DESCRIPTION

OF

THE „MOSKOVKA,"

A NEW ROTATOR STEAM ENGIHE,

INUENTED AND PATENTED

BY

ALEXIS KHOMIAKOFF.

OF MOSCOW.

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Перепечатывается съ Лондонскаго изданія 1851 года и съ приложеннымъ къ этой брошюрѣ чертежомъ, который, для удобства чтенія, повторенъ въ большемъ размѣрѣ по рисунку, сдѣланному инженеромъ Т. М. Аверинымъ. *Изд.*

PREFACE.

The general application the Steam Engine to every purpose connected with the Arts, Manufactures, and Locomotion in all its varieties, renders any improvement tending to the simplification of its construction, a matter of the greatest interest to society at large; and although economy of first cost be undoubtedly a desideratum, the more important economy of working is much more interesting to those who depend upon its assistance in the wide spread competition of the present day, when all resort to mechanical means as the only resource by which the great demands on production can be met.

The Steam Engine has during the last few years been in great request for agricultural purposes, in order that the farmer might avail himself of the many facilities which it offers for superseding the more expensive part of manual labour, and thus place himself in the same advantageous position with the manufacturer. This demand has originated a great variety of useful appliances, and a general improvement in the character of the machinery of this class.

The reciprocating engine has received a large share of attention at the hands of the mechanic, and little remains to be effected in the way of further improvement.

The inventor and patentee of the «Moskovka» Rotatory Engine has turned his attention to that particular construction of engine, as possessing those distinctive characteristics which ought, under the hands of able mechanics, to develope two prominent features of excellence, viz.— economy of construction and economy of wor-

king, which are the great desiderata. The minor advantages, such as portability, compactness, &c., naturally accompany them.

The Inventor, after much reflection, flatters himself that he has succeeded in effecting these objects, and submits his labours to the world, in the hope that his Engine will be found to possess those qualities which will claim for it a favorable introduction.

The following description of the Engine will illustrate the several features of its construction and mode of action, from which it will be seen that in adopting the rotatory principle, the much desired direct action of the steam is made use of without the intervention of transmitting agents; and as such, offering the greatest advantages as regards the application of a given force to produce a desired effect.

Applications for further particulars, and licenses to construct the Patent Engine, to be made to Mr. Alexis Khomiakoff, the Inventor, at Moskow, who is disposed to treat with liberality those who are among the earliest constructors of his Engine.

DESCRIPTION

of the

ROTATORY STEAM ENGINE,

THE „MOSKOVKA".

The great problem of steam engine fabrication is to obtain, Ist—a circular motion without any intermediate mechanism between the power of steam and the machines which it is intended to move; 2nd—an action as uniform as possible, or at least with but very slight variations; 3rd—a greater uniformity of temperature in the receptacle of steam than is obtained at present; 4th—a considerable diminution of friction; 5th—a greater economy of space; and 6th—a noiseless action.

The inventor of the „Moskovka" hopes he has obtained these results by the following plan of a steam engine.

The novelty of the „Moskovka" consists in the constancy of the steam current, and of the vacuum produced by its mechanism. This constancy is obtained by the introduction of steam and its escape taking place through moveable parts which turn with the piston and axle.

The body of the steam engine is composed of a hollow cylinder, *A*, opening on both sides into two semi-cylinders, *B B'*, and by its bases into two lesser cylinders, *C C'*. The lesser cylinder *C* communicates by the introduction tube *i n* with the boiler; the cylinder *C'* communicates by the escape tube *e s* with the condenser or the atmosphere.

All these parts are immoveable (see figs. 1, 2, 3, 4, 5).

The axle, *T*, passes through the upper lid of the lesser cylinder *C*, and the lower lid of the cylinder *C'*, through openings which are made steam and air tight.

The middle of the engine is occupied by a moveable cylinder *D*, with a piston *x* (figs. 3, 5, 7, 8). This moveable cylinder opens by

its bases into the cylinder $C C'$, and fits so exactly to the lids of the great cylinder as to allow no loss of steam.

The moveable cylinder is hollow, and conected with the axle by a strong plate E (figs. 3, 5, 6, 7) which allows no direct communication between the two cylinders C and C', and consequently no direct communication between the introduction tube and the escape.

The moveble cylinder has two openings $y\,y'$ (figs. 3, 5, 7). One of these openings lets the steam rush into the great cylinder, the other lets the steame out of the engine into the escape tube. The openings $y\,y'$ are separated by the piston x; one of them is above, and the other under the solid plate E, which divides the inner space of the moveable cylinder in two halves.

The two semi-cylinders $B\,B'$ contain two shutters, indicated by *sh.* 1 and *sh.* 2 (figs. 3, 5, 8, 9, 10, 11); each shutter consisting of a semi-cylindric column, and of two circular bases $f\,f'$.

The bases of the shutters fit exactly to corresponding circular openings in the upper and lower lids of the immoveable cylinder A, and of the semi-cylinders B and B'. The shutters turn, without allowing any loss of steam, on centres $a\ a$, adapted to any immoveable contrivance, which is not indicated in the plans, as being easily understood by every builder of engines.

The shutters work alternately. In the figures 2, 3, 4, 5, they are shown in their different positions; *sh.* 1 being open to let the piston pass, *sh.* 2 being shut and adhering firmly to the moveable cylinder D. In the figure 4, the space indicated by $s,\ s,\ s,\ s,$ is full of steam which passes by the opening y, acts by pressing against the shutter *sh.* 2, and pushing the piston x. The space marked with $v,\ v,\ v,$ is the vacuum produced by the escape of steam through the opening y', which is not indicated in the figure, being under the solid plate E.

The semi-cylindric columns *sh.* 1, *sh.* 2, present to the piston a concave surface, forming exactly a part of the interior circumference of the great cylinder A, and are cut on the edges in the form of a concave circular surface, which adapts itself exactly to the outward surface of the moveable cylinder D, allowing no leakage, and producing but a slight degree of friction (see figs. 5, 11). This little concave surface is marked by the letters $a\,b$.

The upper base of the shutters supports a simple concave pillar *z*, *z'*, which being pushed by the eccentric *w*. (fig. 4) fixed to the axle, turns the shutter, and gives it the position requisite for the passage of the piston. The shutter being released from the pressure of the eccentric turns again on its centres by the action of a counterpoise or of steam, and adheres to the moveable cylinder *D*. Or the motion of the shutters may be effected by means of an eccentric *w*, fixed on the axle of the moveable cylinder or piston, *D*, which acting upon a lever z, on the axle of each of the shutters (the end of which is furnished with a roller to reduce the friction) gives the position requisite for the passage of the piston. The shutters being released from the pressure of the eccentric, are turned again on their centres by the action of counterpoises or springs, uniting the opposite ends of the levers z, z, and adhere to the moveable cylinder *D*.

Steam offers no resistance to this motion of the shutter, the quantity of steam which is pushed out of the great cylinder *A* by the shutter finding a sufficient receptacle in the void left by the same motion in the semi-cylinders, *B B'* (see fig. 5).

The figures of the plate are—

Fig. 1. General side view of the whole engine.

Figs. 2 & 4. End of the same.

Fig. 3. Section of the same on the line *O T* of fig. 2.

Fig. 5. Horizontal cut of the same on the line *P Q* of fig. 1.

Figs. 6, and 7. Interior moveable cylinder with piston and openings. Cut of the same, with axle and circular plate separating the steam in the upper part of the cylinder, from the vacuum in the lower half.

Figs. 8, 9, 10, and 11. Front view of the shutter, with the centres and concave pillar. Side view of the same with centres and pillar. Plan of the upper lid of the same. Horizontal cut of the shutter.

Fig. 12. Eccentric.

ACTION OF THE ENGINE.

Steam coming out of the boiler by the introduction tube *i n*, through the lesser cylinder *C*, into the upper half of the moveable

cylinder *D*, and finding an immoveable obstacle in the plate *E*, rushes through the opening *y*, into the great cylinder *A*, finds itself compressed between the shutter *sh.* 2, and the piston *x*, pushes the piston and gives the axle a circular motion. The shutter *sh.* 1, being released from the pressure of the eccentric, turns (by the effect of a counterpoise or of steam) back, and adheres to the moveable cylinder *D*; steam continuing to pour in by the opening *y*, finds itself compressed between the shutter *sh.* 1, and the piston, and propels the mechanism further on. The shutter *sh.* 2 is at the same time turned by the pressure of the eccentric *w*, to the position requisite for the passage of the piston, and the steam escapes through the opening *y'* into the lower half of the moveable cylinder *D*, the lesser cylinder *C'*, and the escape tube *e s*, which communicates with the condenser or atmosphere.

Thus are obtained a constant and uniform pressure of steam on one side of the piston, and a constant vacuum on the other. The result is a constant rotatory motion of the engine, without any other variations, except the slight resistance of the turning shutters.

ADVANTAGES OF THE STEAM ENGINE—THE „MOSKOVKA".

This solution of the problem is quite a new one, and the inventor hopes, a superior one to all former schemes in the same line.

The current of steam never varies, and is never interrupted, flowing in as a stream of water. The production of vacuum is constant, consequently the power is as uniform as possible. The steam acts with full power without any intermediate mechanism to produce rotation. The temperature is constant, steam pouring in always in a heated space only, slightly cooled by the outward surface of the immoveable cylinder. Friction is immensely diminished by the simplification of the mechanism, and the circular motion of every moveable part. Great economy of space is obtained. The action is completely noiseless, the shutters turning gradually, and coming lightly in contact with the moveable cylinder.

Retrograde motion is easily obtained by a change of the introduction-tube to an escape-tube, and *vice versâ*, and by a momentary alteration in the position of the shutters, with a displacing of the counterpoise and eccentric.

The engine can work as well in a vertical as in a horizontal position.

POSSIBLE CHANGES WHICH DO NOT AFFECT THE ESSENTIAL CONDITIONS OF THE ENGINE.

Changes may easily be made in this engine for practical purposes, without affecting its principal elements.

Thus, if it was found that the pressure of steam against the circular plate *E* in the moveable cylinder had a tendency to alter the position of the axle *T*, and to push it towards one of its ends, the upper lid of the lesser cylinder *C*, and the lower lid of the cylinder *C'*, could be made moveable, and screwed to the axle *T*, by which scheme equilibrium would be perfectly restored.

If a rapid change of direct motion to retrograde was required, flat shutters could be used instead of semi-cylindric ones. (See figs. 13, 14, 15).

The shutter *sh* moves to and fro between two strong metallic plates *g g'*, being repelled out of the cylinder by two eccentrics *w*, (one of them fixed above and the other beneath the cylinders) and driven back into the cylinder by counterpoise, spring or steam. In this last case, steam can act by means of a cylinder affixed to the boiler, its circular piston being of a somewhat larger area than the area of the edge *a b* of the shutter, and vacuum being obtained alternately with steam pressure. The shutter moves easily between the two metallic plates, being kept in an unvarying position by the four rollers or sliders *e e e e*. Only one shutter is indicated in the plate, the other being exactly of the same construction. Rollers or little wheels *r r* may be adapted to the shutter, in the places where it meets the eccentrics, to diminish friction. Elastic plates *d d*, introduced in the surface of the great cylinder, hinder the escape of steam. The remainder of the engine is the same as in the former description.

The advantage of this scheme would be a facility to produce the most rapid changes of direct and retrograde motion; the loss of power being equal to the resistance opposed by friction, and to the resistance of steam against the edge *a b* of the shutter. The retrograde motion of the shutter, when repelled out of the great cylinder, could find no difficulty, as it would be aided by the effect of vacuum produced in the little steam apparatus which is affixed to the boiler, and which, when filled with steam, pushes the shutter into the great cylinder *A*.

The openings for introduction and escape of steam may be made in the body of the piston itself, which could have an oval form, for the purpose of obtaining a greater solidity. The piston could likewise act as an eccentric, though such a method would probably render it more liable to be worn out, and to wear out the shutters, augmenting at the same time friction without necessity.

Another variety of the „Moskovka" steam engine is constructed on the following plan:

For the two cocks or shutters may be substituted two pairs of sliding plates; these plates, sliding through openings in the bases of the great immoveable cylinder along the surface of the moveable cylinder and the inner surface of the immoveable one, meet steam-tight, and act as shutters or diaphragms.

The sliding plates may be moved backwards and forwards by the pressure of springs, condensed air or steam, and by the action of the working gear.

All the other parts of the engine remain the same as in the former plans, with the only difference that the diameter of the moving cylinder may be considerably reduced. The disposition of the sliders in indicated in the figures.

The metallic packings render the meeting of the sliding plates steam-tight, and the escape of steam through the tubes or grooves *o o* avoids the resistance of the steam to the motion of the plates.

This variety of the „Moskovka" seems to avoid all the defects which are generally attributed to rotatory engines. No striking against surfaces which can be spoiled by them — no deterioration of the surfaces of the working or of the immoveable cylinder—no difficulty in avoiding leakage or loss of steam.

If compared with the common engine, this variety of the „Moskovka" appears to offer great advantages.

In both, a loss of power is produced by the friction of the piston to an almost equal degree.

In the „Moskovka" some resistance, and consequently, some loss of power, is produced—1st, by the friction of the moving cylinder in the bases of the immoveable one; but this resistance is next to nothing, by the reason that the moving cylinder can be made of a very small diameter. 2nd, by the friction of the sliding plates, and the power necessary to conquer it; but the motion of the plates being comparatively slow, and the friction acting on no very broad

surface, the power to conquer it must necessarily be very inconsiderable. This disadvantage is by far over-balanced by the loss of power which, in the common alternate engine, arises from the clumsy and ponderous contrivances used for the sake of converting rectilinear motion into circular motion, and from the complication of the machinery.

Considering that the action of this variety of the „Moskovka“ is in every respect as smooth as the action of the common alternate engine, but superior to it in uniformity and equality, by reason of the continuous introduction and egress of steam, that the new engine is by far less ponderous, and requires considerably less space, and loses much less of the useful power of steam, the inventor is induced to hope, that, on a fair trial, the new engine will be found able not only to rival the common engine, but even completely to supersede its use.

The figs. 16, 17, refer to this arrangement.

Fig. 16.

B B B B The immoveable cylinder.
a a Sliding plates met.
a' a' The same open for the passage of the piston.
A Moving cylinder with piston and opening for steam, *b*.

Fig. 17.

A The moving cylinder.
B Part of the great cylinder.
a a Sliders with metallic elastic packings.

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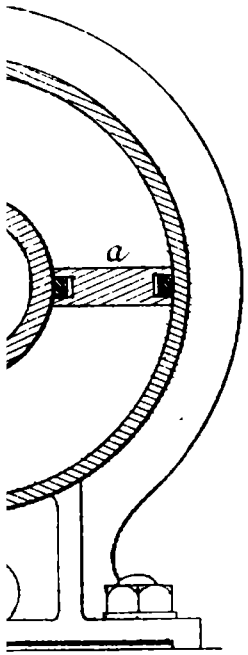
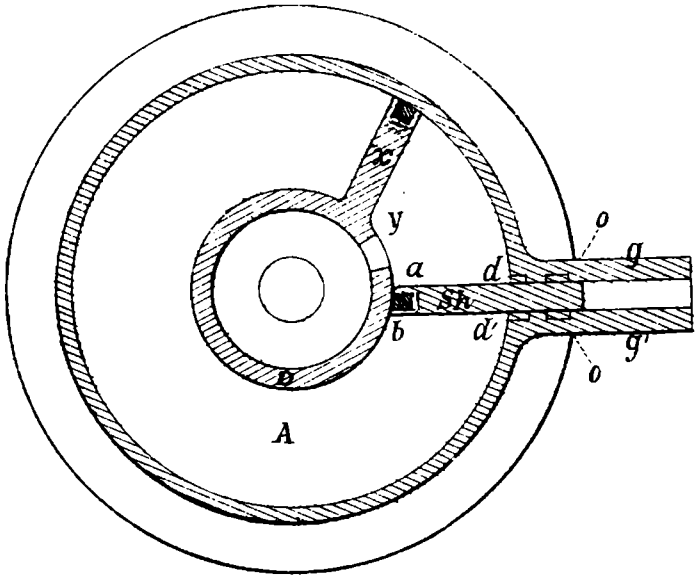


Fig:13.



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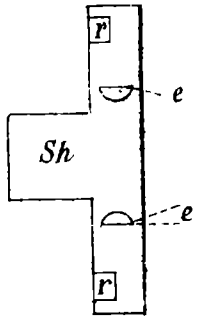

Fig:15

Fig. 13.