2 Sheets—Sheet 1.

W. B. TURNER.

Shutter.

No. 197,302. Patented Nov. 20, 1877.

Fig: 1.

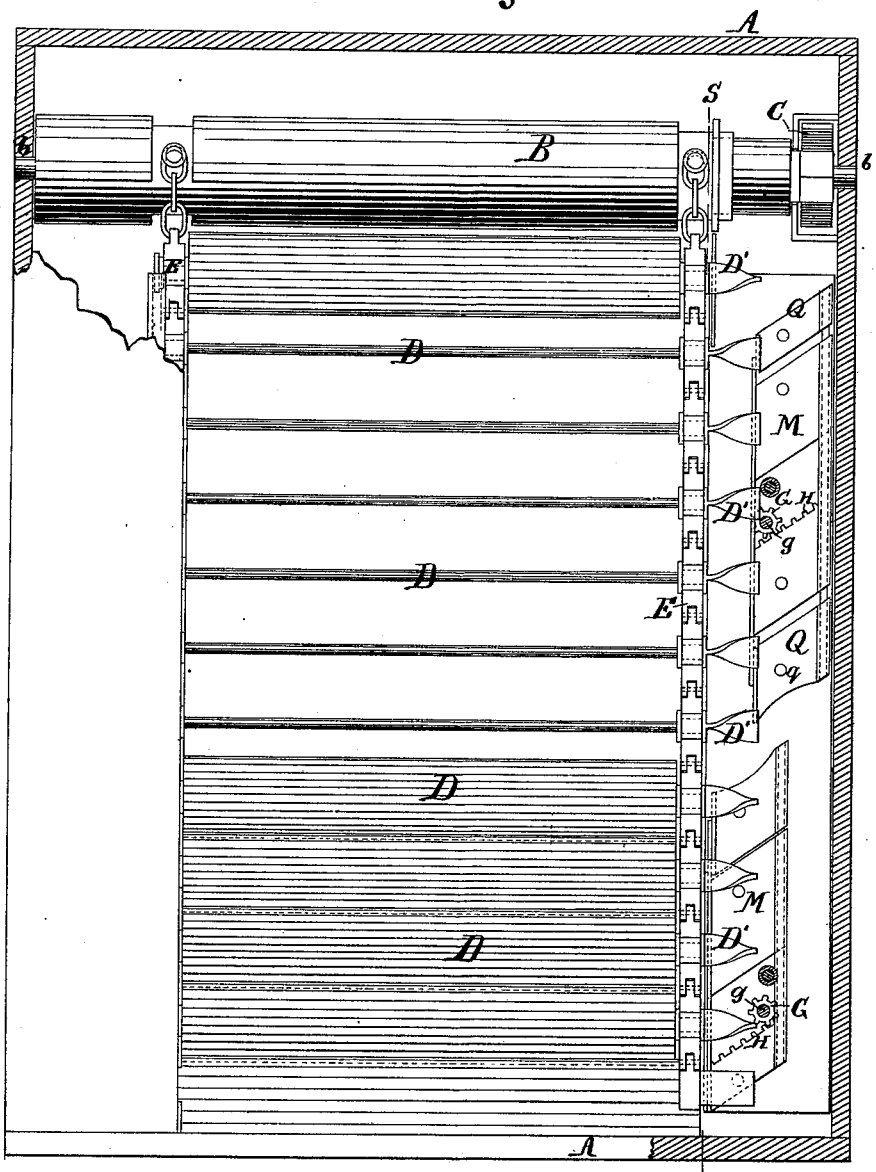
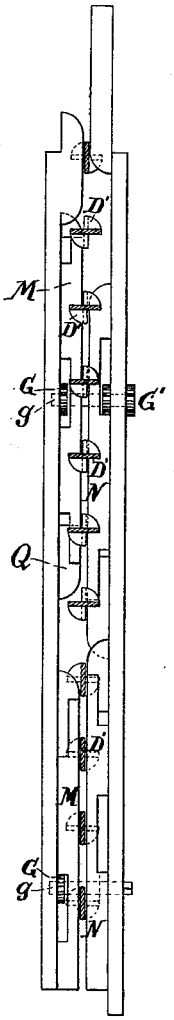


Fig: 2.



Witnesses:

A. W. Henry Gentner 2

Chas. C. Stetson

Inventor:

Wm. B. Turner,

by his attorneys

F. A. Stetson.

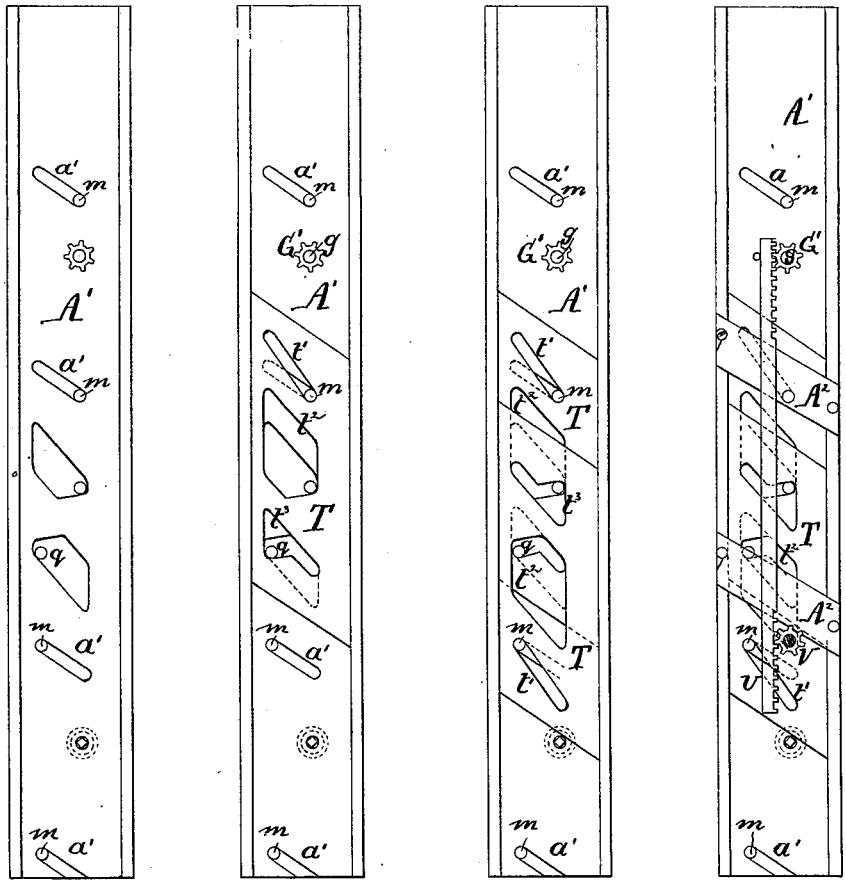
New York.

2 Sheets—Sheet 2.

W. B. TURNER.
Shutter.

No. 197,302. Patented Nov. 20, 1877.

Fig: 3. Fig: 4. Fig: 5 Fig: 6.



Witnesses:
A. H. Terry Jr. Gentner 2
Chas. C. Stetson

Fig: 7.

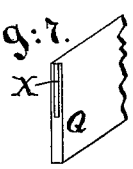
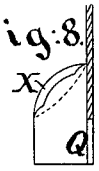


Fig: 8.



Inventor:
W. B. Turner,
by his attorneys
F. L. Stetson,
New York.

UNITED STATES PATENT OFFICE.

WILLIAM B. TURNER, OF NEW YORK, N. Y., ASSIGNOR TO WILLIAM MENZIES AND WILLIAM MENZIES, JR., OF SAME PLACE.

IMPROVEMENT IN SHUTTERS.

Specification forming part of Letters Patent No. **197,302**, dated November 20, 1877; application filed March 23, 1877.

To all whom it may concern:

Be it known that I, WILLIAM B. TURNER, of New York city, in the State of New York, have invented certain new and useful Improvements in Rolling-Slat Shutters; and I do hereby declare that the following is a full and exact description thereof.

The improvements pertain to shutters generally, and especially to that class of shutters which open by being wound upon a roller operated by any suitable power.

The invention is intended for use in dwellings, city store-fronts, warehouses, manufactories, and generally in all situations where it is desired not only to have an efficient and easily-operated protection against burglars and fires, but also to admit light and air through the whole or a portion by rolling the slats. When desired, the light and air may be admitted at the upper portion of the window or space covered by the shutter, while the lower part is tightly closed to prevent observation, or vice versa.

I provide against possible derangement or difficulty from any attempts to roll up the shutters while the slats are in a transverse position. The slats automatically assume the proper flat position prior to their coming in contact with the roller.

I extend each slat beyond the chain or connection which attaches it to the adjacent slats above and below, and cause the projecting end to traverse in a groove or space between suitable guides or ways. These ways are adjustable, and may be moved to or from the shutter within certain limits. The projecting end of each slat is twisted like a portion of a screw-auger, so that by moving the guides or ways outward and inward, so as to engage with the projecting end of the slat at different points, it will hold the body of the slat, which is, of course, plane or untwisted, in differing degrees of inclination.

By this means the several slats may be held closed together, so as to form a continuous shutter, without openings save the close joint where the slats lightly lap upon each other, or they may, by shifting the guides to the other extreme position, hold the bodies of the slats horizontally to allow the fullest opening for the entrance of light and air. To allow of opening one portion without another, I form the guides in short lengths, operated separately. Careful provision is made for properly bridging across from the ends of one pair of guides to the next adjacent ends.

Special provision is made that each slat in the shutter shall be certainly turned into the proper vertical position on arriving at the upper end of the opening and approaching the roller.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a face view of a window provided with my invention, some portions being removed. Fig. 2 is a section through some of the parts on the line S S in Fig. 1. It shows the spiral ends and the guides with their extension-pieces and some of the means for working them. Figs. 3, 4, 5, and 6 show the mechanism for operating the guides and their extension-pieces. These figures represent each one side of the interior of the casing in which the spiral extensions of the slats traverse. The guides and their extensions are not shown. Fig. 3 represents a little more than the fixed parts. Fig. 4 represents the same, with one of the operating plates in position. Fig. 5 represents the same, with both the operating plates for that side of the casing. Fig. 6 shows the same, with the small removable coverings which confine the operating plates, and also the racked bearings and gear-wheels which communicate motion in shifting the position of the upper sets of guides.

In the drawings, Fig. 1, the observer is supposed to stand on the inside of the building. Figs. 7 and 8 are detailed views on a larger scale. Fig. 7 is a side view of one end of one of the extension-pieces. Fig. 8 is a vertical section of the same.

Similar letters of reference indicate like parts in all the figures.

A is the stationary work of the building. B is the roller, turning in bearings *b*, and operated by any suitable means. (Not represented.) A spring, C, balances, or partially balances,

the weight of the shutter, which is formed of slats D D, connected flexibly together by chains E, and having twisted extensions D′ reaching beyond the bearings in the chains, and serving to control the position of the slats.

M M and N N are sections or lengths of the guides which receive the twisted ends D′, and are adapted to be moved to the right and left, at will, by means of spur-wheels G fixed on shafts *g*, and operated by hand-cranks or other eanms. (Not represented.) The teeth of the wheels G engage in inclined racks H attached, respectively, with reverse inclinations to the guides M N, and forming a part thereof.

In moving the guides outward or to the right, one guide is moved obliquely downward and the other obliquely upward.

Fig. 1 shows the shutter drawn down to cover the entire window, but with the upper portion opened to admit light and air by the slats having been turned into the horizontal position. To effect this the guides M N, which control the upper portion of the shutter, have been moved outward or to the right, by the turning of the gear-wheel G in the proper direction, while the guides M N, which control the position of the lowermost slats, are in the extreme left position.

To avoid confusion, I may premise that in referring to the motions of the guides I will use the term "out" to describe the motion away from the shutter, or to the right in Fig. 1, and the term "in" to mean the motion in the opposite direction toward the shutter. This is toward the left in Fig. 1.

I have shown the guides only divided into two sections; but in a tall window the guides may be divided into three or more sections similarly moved. Each section of the guides is controlled by inclined slots *a′* formed in plates A^1, attached to the adjacent casing A. These slots *a′* receive corresponding fixed projections or pins *m*, extending out from the bodies of the guides. The slots in the plate or plates A^1 in the back casing are inclined in the reverse direction to those in the front. They cause the two guides in each pair to move, the one upward and the other downward, whenever the pair of guides is shifted outward or inward to change the position of the slats.

One end attained by giving such upward and downward oblique motion to the guides simultaneously with their outward and inward movement is that it assists the rolling of the slat in the proper direction.

I desire to avoid needlessly extending the twisted portions. If the twist is made very short, like a screw-propeller of small pitch, it would seem that the friction must be great in turning the slat by simply moving the guides outward or inward; but when, in addition to the proper outward or inward motion of the guides, one guide moves upward on the side of the slat which is to be turned upward, and the opposite corresponding guide moves downward which bears on the side that is to be moved downward, it favors the turning of the slats.

When the guides are shifted again in the opposite direction, the motion again favors the rolling of the slats. The slats may be said to be turned partly by frictional contact of these guides.

Another important end attained by the oblique movement of the guides is the proper operating of the devices which bridge across the intervals between each section of guides and the next.

On the end of each guide is a slide, which I call an "extension-piece," and which is capable of sliding out, and increasing the length of the guide to a variable extent. These slides are operated by a third piece, which is moved by the motion of the main guides relatively to each other.

The connections are so operated that the ends of the extension-pieces abut against each other, or come sufficiently near to accomplish the purpose intended, and control the position of the slat perfectly as it moves up and down in raising and lowering the shutter.

A description of one extension-piece and its mode of working will serve for all. It will be understood that there is a similar extension-piece on each guide.

Referring to Fig. 1, Q is the movable extension-piece on the end of the guide M. It engages with the guide M by extending into a socket on the latter, and is rigidly held in line therewith, and in the same plane. It acts as a part of the guide M, being moved outward and inward therewith. It is only capable of one motion relatively to the guide to which it is socketed—that of simple extension and contraction. Its inner edge is adapted to serve as a guide, and the twisted extensions D′ of the several slats are guided by the extension Q, so far as the latter extends, in the same manner as by the main guide M.

But it is important, in order to accommodate all positions of the guides, and particularly to accommodate the widest range of diversity in their position—that is to say, when the guides N are the farthest out—that the extensions Q shall not be in their most extended position, so as to abut together. In other words, the extensions Q require to be peculiarly operated, as the guides to which they are attached are moved outward and inward, and the operation must depend on the position of the other guide with which the extension is to aid in making the connection. Thus, the extension Q, being attached to the guide M, must not only move outward and inward with the changes of position of the latter, but must also be moved automatically upward and downward, according to the position of the other pair of guides N.

This is effected by a connecting-plate, T, (see Figs. 3, 4, 5, and 6,) which lies alongside, and is peculiarly slotted and connected. It is guided by vertical lips or flanges on the casing A, or on plate A^1, attached thereto, and

is capable of no motion, except a direct movement upward and downward.

Each plate T has a slot, t^1, considerably more inclined than the slot a'. This slots t^1 receives an extension of the pin m from the other guide N, and, as the guide N and its connections are moved outward and inward, the traversing of the slot t^1 over the pin m causes the plate T and its connections to be elevated or depressed.

The plate T has a large opening, t^2, in the vicinity of its center, which performs no function, except to form an opening through which a pin plays idly to operate other parts.

The plate T has a third opening, t^3, near its lower end. The upper edge of this opening is inclined like the slot t^1, but to a less degree. Its lower edge is parallel to the upper edge for about half the distance. Above that the aperture is greatly widened on the lower side. This aperture t^3 receives the pin q, set in the extension Q.

So long as the sets M N of guides are in line with each other, the extensions Q on each abut against each other. When one set of guides M N and their attachments are moved inward, or the other set of guides M N and their attachments move outward, so as to bring these parts much out of line, the extensions Q from the lower set of guides M N are moved one downward and the other upward, and the corresponding extensions Q on the upper set of guides M N are moved one downward and the other upward. These movements are effected through the respective connections T, and through the working thereon of the several pins and slots.

The upper ends of the upper guides M are equipped with extensions corresponding to Q, operated by pins extending from them, working in slots in the casing A^1.

The motion induced in each instance causes the slats to be not only controlled in position during their passage from a pair of guides, M N, to another pair, M N, and during their passage from the latter up to the roller B, but also to be turned in position, if it is necessary that turning should be effected in changing from the control of one pair of guides to the control of the other pair, or from the upper pair of guides to the roller.

There are removable plates A^2, which serve merely as coverings to partially case in the operating plates T. These are shown in Fig. 6.

The roller B is preferably hexagonal, octagonal, or the like, to receive the first layer of the shutter as it is wound thereon. The rolling up and the unrolling may be effected by gearing, in the same general manner as has long been practiced with iron shutters.

To turn the several wheels G, and thus adjust or set the several sections or guides out and in, a crank may be separately applied upon the squared ends of the several shafts g; but, to save the necessity for climbing up to the higher sections, I prefer to employ a racked bar, U, gearing into a wheel, G′, on the upper shaft g, and operated by a shaft carrying a similarly-toothed wheel, V, which, being at a lower level, is more accessible.

The motion induced by the connections, combined as shown, is exactly that which is required to maintain the adjoining ends of the guides and their several extension-pieces in the right relations. In moving a shutter downward or upward a peculiar relation is involved in the act of passing from one section M N to another section M N of the guides.

The slats are never, on the one hand, left free or unguided, and on the other hand, the parts are never caused to bind so as to induce severe strains. When, for example, the upper set of guides M N are much farther out toward the ends of the spirals D′ than the lower set of guides M N, it will necessarily follow that each slat, in moving down and being changed from the control of the upper guides to the control of the lower guides, must suddenly turn nearly quarter of a revolution. This movement is effected by my mechanism. Just at the moment that the spiral D′ is released from the control of the upper guides M N, one corner commences to touch the highest extension Q of the lower guides M N, and a further motion of the slat downward turns it rapidly into the correct position.

To reduce the noise which would otherwise be made in operating my shutter, I cushion the ends of the extensions Q. This is most conveniently done by riveting or otherwise securely attaching pieces of leather, as indicated by X. (See Figs. 7 and 8.) Such cushioning may be extended along the edges of the guides, and generally to all the parts which strike or rub together; but I deem it especially important on the ends of the extensions Q, to prepare them to receive the blows from the spirals D′, when they are successively turned to a considerable angle as they pass the joint. Other material than leather, and other modes of fastening than riveting, may be employed.

The parts may be made by machinery with great perfection and dispatch. The shutters may be made of small size and nice workmanship, adapted for sleeping-cars and railroad purposes generally. They may be made of metal, wood, glass, or any other suitable material. The shutters may be employed to cover all openings of any kind or character, either in buildings, vehicles, or vessels, as I do not intend to confine its use.

Some of the details may be modified within wide limits. The plates may be of iron, case-hardened. Anti-friction wheels may be mounted on the several pins. Both ends, instead of one end of each slat, may be extended and twisted, as shown, and the duplication of the mechanism for operating may be of more than sufficient advantage to compensate for the increased expense, by reason not only of its dividing the strain and increasing the certainty of the action, but also of its allowing the shutter to be worked successfully a few days in case of accident to any of the parts on one

side. The wear is well distributed, and I believe that the mechanism will be very durable.

Although I have described the shutter as working vertically, it will be understood that the shutter may work on inclined windows, as in the roofs of buildings, or even to cover horizontal apertures. It is capable of working in any of the positions where such shutters are wanted.

The counterbalancing-spring, or its equivalent weight, is most important on heavy shutters working vertically. The force may be made greater or less, so as to more or less than balance the weight, as may be desired, in any case.

Shoes moved up and down with the slats may be used, if desired, to reduce the friction between the spirals D′ and the guides M N. In such case the shoes may move outward and inward on the spirals, which latter may be reduced in width, so as to be merely squared and twisted extensions of the bearings or shafts of the slats.

I can employ pinching-screws, or analogous clamping means, at as many points as may be desired, to hold the guides and their attachments very rigidly in any desired position after they have been satisfactorily adjusted. In such case the clamps must be relaxed before any change of the adjustment can be made.

I claim as my invention—

1. The twisted parts D′ of the slats D, in combination with guides bearing thereon, as herein specified.

2. The slats D and twisted parts D′, in combination with guides M M, having freedom to move outward and inward, and with mechanism G H for inducing such motion, so as to control the positions of the slats D D′, as herein specified.

3. The shafts *g* and gear-wheels G, in combination with the guides M N, and with racks H thereon, for readily adjusting the guides out- and inward, so as to change the inclination of the slats D D′ at will, as herein specified.

4. The slats D D′, turned by the moving of the guides M N, with the double motion described—that is, both outward or both inward, and at the same time the one upward and the other downward—so as to favor the turning motion, as herein specified.

5. The extension-pieces Q, connected with the guides M N, and moved outward and inward therewith, operated, as shown, to control the slats in shifting onto and off from the guides M N, as herein specified.

6. The sections M N of the guides, made separately adjustable to allow the slats at different levels in the same window to be set at different angles, as herein specified.

7. The movable plates T, connecting the sections of guides N with the extensions Q of the adjacent sections N, arranged and operating as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand this 20th day of March, 1877, in the presence of two subscribing witnesses.

WM. B. TURNER.

Witnesses:

THOMAS D. STETSON,

CHAS. C. STETSON.