To all whom it may concern:

Be it known that I, FRANK O'NEILL, Jr.,
a citizen of the United States, residing at
226 Central Park West, New York city, in
the county of New York, State of New York,
have invented certain new and useful Impro-
vements in Reels for Motion-Picture Films; and I do hereby declare the follow-
ing to be a full, clear, and exact description
of the invention, such as will enable others
skilled in the art to which it appertains to
make and use the same.

This invention relates to reels for motion-
picture film strips and the like, and has for
its object the provision of an improved reel
structure which is exceptionally convenient
to use and is thus capable of effecting con-
siderable saving in time in the handling of
such film strips.

More particularly the invention relates to
the provision of a "split" reel, that is, a
reel having separable sides so as to permit
the film strip to be removed bodily from the
reel without the necessity of rewinding it.

Reels of this kind made in separable sec-
tions are employed as receiving reels in film-
feeding devices for motion picture project-
ing machines wherein the film strip is un-
wound from the center of the feed coil as it
is fed through the projecting machine.

Under modern conditions of motion pic-
ture exhibiting there is frequently very
little time between re-exhibitions of the
same film. During this time the operator
has to take the receiving reel apart, turn the
lower section on which the film remains up-
side down on top of the magazine film car-
rier, transfer the film thereto, and thread
the leading end of the film through the ma-
chine and on to the receiving reel which he
has replaced upon its driving support in the
lower box. These operations are relatively
few in number, but it will readily be seen
that it is of the greatest importance to pro-
vide a reel which is properly constructed to
facilitate to the highest degree the removal
of the film, and to which also the film may
readily be attached after re-threading
through the machine.

Another result which can be obtained by
properly constructing this reel and which is
greatly to be desired is the reduction of the
duration of "white screens" which are
caused by film breakage, and which, when
prolonged, become a serious annoyance to
the audience.

My invention aims to overcome these dif-
culties and secure the ends above mentioned.
and comprises providing a reel having separ-
able sections and means operable to posi-
tively separate the sections while maintain-
ing them substantially parallel with one an-
other, so as to disengage the film from one of
the sections. This means is also preferably
operable to force the reel sections together
and to clamp them in operating position.

In order to further facilitate the quick re-
moval of the film coil, my invention also con-
templates the provision of relatively narrow
and preferably slightly conical ribs on the
winding hub of the reel, these ribs being dis-
posed parallel with each other when the reel
is assembled and adapted to coact with a
relatively narrow surface of the film near its
edges from which they easily disengage
when the sections are separated so as to al-
low the film coil to be freely removed from the
reel.

In order to provide a means for quickly
attaching the end of the film to the winding
hub, to secure a rigid unitary reel struc-
ture, and to further assist in the rapid as-
sembly of the reel sections, I provide the
winding hub portion of each section with a
longitudinal open-ended slot, and construct
the winding hub portion of each section
with wedge-shaped interfitting projections
which preferably constitute segments of the
winding hub or drum, and which are adapt-
ed to coact with each other as the reel sec-
tions are brought together to cause the open-
ended slots to come into alignment with each
other so as to form a locking slot for re-
ceiving the end of the film strip. When the
reel sections are drawn together by the
means above mentioned, the interfitting of
the wedge-shaped members or tongues holds
the parts of the reel securely together and
makes of it a solid unitary reel structure.
By utilizing this same interfitting construc-
tion and permanently uniting the reel sec-
tions by means of a suitable flanged bearing
hub, a standard non-separable reel may also be made.

The invention further contemplates a particular form of attaching or locking slot into which the end of the film strip may be easily threaded, but which, at the same time, by means of relatively narrow portions provided at the ends of the slot, effectively engages the strip and secures it to the reel drum.

By referring to the accompanying drawings illustrating, by way of example, the preferred embodiments of my invention, a better understanding of these and other novel features of the invention will be had.

In these drawings—

Fig. 1 is a view in elevation of my improved reel;

Fig. 2 is a view in central longitudinal section of the reel illustrated in Fig. 1, but drawn to a larger scale;

Fig. 3 is a view in side elevation with the sections of the reel slightly separated from one another to show the action of the interfitting wedge-shaped projections in aligning the film attaching or locking slots;

Figs. 4 and 5 are views of the preferred means for positively separating and drawing together the reel sections;

Fig. 6 is a view of a portion of the winding drum or hub to show the preferred form of attaching or locking slot;

Fig. 7 is a view of my invention when applied to a standard or non-separable reel; and

Fig. 8 is an end view of the flanged driving hub used to permanently secure the reel sections of Fig. 7 together.

Referring to the accompanying drawings, my improved reel comprises sections 10 and 11, which, for convenience, I shall refer to respectively as the upper and lower sections. Each of these sections comprises a central portion 12 and a rim 13 which are joined to each other by the spokes 14, the rim and these spokes forming the side portions 15 and 16 of the reel sections. The winding drum or drum portion of section 10 comprises a series of wedge-shaped members 17, and that of section 11 is made up of an alternate series of similar wedge-shaped members 18, members 17 and 18 being adapted, when the reel sections are placed together, to interfit with each other, the section 17 entering recesses 19 between the projecting wedge members 18 and projections 18 entering recesses 20 which alternate with the wedge-shaped projections 17. Provided in the winding drum portion of section 10 there are a plurality of longitudinal open-ended slots 21 and in reel section 11 there are provided a similar number of corresponding open-ended longitudinal slots 22. These slots 21 and 22 being cut when the reel sections are clamped tightly together, they are always thereafter forced into alignment with one another when the reel sections are put together by means of the sloping co-acting surfaces of the wedge-shaped members 17 and 18.

The open-ended slots 21 and 22 together form the means of attaching or securing the end of the film strip to the drum of the reel and each of these slots is preferably constructed as shown in Fig. 6, in which the central portion 23 is relatively wide so as to facilitate the threading of the end of the film strip into it, and having narrow end portions 24, the widths of which are of the same order of magnitude as the thickness of the film strip. Hence, when the film is threaded into this locking slot and bent over against the surface of the winding drum, the edges of the film strip will be engaged by the relatively narrow portions 24 and bent sharply at right angles, thereby gripping the edges of the film sufficiently to ensure against its being pulled out as the film is wound on the reel.

Formed integrally with the hub portions of the reel sections 10 and 11, and located in the corners where these hub portions are joined on to the sides of the reel, are the circumferential ribs 25 and 26, the surfaces of which are preferably slightly conical as shown clearly in Fig. 2. These ribs thus positioned are adapted to coact with relatively narrow surfaces of the inner convolution of the film coil near the edges thereof and support the same out of contact with the surface of the winding drum. The function of these ribs will be described more fully further on.

The means for removably clamping the reel sections together and for positively separating them when it is desired to take the reel apart to bodily remove the coil of film will now be described. The central portion of each of the reel sections 10 and 11 is dished as shown at 27 and 28 respectively, the bottoms of these recesses being formed by the flat walls 29 and 30. A driving hub 31 (Fig. 5) is provided and has a standard size bearing opening 32 and an external flange 33 which is adapted to be secured to wall 30 by means of a suitable number of screws or rivets 34. The inner end 35 of this hub is provided with a relatively large pitch thread 36, and coacting with this thread is a mating member or nut 37 (Fig. 4) correspondingly threaded at 38 and provided with the thumb handles 39 for turning the nut, these handles being housed within the recess 27. This nut 37 is mounted to rotate in a suitable aperture in wall 29 and is held against removal therefrom by means of a collar 40 held in place by means of a set screw 41. The central portion 12 of each reel section is provided with a series of holes 42 which are properly spaced to convenient-
ly receive the fingers of the hands of the operator when he desires to put the reel sections together or take them apart.

The operation of removing the film coil from the reel is as follows. Let us assume that the reel has been removed from the receiving reel box of a motion picture projecting machine and it is desired to transfer the coil of film which has been wound upon it, to the magazine carrier plate so as to re-exhibit the film without rewinding it in order to bring the leading end of the film to the outside of the coil.

The reel is preferably placed in the horizontal position with the lower section 16 resting upon some convenient support, such as a table. The nut 37 is now rotated by means of the handles 39 and the coacting threads 38 and 36, which, because of their great pitch, more nearly resemble cam-like surfaces, cause the upper reel section 19 to be forced upwardly from the lower section 11. As the separating force of the coacting threads is applied at the center of the upper reel section, and because of the length of the bearing surface which is provided at 43 between the hub 31 and nut 37, the reel section 19 will be lifted with its side portion 15 in substantially parallel relation with the side portions 16 of the lower section 11.

The inner convolution of the film coil is resting upon the conical circumferential ribs 25 and 26, but as the reel section 10 is lifted in the manner just described from reel section 11, the conical rib 25 will disengage the relatively narrow surface of the film with which it has been in contact simultaneously at all points of its circumference, leaving the film coil upon the lower reel section 16. The length of the cam-like surfaces or threads 36 and 38 is sufficient to positively separate reel 10 from reel section 11 a distance somewhat greater than the longitudinal width of rib 25 so as to compel the disengagement of the film from this reel section. These threads are also preferably so proportioned that approximately three quarters of a turn of the nut 37 is sufficient to complete this movement of reel section 10. The reel section is now free to be lifted up from section 11 by grasping the opposite sides of the rim 13 with the hands. The lower section 11 holding the coiled film is now quickly turned upside down upon the magazine carrier plate of the projecting machine, the fingers of the hand being pressed against the exposed edges of the film coil to retain it in position against the reel section during this operation. The film coil is now resting upon the carrier plate and the reel section 16 may be lifted away from the coil. The previous removal of rib 25 from engagement with the opposite edge of the inner convolution of the film coil will loosen the coil and this loosening in combination with the coning of rib 26 makes it possible to lift section 16 away from the coil without pulling up along with it the inside turn of the film strip. The inner end of the film strip which was threaded through the attaching slot in the winding hub will slide edgewise out of the open end of the slot portion 21.

It now remains to reassemble the sections of the reel, place the reel in the receiving reel box, and thread the film onto it. To reassemble the reel sections, one may be grasped in each hand by inserting the fingers in the holes 42 and the two sections brought together by the eye in their approximate assembling positions. They will be rotated slightly with respect to one another so as to allow the wedge-shaped interfitting projections of the winding hub to engage one another and the slender inner end 35 of the hub will assist in further centering the two reel sections by entering the threaded opening of nut 37 which allows the threads 36 and 38 to rest one upon the other. Now by a three-quarter turn of nut 37 with the fingers the two sections 10 and 11 are forced together and clamped in operating position. During this drawing together of the reel sections the sloping surfaces of the wedge-shaped members 17 and 18 coact to bring the open-ended slot portions 21 and 22 into accurate alignment with one another to form the film locking slot. The hub 31 of the assembled reel is now slipped onto the operating shaft in the receiving reel portion of the projecting machine and the film strip threaded from the magazine coil which has previously been placed upon the carrier plate down through the feeding mechanism to the take-up reel portion. The end of the film is now slipped into the relatively wide portion 23 of the locking slot and as the film is further pushed into the slot, its outer edges pass into the relatively narrow portion 24 of the locking slot the widths of which are of the same order of magnitude as the thickness of the film strip itself. A slight turn of the take-up reel will now bend the film at right angles along the surface of the winding drum and the film is ready for re-exhibition.

Each of the above reel sections is preferably made by die casting, employing an aluminum alloy which is light in weight and yet sufficiently strong to withstand the rough usage which such a reel is bound to receive. The rim 13, the spokes 14, the central portion 12, the winding hub portions, including the wedge-shaped interfitting members and the conical circumferential rib, are hence formed integrally and result in an exceptionally strong and durable structure. All portions of the reel are reduced in dimensions wherever possible, in order to save weight, and cross sections designed to give maximum strength are em
ployed. Thus, the spokes 14 are formed with the rib structure 44. The reel sections may also be sand casted if desired.

When operating a motion picture machine, if the film strip should break because of a defect in it, or otherwise, which results in a "white screen", it is customary to open up the receiving reel box, pass the broken end of the film through it and onto the coil of film which has been wound onto the receiving reel. The operator then holds his finger against the broken end of the film while the reel is making a few revolutions until there is sufficient frictional engagement of the broken end with the film remaining on the reel to cause the film to resume feeding through the machine.

This method can be easily followed if there is not too much film on the receiving reel when the break takes place. On the standard reels now in use it is necessary from strength considerations to provide a relatively wide rim. In the case of a reel large enough to hold a two thousand foot film, such as are now in common use, many hundreds of feet of film may be wound upon the reel within the space occupied by one of these relatively wide rims. With the use of my improved reel, however, it is possible to greatly reduce the width of the rim 18 and to still further effectively reduce the width of this rim I have provided the openings 45 at the points where the spokes 14 join the rim 13. Through these openings the operator is given access to the surface of the film coil after it is hidden behind the rim of the reel and up to the point where the full capacity of the reel is taken up.

Referring now to Figs. 7 and 8 of the accompanying drawings which illustrate the application of some of the features of my invention to a standard solid or non-separable reel, there are here shown the reel sections 46 and 47 which are in all respects similar to the reel sections 10 and 11, including the interfitting wedge-shaped projections 17 and 18 on their winding hub or drum portions. These reel sections are, in this modification of the invention, held together by the bearing hub 48 which is provided with the flanges 49 and 50. These flanges are so spaced as to be disposed inside of the walls 51 and 52 when the reel sections are assembled together. The flanges 49 and 50 are each provided with a series of equally spaced tapped holes 53, and walls 51 and 52 are also provided with oppositely positioned drilled holes through which the screws 54 and 55 may pass to engage the threads in holes 53. The screws 54 and 55 serve to draw the reel sections 46 and 47 firmly together to bring the lateral wedge-shaped projections 17 and 18 into engagement with each other so as to hold the reel sections rigidly against any possible movement relative to one another.

By means of this invention I have provided a separable receiving reel for film strips which greatly facilitate the operation of motion picture projecting machines of the non-rewinding type by providing a reel structure which is adapted to be taken apart easily and from which the film may be bodily removed without causing annoyance and loss of time by the inner convolutions of the coil remaining engaged with the winding hub. The positive separation of the sections of the reel and the conical ribs which are easily disengaged from the coil effect this saving in time in the manipulation of the reel. The improved locking slot enables the leading end of the film to be quickly attached to the winding drum and the wedge-shaped members of the winding drum enable such a slot to be provided without interfering with the quick assembling of the reel sections. In the standard or non-separable reel these interfitting projections in combination with a positive means for drawing and holding the reel sections together produce an extremely rigid and rugged reel which is capable of withstanding hard usage. By reducing the width of the rim to a minimum and providing the openings opposite the spokes a broken film may be again placed in operation with a minimum loss of time even when such break occurs after the reel is well filled with film.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A reel for film strips or the like comprising separable sections and having means operable to positively separate said sections while maintaining them substantially parallel with one another so as to disengage the film from one of said sections.

2. A reel for film strips or the like comprising separable sections and having means operable to positively separate said sections while maintaining them substantially parallel with one another so as to disengage the film from one of said sections, said means being also operable to force the said reel sections together and to clamp them in operating position.

3. A reel for film strips or the like comprising two separable sections provided with cooperating members having cam-like surfaces by the actuation of which the said reel sections are drawn together, or forced apart a sufficient distance to disengage the film from one of said sections.

4. A reel for film strips or the like comprising two separable sections provided with cooperating members having cam-like surfaces by the actuation of which the said reel sections are drawn together, or forced apart a sufficient distance to disengage the
film from one of said sections, the sections being maintained substantially parallel with one another during said movement.

5. A reel for film strips or the like comprising a pair of separable sections, and mating threaded members associated with said sections by the actuation of which members said sections are clamped together, or positively separated a sufficient distance to disengage the film from one of said sections.

6. A reel for film strips or the like comprising separable sections each having a circumferential rib on its winding hub, said ribs being disposed parallel with each other when the sections are assembled, and adapted to coact with a relatively narrow surface of the film near the edges thereof to support the same when the reel sections are assembled, a longitudinal open-ended slot on each of said hub portions, each of said hub portions being provided with wedge-shaped projections adapted to interfit with those on the opposite hub portion, and means operable in one direction to force said reel sections apart to disengage the film from one of said ribs, said means being also operable in the opposite direction to force said sections together causing said wedge-shaped projections to coact to align said open-ended slots and form a locking slot for receiving the end of the film strip.

7. A reel for film strips or the like comprising, separable sections each having a circumferential rib on its winding hub, said ribs being disposed parallel with each other when the sections are assembled and adapted to coact with a relatively narrow surface of the film near the edges thereof to support the same, and means operable to positively separate said sections while maintaining them substantially parallel with one another so as to disengage the film from one of the said ribs.

8. A reel for film strips or the like comprising, separable sections each having a circumferential rib on its winding hub, said ribs being disposed parallel with each other when the sections are assembled and adapted to coact with a relatively narrow surface of the film near the edges thereof to support the same, and means operable to positively separate said sections while maintaining them substantially parallel with one another so as to disengage the film from one of the said ribs, said means being also operable to force the said reel sections together and to clamp them in operating position.

9. A reel for film strips or the like comprising separable sections each having a side portion and a winding hub portion, the winding hub portion of each section being provided with a longitudinal open-ended slot, and having wedge-shaped interfitting projections adapted to coact with each other as the reel sections are brought together to cause said open-ended slots to come into alignment with each other to form a locking slot for receiving the end of the film strip.

10. A reel for film strips or the like comprising, separable sections each having a side portion and a winding hub portion, and a circumferential rib on each of said hub portions, said ribs being adapted to coact with relatively narrow surfaces of the film near the edges thereof to support the same when the reel sections are assembled, a longitudinal open-ended slot on each of said hub portions, each of said hub portions being provided with wedge-shaped projections adapted to interfit with those on the opposite hub portion, and means operable in one direction to force said reel sections apart to disengage the film from one of said ribs, said means being also operable in the opposite direction to force said sections together causing said wedge-shaped projections to coact to align said open-ended slots and form a locking slot for receiving the end of the film strip.

11. In a reel for film strips or the like, means for attaching the end of the film to the winding drum thereof comprising, a longitudinal slot in the surface of said drum the central portion of which is relatively wide to facilitate the entrance of the end of the film strip therein, and having narrow end portions the widths of which are of the same order of magnitude as the thickness of the film strip so as to bend said strip near its edges sharply at right angles and removably secure it to said drum.

12. A reel for film strips or the like comprising two substantially similar sections each having a side portion and a winding hub portion said winding hub portions of said sections having interfitting wedge-shaped projections, and a bearing hub provided with means for holding said wedge-shaped projections in engagement with each other to prevent the relative rotation of the reel sections and form a rigid structure.

In testimony whereof I affix my signature.

FRANK O'NEILL, Jr.