery of the stream of clay from the die, a stop upon said table to be operated upon by the said stream to start the forward movement of the table, a cutter carriage and a cutter thereon movable transversely to and upon the said table for severing the stream of clay transversely, mechanism for advancing the table at an increased rate with the severed clay thereon clear of the advancing stream and afterward returning the said table to a position of rest, mechanism for operating the cutter carriage, a driving shaft, and engaging devices between said shaft and said two mechanisms to be thrown into and out of engagement by the movement of said table, substantially as herein set forth.

2. In a brick machine, the combination of a die and a press for forcing a stream of clay therethrough, a table movable back and forth in the line of the delivery of the stream of clay from the die, a stop upon said table to be operated upon by the said stream to start the forward movement of the table, a cutter carriage and cutter thereon movable transversely to and upon said table for severing the stream of clay transversely, mechanism for advancing the table at an increased rate with the severed clay thereon clear of the advancing stream and afterward returning the table to a position of rest, mechanism for operating the cutter carriage, a rocking frame and mechanism for actuating the same to lift the bricks off the machine, a driving shaft, and engaging devices between the said shaft and said several mechanisms to be thrown into and out of engagement by the movement of the table, substantially as herein set forth.

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