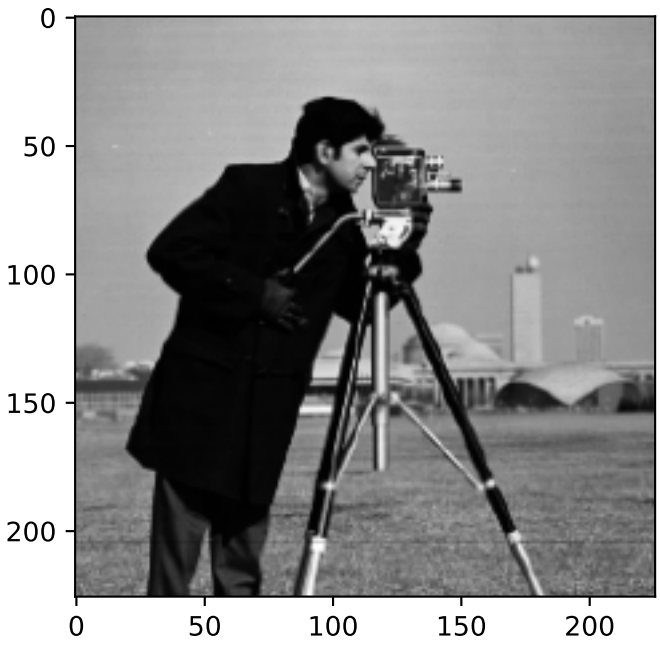
In [1]:
```
import matplotlib.pyplot as plt
import cv2
import numpy as np
import copy
```

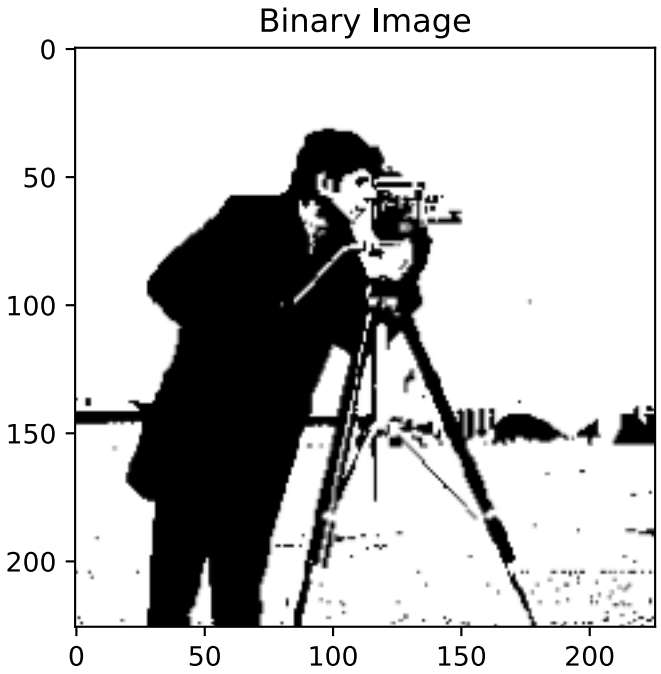
In [2]:
```
img = cv2.imread('camera.png',0)
# img=cv2.resize(img,(512,512))
# fig=plt.figure(figsize=(15,15))
# ax=fig.add_subplot(111)
plt.imshow(img,'gray')
print(img)
```

```
[[158 155 158 ... 154 153 151]
 [157 158 157 ... 155 155 154]
 [155 159 159 ... 150 152 153]
 ...
 [110  92 110 ...  79  99 102]
 [124 117  87 ... 115 104 132]
 [123  99  89 ... 139 151 135]]
```



In [3]:
```
# blur = cv2.GaussianBlur(img,(5,5),0)
(thresh, blackAndWhiteImage) = cv2.threshold(img,0,255,cv2.THRESH_BINARY+cv2.THRESH_OTSU)
plt.title('Binary Image')
plt.imshow(blackAndWhiteImage,'gray')
```

Out[3]: <matplotlib.image.AxesImage at 0x12acc0a0>



In [4]:
```
# struc_ele1=np.array([[999,255,999],[0,255,255],[0,0,999]])
# struc_ele2=np.array([[999,255,999],[255,255,0],[999,0,0]])
# struc_ele3=np.array([[999,0,0],[255,255,0],[999,255,999]])
# struc_ele4=np.array([[0,0,999],[0,255,255],[999,255,999]])
# ele=[struc_ele1,struc_ele2,struc_ele3,struc_ele4]


struc_ele1=np.array([[255,255,255],[999,0,999],[0,0,0]])
struc_ele2=np.array([[999,255,255],[0,0,255],[0,0,999]])
struc_ele3=np.array([[0,0,0],[999,0,999],[255,255,255]])
struc_ele4=np.array([[0,0,999],[0,0,255],[999,255,255]])
struc_ele5=np.array([[0,0,0],[999,0,999],[255,255,255]])
struc_ele6=np.array([[999,0,0],[255,0,0],[255,255,999]])
struc_ele7=np.array([[255,999,0],[255,0,0],[255,999,0]])
struc_ele8=np.array([[255,255,999],[255,0,0],[999,0,0]])
ele=[struc_ele1,struc_ele2,struc_ele3,struc_ele4,struc_ele5,struc_ele6,struc_ele7,struc_ele8]
```

In [5]:
```
result=[]

padded_arr =np.zeros((img.shape[0]+2,img.shape[1]+2))
for i in range (img.shape[0]):
    for j in range(img.shape[1]):
        padded_arr[i+1][j+1] = blackAndWhiteImage[i][j]

img1=np.zeros(img.shape,'uint8')
for e in range(len(ele)):
    # result.append(hitormiss(blackAndWhiteImage,ele[i]))
    for i in range(img.shape[0]):
        for j in range(img.shape[1]):
            index1=0
            c=True
            for k in range(i,i+3):
                index2=0
                for l in range(j,j+3):
                    if(padded_arr[k][l]!=ele[e][index1][index2] and ele[e][ind
ex1][index2] != 999):
                        c=False
                    index2+=1
                index1+=1
            if(c):
                img1[i][j]=255
            else:
                img1[i][j]=0

        temp=copy.deepcopy(img1)
        result.append(temp)
```

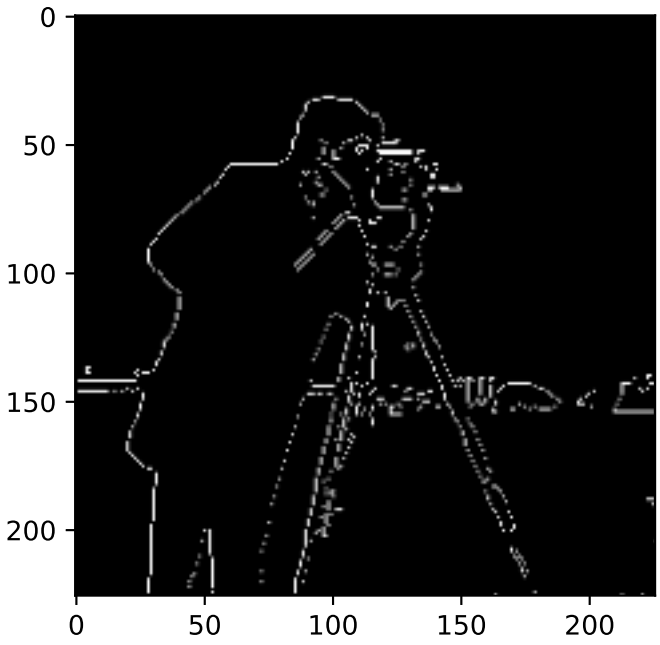
In [6]:
```
new_img=np.zeros(img.shape,'uint8')

for i in range(img.shape[0]):
    for j in range(img.shape[1]):
        temp=0
        for k in range(len(result)):
            temp= temp or result[k][i][j]

        new_img[i][j]=temp
```

In [7]:
```
plt.imshow(new_img,'gray')
```

Out[7]:
```
<matplotlib.image.AxesImage at 0x9f5868>
```



In [8]:
```
# thinning = np.zeros(img.shape,'uint16')

# for i in range(img.shape[0]):
#     for j in range(img.shape[1]):
#         thinning[i][j]=blackAndWhiteImage[i][j]-new_img[i][j]

# plt.imshow(thinning,'gray')
```

In [ ]:
```

```