H. WOODBURNE.
Revolving-Shutter.

No. 196,614 Patented Oct. 30, 1877.

FIG. 4.

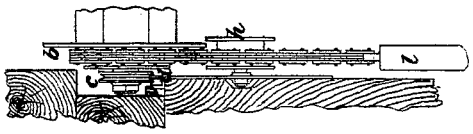


FIG. 3.

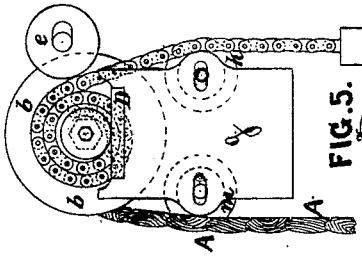


FIG. 5.

FIG. 2.

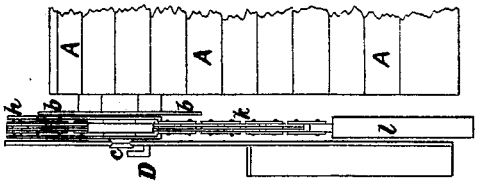


FIG. 1.

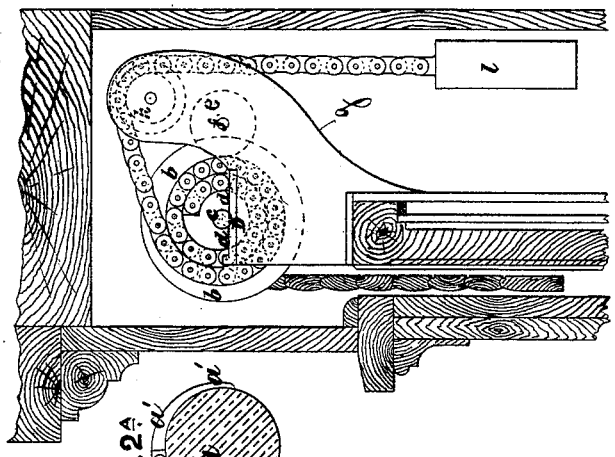
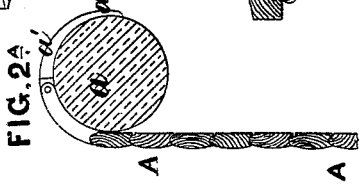


FIG. 2A.



Witnesses.

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UNITED STATES PATENT OFFICE.

HENRY WOODBURNE, OF ULVERSTON, ENGLAND.

IMPROVEMENT IN REVOLVING SHUTTERS.

Specification forming part of Letters Patent No. **196,614**, dated October 30, 1877; application filed September 4, 1877.

To all whom it may concern:

Be it known that I, HENRY WOODBURNE, of Ulverston, in the county of Lancaster, England, have invented certain new and useful Improvements in and connected with Revolving Shutters, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

The object of the first part of this invention is to cause revolving shutters to revolve with facility, to have them always at even balance, whether up or down, and always in a vertical position when down or partially so, while at the same time I am able to carry the band which communicates the rotary motion to the shaft back to such convenient position as it may be necessary, in order to provide room or space for the passage of cord, chain, or band and weight, it being very inconvenient, in many cases, to have the chains and bands close up to the shutters themselves. Attempts have been made to overcome this difficulty, but heretofore without success.

Figure 1 of the accompanying drawings is an end elevation, partly in section, of a revolving shutter fitted and constructed according to my invention, and illustrating one mode of carrying the same into effect. Fig. 2 is a front elevation of same, but showing a portion only of one side thereof. Fig. 2^{A} is a cross-section of the roller on which the shutter coils.

To one or both ends of the roller-shaft round which the shutters are coiled, I fit a groove-pulley, preferably, as hereinafter described, and a roller, which I find advantageous to make of V-section.

a is the roller. Two or more tapered lugs, *a'*, are fixed on the roller *a*, as shown at Fig. 2^{A}, and A is the shutter to be coiled thereon. *b* is one of the grooved end pulleys. *c* is one of the end rollers, preferably made of a V shape. These rollers *c* are upon bearings *d*, that may be within boxes D, and are of a corresponding section. Oil or other lubricating material may be applied at the bearings *d*, and these are made of such length as may be required, according to the distance the roller has to travel therein, which is regulated by the length and thickness of the shutter, as is well understood. At or near one end of the bearing *d* upon which the roller *c* revolves, I provide a friction-roller, *e*, mounted on a spindle, *f*, free to revolve on a stud or spindle that may be set in a slot in the side frames or brackets *g*, which are conveniently made in one with the boxes D, as shown. Adjacent to this roller *e* there is another roller, *h*, which is preferably grooved. Round the grooved pulley *b* on the shutter-roller a cord, chain, or band is wound—preferably a band, *k*, made of leather, or leather and metal, or of any other suitable material. The band or chain *k* is first brought to press against the flat friction-roller *e* and then to the grooved pulley *h*. *l* is the balance-weight suspended therefrom. The chain may be carried to any convenient distance; if the distance is considerable, of course passing over other guide-pulleys and down the boxing, with its balance-weight attached. While the band or chain *k* is winding on or unwinding from the grooved pulley the surface of that part which is unwound from its pulley *b* is kept up against the guide-roller *e*, and it is by this means that I am enabled to regulate the motion of pulleys, because the guide-roller *e* always presses against the band or chain; or, in other words, the band or chain *k* presses or rubs against the guide-pulley *e* as the shutters A are coiled up or uncoiled. In this way the roller *c* of the roller-shaft *a* travels along to and fro in the box D in the direction necessary to coil or to uncoil, and, the band being always up against its friction-roller *e*, as before described, the up-and-down motion of the shutter A becomes facilitated, and it always hangs vertically in the grooves or slides. A band or chain of equal thickness throughout may be used; but I prefer a band which tapers or diminishes in thickness, the degree of taper being regulated according to the thickness of roller or depth of shutter, and other circumstances, as practice may dictate. The band being made of leather or of a composition of metal and leather, shutters can be raised or lowered without any appreciable noise; and, therefore, shutters constructed according to my invention are particularly applicable to private houses, as well as for shops and other buildings where they are now generally used.

I prefer to use a taper chain of the follow-

ing construction: It is made of sheet-iron links, punched out to a curvature, as shown, the radius being such that each lap or coil of chain is struck from the center of the roller carrying the chain. The latter will thus always present an even and true edge-surface to the friction-pulley, and at the same time from the taper, as before described, each link being narrower than the next higher one, and each coil of chain is broader than the next following outer one.

Fig. 3 of the accompanying drawings is an end elevation of a shutter with a modified arrangement of my aforesaid friction and guide pulleys. Fig. 4 is a portion of a front elevation of same, showing one end of a shutter only. The front flange of the grooved pulley *b* is removed in Fig. 3 in order more clearly to show the part to be described. *b* is the grooved pulley, which is formed with a hexagonal (or it may be any other equivalently-shaped) stem, which is shown in dotted lines, and with its spindle *c* fits into a correspondingly-shaped socket in each end of the shutter-roller. To change the position of the grooved pulley I have only to remove same from socket, and change it to the angle required. By this adjustment of the grooved pulley the effective force of the weight may be increased or diminished, as required, for the easy working of the shutter, thereby preventing any jar or strain when the same arrives at the end of its course. The band or chain *k* in this case passes by a friction-pulley, *e*, and then over a guide-pulley, *h*, which latter is so placed that the chain passes down thereto in a slanting direction, the balance-weight *l* tending to draw the shutter-roller toward the same side against the friction-pulley *e*, whereby the roller *c* on the spindle is made to travel along the rail *d* of the box D in a manner similar to that described with reference to Figs. 1 and 2. The shutter A, in this case, also passes over a guide-pulley, *m*, to insure that the shutter shall hang perpendicularly therefrom.

Fig. 5 shows a modified arrangement of chain, the first link *x* of which is made considerably more tapered than the others, and also for a greater length, so as to form a spiral for the chain to roll upon.

I claim as my invention—

1. The combination, with the shutter and its roller, of a rolling-support for the axis of the roller that allows the roller to move laterally as revolved, and the shutter to hang vertically, substantially as set forth.

2. The roller and shutter on bearings that allow of a lateral movement, in combination with the counterpoise, a chain or belt to the same, and a pulley against which the chain or belt presses as the shutter is drawn up or down, substantially at set forth.

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